



**The Recycling
Partnership**
Solving for Circularity

State of Recycling

The Present and Future of
Residential Recycling in the U.S. | 2024

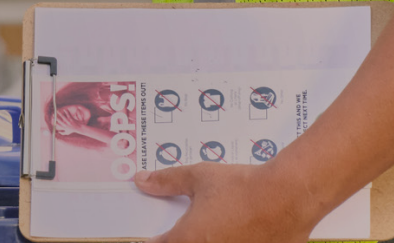


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Why We Wrote this Report

There are massive environmental and economic benefits that come from recycling. However, the gaps in our U.S. residential¹ recycling system prevent us from achieving all of those benefits. In this report, we examine the current state of residential recycling and identify the gaps that need to be filled.

We look at five key requirements of an effective recycling system and contrast the current state with our vision for a thriving one. The five requirements of an effective recycling system in the U.S. are:

-  **Packaging Recyclability**
-  **Recycling Access**
-  **Recycling Engagement**
-  **Processing and Sortation**
-  **End Markets**

Part 1 of the report provides new data, analysis, and perspectives on where we are today, where the weak spots are, and where investment and action will have the biggest impact. Part 2 explores three strategies to fill the gaps between current levels and those required in an optimal system.

We're providing an actionable roadmap for policymakers, private industry, community recycling programs, and everyone who believes in recycling as a strategy to reduce waste, lower greenhouse gas emissions, and provide raw materials for new products.

¹ We focus on residential recycling because, with the exception of cardboard, most recyclable packaging is generated by households, making the improvement of residential recycling essential for meeting sustainability and recycled content goals.

What You Need To Know

5 Key Takeaways



21% of residential recyclables

are being recycled – every material type is under-recycled.



76% of residential recyclables

are lost at the household level, underscoring the importance of access and engagement.



Only 43% of households

participate – non-participation is due to both lack of access and insufficient communication and outreach.



EPR policies

drive improvement to all 5 requirements of an effective recycling system, including recycling engagement – the area most in need of investment.



Private industry

must invest beyond EPR to: design packaging for recyclability, improve collection, and harvest the opportunities in regions of greatest material loss.

There's No Silver Bullet

We need to address all five requirements of an effective residential recycling system:

- **All packaging² should be recyclable³.** While data on packaging recyclability is limited, available information indicates that less than half of plastic packaging is recyclable⁴.
- **All U.S. households need access to recycling.** Today, 73% do, and among multifamily households, only 37% have recycling access.
- **Households need to engage in recycling.** Currently, just 43% of households participate in recycling, of those that have access 59% use their recycling service, and of those that do only 57% of recyclable material is put in recycling containers, meaning many households do not participate to the fullest extent possible. In an effective system at least 90% of households would participate. This underscores the need for investment in communication, outreach and support.
- **Recycling facilities should be able to process 95% of the recyclable material they receive into saleable commodities.** Today, we estimate that 87% of material is sorted and sent to market.
- **End markets for recyclable material should be sufficient so that recycling facilities can sell their commodities.** Today, most local governments absorb the cost of processing recyclables because demand is insufficient.

² We focus on packaging and printed paper because this is the material that should be captured in curbside recycling. In addition, packaging comprises a major portion of the municipal solid waste stream ([EPA Facts and Figures report](#)) and it becomes waste within less than a year.

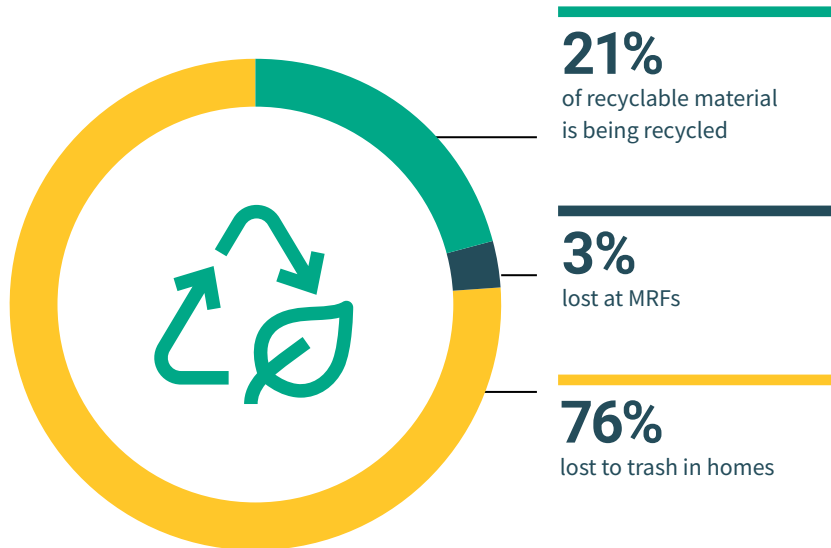
³ Reduction and reuse strategies should be prioritized, consistent with [EPA's waste management hierarchy](#). It is only after reduction and reuse are not options that recycling becomes a strategy.

⁴ Based on information sources noted on [page 9](#).



Focus on Areas of Biggest Impact

Based on a new methodology that tracks the fate of materials in the system, including material from single-family *and* multifamily homes, and *includes* film and flexible material⁵, **21% of recyclable material is being recycled**.⁶ Out of the 79% of lost material, 76% is lost at the household level and not collected, underscoring the importance of recycling access and household engagement. Note 21% is a lower benchmark than used in previous reports due to our new methodology, but this study pinpoints where funding and action can drive the most progress.



⁵ On [page 22](#) we explain why we include these items.

⁶ Throughout this report, the residential generation rates and participation capture rates are based on numerous, ongoing multi-year field measurement studies conducted across the U.S in addition to our [National Database](#). These studies show that 47 million tons of residential recyclable material are estimated to be generated annually.

⁷ The vast majority of people believe recycling makes a difference (77%), and has a positive impact (77%), our [Recycling Confidence Index Research Report](#).

Close the Gaps

The strategies described in Part 2 will improve the entire recycling system:

- **Extended Producer Responsibility (EPR) Policies are one of the best ways to close current gaps** by using packaging fees that channel industry funding to improve access, engagement, and processing, while incentivizing packaging recyclability and supporting end markets. The four states that have adopted EPR policies so far are projected to recycle a combined additional 2.4 million tons of material annually that would otherwise be waste.
- Beyond EPR, **private industry has much to gain by investing in recycling**, especially in locations with large amounts of lost recyclable materials that are a valuable source of supply. Adhering to public commitments, meeting consumer expectations, and fulfilling legal requirements are powerful incentives to invest in building and enhancing infrastructure for collection capacity as well as end-use processing and manufacturing capabilities.
- Despite strong national support for recycling⁷, only 43% of all households currently participate, partly because some lack access and partly because of inadequate communication and outreach. Therefore, **the greatest gains will come from investment and action to increase household engagement in recycling.**



Part 1

Where We Are Today

Five Requirements of an Effective Recycling System

For the U.S. residential recycling system to function effectively, five requirements must be met:



1

100% of packaging needs to be recyclable.

The packaging that enters the system must be recyclable; and we need clear, harmonized, and transparent standards as to what makes a package recyclable.

2

100% of households need access to recycling from their home.

Everyone can dispose of trash, but not every household has access to recycling. For those with access, some locations do not collect all packaging types thus limiting the amount of recyclable material collected.

3

Residents need to fully engage in recycling.

Recyclable material is lost because some households with access do not receive sufficient communication to help them use their recycling service and recycle all their recyclables. In an effective system at least 90% of households should participate.

4

Recycling facilities need to effectively process 95% of the material.

Once collected from households, recycling facilities need adequate technology and infrastructure to sort and process different material types.

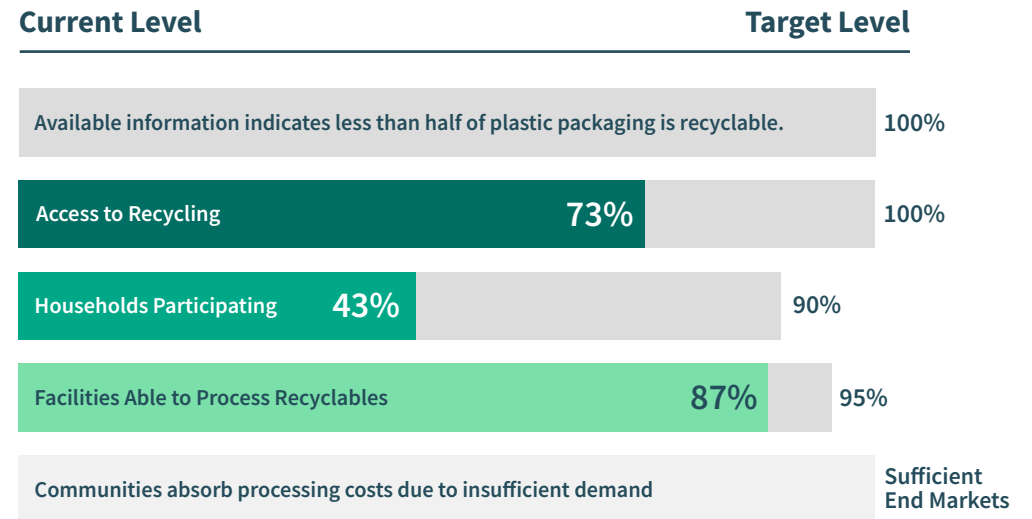
5

Recycling facilities need sufficient end markets.

After recycling facilities sort the various material types, they must be able to sell these recycled commodities. Sufficient end markets for these materials are key to an efficient recycling system.

Requirements of an Effective Recycling System

These five links in the circle are the essential requirements of an effective recycling system. Below we describe the gaps in our current system:



Key Takeaways

Each link of this chain is interconnected. We cannot improve recycling without addressing all the gaps.

Recycling Engagement Needs Support. Nationwide, recycling engagement is the area most in need of support and investment.

Packaging Recyclability



In an optimal system, the packaging we bring home would be reused or recycled. We are far from that system today. One reason for this is that not all packaging is designed for recyclability.

How do we know if packaging is recyclable?

Recycling is a multi-step process without uniformly accepted standards; therefore, we developed the [Circular Packaging Assessment Tool](#) with extensive input from leaders representing different sectors of the recycling process. The tool examines five areas that are critical for packaging to be considered recyclable.

An important source of guidance for designing with recyclability in mind is the design guides published by industry organizations for major material types.⁸ These design guides are a living set of reference points that reflect changes in the recycling system. They exist to recognize that design is a critical part of the recycling system and that there is still much work to be done on this issue.

⁸ Many key industry associations provide guidance including the Aluminum Association's Container Design Guide, American Forest & Paper Association (AF&PA) Design Guidance for Recyclability, The Association of Plastic Recyclers (APR) Design® Guide, Carton Council of North America's Food and Beverage Cartons Design Guidance for Recyclability, and Can Manufacturers Institute (CMI) Steel Container Design Guide for Recyclability.

⁹ Note that GreenBlue's data is focused on packaging items and not overall weight, nor does it cover the entire spectrum of generated packaging.

How much packaging is recyclable?

While there are no published metrics demonstrating adherence to design guides or how much of all packaging is designed to be recycled, there are some sources that provide insight.

→ The [U.S. Plastics Pact's](#) 2021 Annual Report, released in February 2023, shows that for Pact members, 36% of plastic packaging on the market is reusable, recyclable, or compostable. Pact members have committed to making 100% of their plastic packaging reusable, recyclable, or compostable by 2025, underscoring the need for rapid progress.

→ GreenBlue's How2Recycle [Recyclability Insights Report](#) found that 44% of the packaging that How2Recycle member companies have submitted for the program's label is recyclable. The remaining 56% of packaging was either partially recyclable or not yet recyclable.⁹ Upcoming data from How2Recycle is expected to show an increase in the percentage of recyclable packaging, but that still less than half of the packaging submitted for assessment by How2Recycle member companies is recyclable. The [Recyclability Insights Report](#) also found that just over half (56%) of companies have goals to make their packaging more recyclable, compostable, or reusable. In an efficient system, 100% of companies would have goals.

Key Takeaway

While data on packaging recyclability is limited, the available information indicates that **less than half of plastic packaging is recyclable**, but companies can improve this by using the resources available to design packaging with recyclability as a goal.

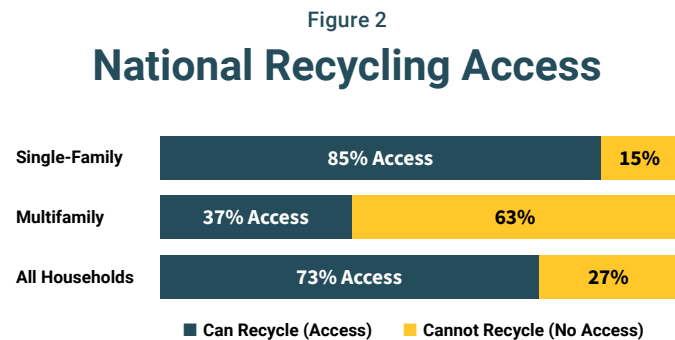


Recycling Access



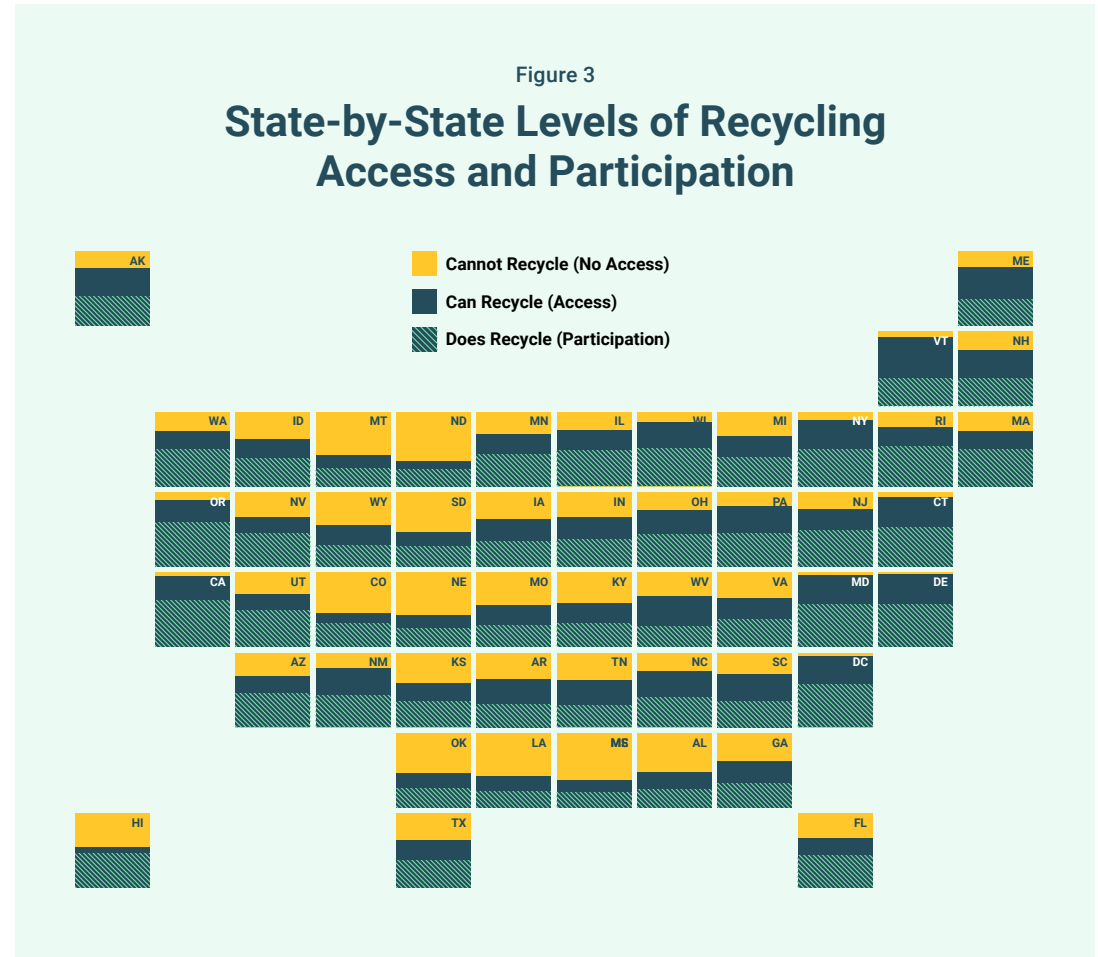
Access to recycling means having the ability to easily recycle all your recyclable items both because you have an active and convenient recycling service and your local program accepts all recyclable materials. We define “access” as a household having physical access to a recycling container. We include drop-off recycling programs as a form of access for single-family households that do not have curbside recycling service but have a drop-off recycling program available to them. For multifamily households, access is defined as having a recycling container on-property. We also exclude households that can subscribe or opt-in to a recycling service but have not done so.

Figure 2 below shows national recycling access levels for all households, including single-family and multifamily.



The map in **Figure 3** shows state-by-state levels of recycling access¹⁰ and participation.¹¹

The chart in **Figure 4** on the following pages provides a detailed breakdown of state-by-state recycling access showing single-family, multifamily, and type of recycling service.



¹⁰ Access data comes from The Partnership’s [National Database](#). Access data does not include access to a deposit return system.

¹¹ Solid and consistent data on recycling behavior is rare in the U.S. recycling system. For the purposes of this study, we used a combination of datasets and assumptions to conduct calculations. Curbside recycling participation data was derived from a community survey conducted for the 2020 State of Curbside report, supplemented by data from The Recycling Partnership’s curbside cart grantees. Participation data for drop-off systems and on-property multifamily recycling were unavailable and presumed rates of 30% and 50% were used, respectively. Finally, in the absence of specific and more recent data, we used an assumed subscription uptake rate of 30% based on our engagement with subscription communities and data from previously published studies.

Figure 4

State-by-State Access

(Single-family, Multifamily, and Type of Recycling Service)

	Number of Single-family Households	Number of Multifamily Households	Single-family - Can Recycle (Access)			Multifamily	All Households	
			Total	Curbside	Drop-off	Can Recycle (Access)	Can Recycle (Access)	Cannot Recycle (No Access)
Alabama	1,428,595	459,773	61%	31%	30%	10%	48%	52%
Alaska	210,501	47,484	90%	44%	46%	18%	77%	23%
Arizona	1,969,978	673,354	88%	75%	12%	11%	68%	32%
Arkansas	920,325	250,086	79%	34%	44%	14%	65%	35%
California	9,435,863	3,666,618	97%	94%	3%	89%	95%	5%
Colorado	1,587,838	549,388	57%	44%	13%	12%	45%	55%
Connecticut	1,120,161	265,144	93%	69%	24%	82%	91%	9%
Delaware	286,653	84,285	99%	99%	0%	89%	97%	3%
District of Columbia	132,471	155,835	100%	100%	0%	90%	95%	5%
Florida	5,303,296	2,627,676	90%	85%	5%	16%	66%	34%
Georgia	2,870,892	959,056	76%	38%	38%	19%	62%	38%
Hawaii	319,884	148,043	82%	82%	0%	25%	64%	36%
Idaho	537,006	112,216	76%	56%	20%	10%	64%	36%
Illinois	3,698,161	1,185,519	85%	75%	10%	41%	74%	26%
Indiana	2,109,149	493,389	79%	45%	34%	11%	66%	34%
Iowa	1,031,386	242,373	75%	44%	31%	19%	64%	36%
Kansas	940,675	201,147	69%	44%	24%	17%	59%	41%
Kentucky	1,350,441	397,394	74%	42%	32%	8%	59%	41%
Louisiana	1,343,158	408,699	54%	22%	32%	6%	43%	57%
Maine	462,246	107,197	94%	34%	60%	8%	78%	22%
Maryland	1,667,247	563,198	98%	87%	11%	88%	96%	4%
Massachusetts	2,036,146	610,593	93%	76%	17%	46%	82%	18%
Michigan	3,210,628	769,355	82%	53%	28%	11%	68%	32%
Minnesota	1,698,474	509,287	81%	61%	20%	33%	70%	30%
Mississippi	854,876	261,644	47%	25%	22%	6%	37%	63%
Missouri	1,982,224	457,762	68%	34%	33%	6%	56%	44%

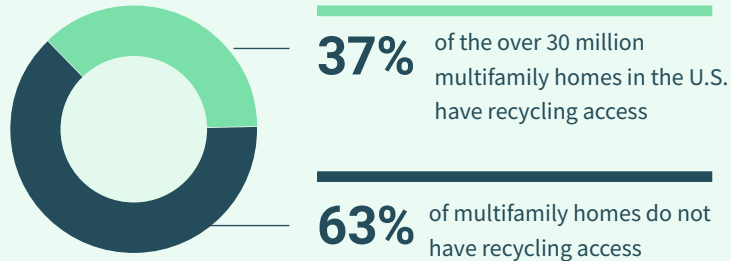
Figure 4 (continued)

State-by-State Access (Single-family, Multifamily, and Type of Recycling Service)

	Number of Single-family Households	Number of Multifamily Households	Single-family - Can Recycle (Access)			Multifamily	All Households	
			Total	Curbside	Drop-off	Can Recycle (Access)	Can Recycle (Access)	Cannot Recycle (No Access)
Montana	346,876	89,098	51%	25%	27%	6%	42%	58%
Nebraska	605,568	160,960	52%	37%	15%	11%	43%	57%
Nevada	820,194	309,771	80%	74%	6%	27%	66%	34%
New Hampshire	415,928	123,109	95%	48%	47%	6%	75%	25%
New Jersey	2,547,499	724,175	94%	92%	1%	20%	77%	23%
New Mexico	595,142	197,534	95%	56%	39%	32%	79%	21%
New York	4,708,498	2,708,254	91%	77%	13%	87%	89%	11%
North Carolina	2,986,954	1,044,371	95%	56%	39%	15%	75%	25%
North Dakota	207,666	113,141	49%	39%	9%	6%	34%	66%
Ohio	3,814,578	902,303	92%	62%	30%	8%	76%	24%
Oklahoma	1,191,617	301,826	57%	29%	27%	11%	47%	53%
Oregon	1,222,867	419,584	90%	87%	3%	86%	89%	11%
Pennsylvania	4,265,065	840,960	95%	71%	24%	15%	82%	18%
Rhode Island	339,287	75,405	97%	86%	11%	6%	80%	20%
South Carolina	1,422,674	538,656	97%	42%	55%	6%	72%	28%
South Dakota	258,856	88,941	52%	35%	17%	29%	46%	54%
Tennessee	2,030,621	608,631	80%	30%	49%	6%	63%	37%
Texas	7,126,834	2,778,713	81%	56%	26%	20%	64%	36%
Utah	815,697	187,546	81%	77%	4%	20%	70%	30%
Vermont	212,511	50,291	93%	18%	75%	88%	92%	8%
Virginia	2,451,830	734,663	80%	45%	34%	16%	65%	35%
Washington	2,081,215	824,401	91%	84%	7%	33%	74%	26%
West Virginia	579,237	154,914	84%	25%	59%	6%	68%	32%
Wisconsin	1,869,571	508,107	88%	68%	20%	72%	85%	15%
Wyoming	184,050	49,139	70%	35%	35%	6%	56%	44%
National	91,609,109	30,741,008	85%	63%	21%	37%	73%	27%

Figure 5

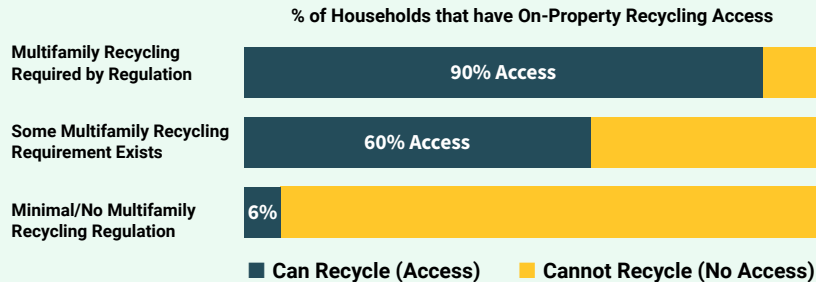
Multifamily Recycling



When it comes to recycling access, multifamily communities are among the most underserved in the U.S. **Our data shown in Figure 5 above indicates that only 37% of multifamily homes have recycling access.** The result is that nearly 20 million households (63% of all multifamily homes) are effectively excluded from recycling. Members of the BIPOC (Black, Indigenous, and People of Color) community are approximately twice as likely to live in multifamily housing than non-BIPOC community members. One reason that multifamily properties are frequently left out of the residential recycling equation is that they are often considered “commercial” properties and therefore overlooked by public recycling programs. **What’s the key to increasing multifamily recycling access? Local regulation.** Our research shows that where local authorities require multifamily recycling, 90% of homes have on-property access. That number drops to 6% in locations where there is little to no such regulation (Figure 6 below).

Figure 6

Multifamily On-Property Recycling Access



Recycling Works When it is Resourced



Omaha, Nebraska, the 7th most populous city in the Midwest, shows the impact of recycling carts as a form of access. In 2021, The Partnership provided an \$825,000 grant to Omaha to replace the city’s bins with over 135,000 new recycling carts, increasing the residential capacity to recycle by over five times. As a result, the city saw an increase in recycling tonnage by 68%, far surpassing what it had anticipated.



Orlando, Florida shows what can be done when local policy and education come together. A 2019 ordinance required recycling across the city’s 75,000 multifamily residential units. The Partnership worked with the city through two grants. The first in 2019 to support the rollout of the ordinance and the second in 2021 to extend the program for low to moderate income housing. Through both projects, the program added recycling access for nearly 50,000 homes, which now diverts 1,200 new tons of recyclables annually.



Alleghany County, North Carolina - Recycling in small and rural communities presents unique challenges related to staffing, finances, educational outreach, geographical issues, and program maintenance. In 2020, nearly 7,200 households lost access to recycling when Alleghany County had to close its drop-off recycling facility due to low collection tonnages. Through a grant from The Partnership, the facility was reopened and residents regained access to recycling. The result was the capture of over 50 tons of new recyclable material per year that had previously been lost to landfill and households had the chance to participate in recycling again.

Do recycling programs accept the full range of recyclable materials?

Even if households have recycling access, not every material that is recyclable is accepted for collection in every community. With over 9,000 community recycling programs throughout the U.S., **each program has different standards for what materials can be collected.** Communities make judgment calls on what is collected based on feedback from their haulers or recycling facilities, their own perceptions as to what is recyclable, and community goals for recycling. EPR policies (see Part 2) can provide consistency by establishing a statewide list of accepted materials.

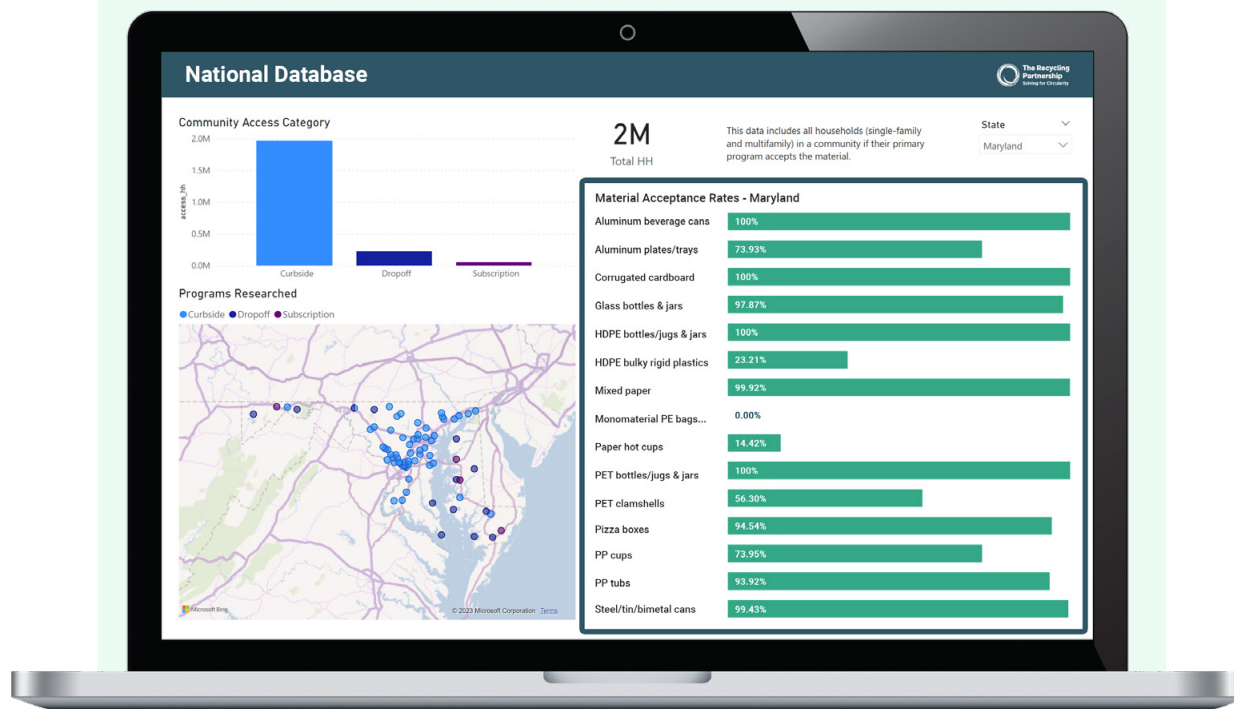
Figure 7 to the right shows an example of community standards for what materials are accepted for recycling from The Partnership's National Database.

Limitations on materials accepted for recycling increase consumer confusion and reduce the amount of recyclable material that could actually be collected.

Our **Recycling Program Solutions Hub** helps address differences in material acceptance as communities use the interactive resource to help local recycling staff connect, optimize, and propel their recycling programs forward.

Figure 8 on the next page shows the different rates of material acceptance on a state-by-state basis, both with and without film and flexible material.

Figure 7
Example of State Material Acceptance Rates from The Partnership's National Database



Limitations on materials accepted for recycling increase consumer confusion and reduce the amount of recyclable material that could actually be collected.

Figure 8

State-by-State Material Acceptance* With and Without Film and Flexible Material**

	Material Acceptance with Film	Material Acceptance without Film
Alabama	59%	64%
Alaska	58%	63%
Arizona	74%	82%
Arkansas	57%	63%
California	82%	90%
Colorado	75%	83%
Connecticut	82%	91%
Delaware	85%	95%
District of Columbia	88%	98%
Florida	72%	80%
Georgia	66%	73%
Hawaii	46%	51%
Idaho	65%	69%
Illinois	79%	88%
Indiana	76%	84%
Iowa	72%	80%
Kansas	75%	83%
Kentucky	60%	67%
Louisiana	58%	64%
Maine	69%	77%
Maryland	61%	68%
Massachusetts	81%	90%
Michigan	77%	85%
Minnesota	79%	88%
Mississippi	55%	60%
Missouri	68%	75%
Montana	61%	66%
Nebraska	60%	67%

	Material Acceptance with Film	Material Acceptance without Film
Nevada	79%	88%
New Hampshire	79%	88%
New Jersey	76%	85%
New Mexico	70%	77%
New York	80%	89%
North Carolina	74%	82%
North Dakota	69%	76%
Ohio	72%	80%
Oklahoma	69%	76%
Oregon	63%	70%
Pennsylvania	70%	78%
Rhode Island	84%	94%
South Carolina	70%	78%
South Dakota	61%	68%
Tennessee	68%	76%
Texas	66%	74%
Utah	66%	74%
Vermont	75%	83%
Virginia	63%	70%
Washington	73%	81%
West Virginia	55%	61%
Wisconsin	75%	83%
Wyoming	64%	70%
National	72%	80%

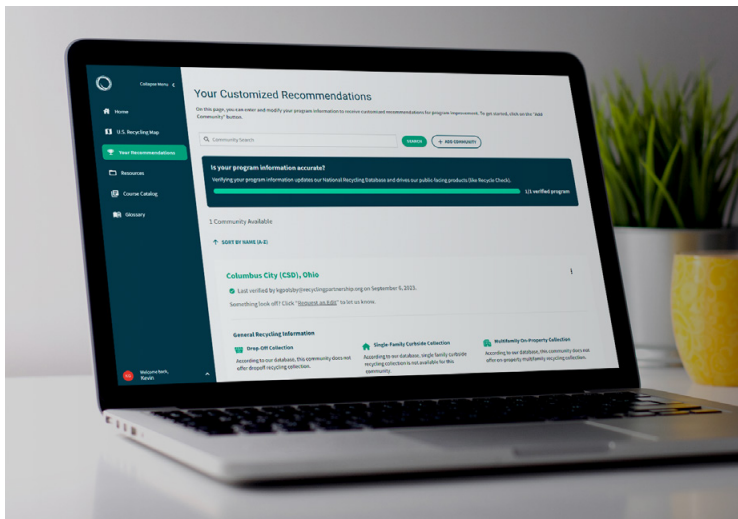
* Material acceptance data comes from our National Database

** While very few curbside programs currently accept film and flexible material, it has become increasing prevalent packaging which is why we believe investment throughout the supply chain is needed to enable more curbside programs to process, sort and accept this material.



Industry Support to Improve Material Access

Polypropylene, a type of plastic used in an array of food and non-food packaging, provides a good example of industry working to improve material acceptance. Established in 2020, [The Partnership's Polypropylene Recycling Coalition](#) was created to improve polypropylene recovery in the U.S. by bringing stakeholders together to provide grants for new and improved polypropylene capture and sortation, and for community education. These grants have helped to increase acceptance of polypropylene by community recycling programs. Prior to this grant program, according to GreenBlue's How2Recycle program polypropylene rigid containers had a 59% material acceptance rate; following Coalition grants, [the polypropylene access rate has increased to 65%](#) providing over 34 million people in over 600 communities with new or expanded access to recycle polypropylene.



Key Takeaways

- **States with higher levels of recycling access generally have higher levels of recycling engagement** as these states have invested in their recycling programs.
- **Single-family households have more than double the recycling access rate of multifamily homes**, which effectively excludes nearly 20 million households (63% of all multifamily homes) from recycling.
- There are 13 states in which **40% or more of all households have no access to recycling**.
- **Industry investment to increase material acceptance can have a measurable impact** by boosting the amount of recyclables collected from households and transforming more materials into new commodities.



Recycling Engagement



Assuming that households have recycling access and their community accepts the widest range of recyclables possible, households must then be able to fully engage in the recycling process, which means using the recycling services they have and putting all of their recyclables in their recycling container. Setting households up with the resources to fully participate requires communication, education, and support.

Household Participation in Recycling

There are two ways to look at recycling participation:

1. Program Participation

Program Participation is the percentage of households with access that use their available recycling service; and

2. Overall Participation

Overall Participation is the percentage of **all** households that participate in recycling.

For Program Participation, we examine how many households with recycling access actually use it and estimate that nationwide **59% of those with access use their program**. For Overall Participation, we combine those that don't use the available service with those who do not have access and estimate that, nationwide **43% of all households participate in recycling**. To boost Overall Participation, we must increase both recycling access and Program Participation.

Figure 3 on [page 10](#) shows state-by-state levels of both participation and access across the country.

Figure 9 to the right breaks out the Program Participation rates for each state.

Figure 9

State-by-State Program Participation Rates (Out of Households with Access)

Program Participation Rate		Program Participation Rate	
Alabama	51%	Montana	57%
Alaska	51%	Nebraska	59%
Arizona	67%	Nevada	69%
Arkansas	47%	New Hampshire	50%
California	65%	New Jersey	64%
Colorado	68%	New Mexico	54%
Connecticut	58%	New York	55%
Delaware	59%	North Carolina	54%
District of Columbia	61%	North Dakota	64%
Florida	67%	Ohio	56%
Georgia	52%	Oklahoma	54%
Hawaii	72%	Oregon	66%
Idaho	58%	Pennsylvania	55%
Illinois	65%	Rhode Island	67%
Indiana	56%	South Carolina	47%
Iowa	54%	South Dakota	59%
Kansas	57%	Tennessee	47%
Kentucky	55%	Texas	58%
Louisiana	49%	Utah	70%
Maine	45%	Vermont	40%
Maryland	60%	Virginia	56%
Massachusetts	61%	Washington	66%
Michigan	58%	West Virginia	41%
Minnesota	61%	Wisconsin	60%
Mississippi	54%	Wyoming	52%
Missouri	53%	National	59%

How can we improve program participation?

Recycling engagement boils down to the daily actions of millions of people across the country. Individuals regularly decide what will be recycled or trashed, how to prepare a product for recycling, and why it might be worth the extra effort to recycle. Improvement in Program Participation requires behavior change. The Partnership’s [Center for Sustainable Behavior & Impact](#) has been addressing this by deepening our understanding of what drives behavior and then creating the conditions that support positive recycling behavior. For example, our in-field research studies in Reynoldsburg, Ohio, showed the impact of different messages. A series of cart tags that used empathetic messaging to destigmatize confusion about recycling drove a statistically significant 38% increase in average recycling route tonnage. That’s an average increase of seven additional tons of recycling per month per route. Our [Knowledge Report](#) describes additional research and insights on how to drive positive change in recycling behavior.

Do participating households place all of their recyclables in their recycling container?

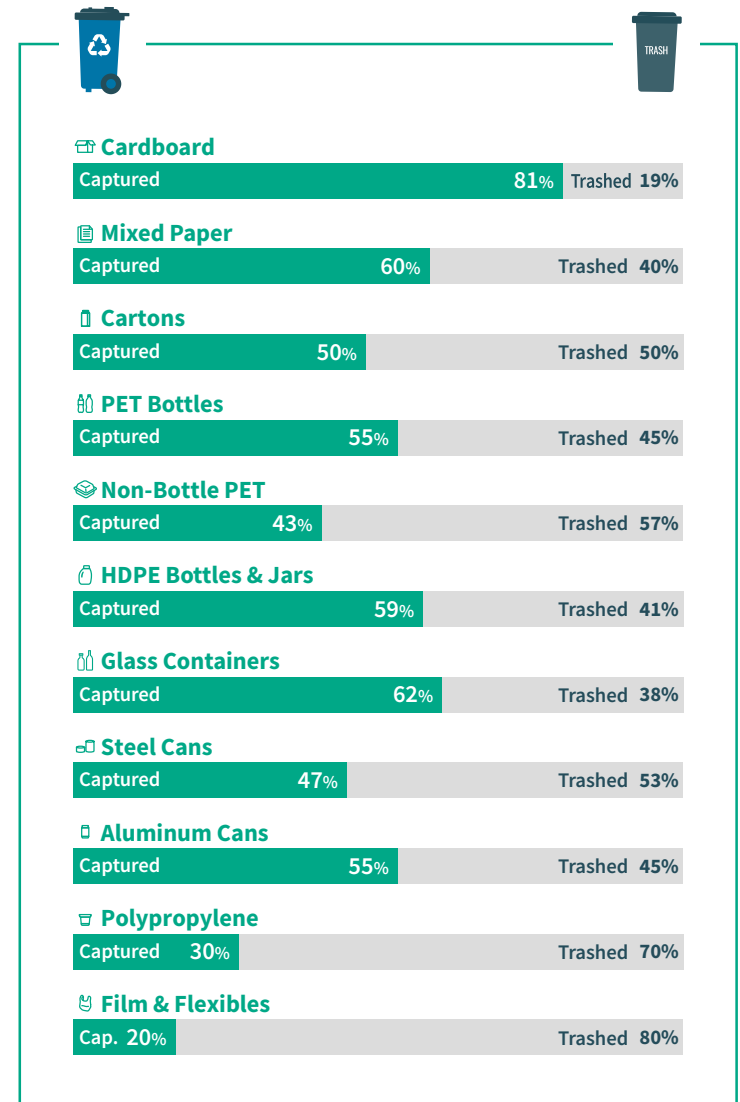
On average, households that participate in a curbside program recycle 57% of recyclable materials. **Figure 10** to the right shows that households are better at recycling some materials (e.g., cardboard) than others (e.g., aluminum cans). This figure shows the participant material capture rates by material type from households that participate in recycling. To ensure households place all their recyclables in their recycling containers, there must be recycling communication, education, and support.

Key Takeaways

- **43% of all households participate in recycling.** In an optimal system, at least 90% would participate. To improve this, we must increase recycling access overall. For those that have access, communication, education, and outreach are critical to boosting full participation.
- The fact that certain items are more frequently placed in the recycling container than others further underscores the **need for better and more frequent communication** so that households are informed of the full range of accepted materials, especially as recycling programs change over time to accept more material types for recycling.

Figure 10

Participant Capture of Different Material Types*



* Where accepted by the community.

Processing & Sortation

Recycling processing facilities (also known as Materials Recovery Facilities or MRFs) vary in their ability to turn inbound materials into outbound commodities, due to differences in equipment, staffing, inbound contamination rates,¹² and other factors. **Figure 11** to the right shows how efficient MRFs are in converting received recyclables into outbound commodities.¹³ Overall, we estimate that MRFs sort and process 87% of the recyclable materials they receive.

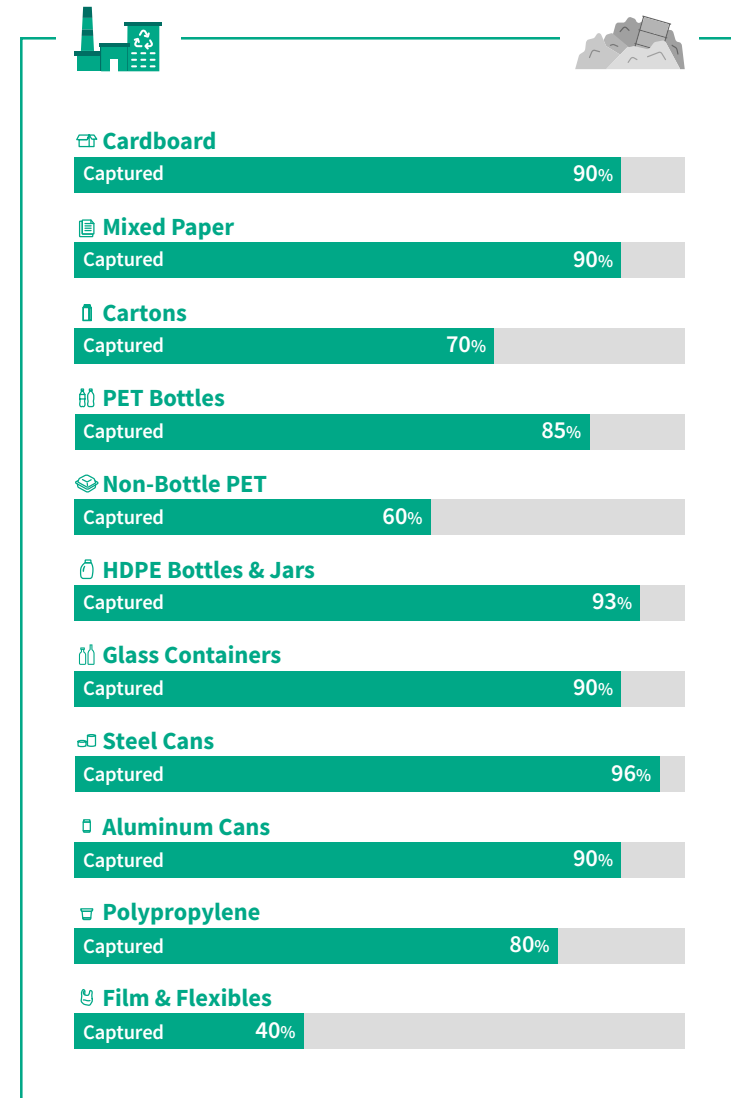
Key Takeaways

- The 95% target rate for MRF processing and sortation in an optimal system is high relative to the current 87% rate but achievable as MRFs make improvements in processing efficiency.
- The greatest opportunities for improvement in MRF efficiency are in the processing of materials that are somewhat newer to the recycling stream, but innovative technologies are greatly enhancing the ability of MRFs to sort and process these newer materials.

¹² “Contamination” occurs when food or other items that do not belong in recycling end up in recycling containers.

¹³ There is very little publicly available data on material-specific or overall MRF capture rates. For the purposes of this study, we used our extensive engagement with MRFs throughout the country to inform material specific capture rates and weighted those individual rates against inbound material percentages to get a baseline of MRF commodity capture across all materials. MRFs also receive materials that are not recyclables (contaminants), which reduces the overall conversion of total inbound tons into commodities, but those contaminants are excluded from the analysis in Figure 11. Our data focuses on the percentage of recyclables received (not all materials received) that are shipped as commodities.

Figure 11
MRF Capture Rates



End Markets

For the residential recycling system to operate effectively, there must be market demand for the commodities it produces.

Assessing End Markets

Determining whether there are sufficient markets is difficult, but for a package to be considered recyclable, it must have a viable path to becoming something else, so the need for sufficient end markets is a key aspect of recyclability. And if the quantity of recyclable material were to potentially double, sufficiency of end markets could become an even greater challenge. Our [Circular Packaging Assessment Tool](#) (see page 9) provides an [End Markets scoring matrix](#) as a working model that examines eight attributes evaluating a material's end market. Additional evidence of demand for end markets for recycled commodities includes the positive momentum of new construction for recycled material processing facilities.¹⁴

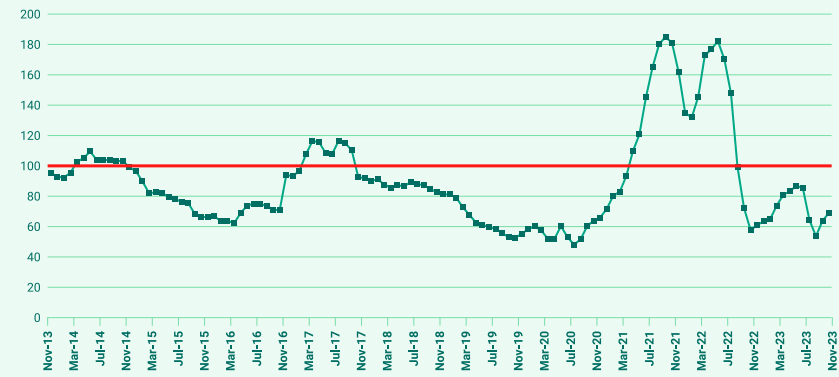
End Market Demand

One of the most powerful drivers of end markets is demand from companies who have pledged to use more recycled material in their packaging. In addition to these public commitments, policy changes and consumer expectations for sustainable packaging choices are compelling reasons for companies to accelerate their demand for recycled raw material for all packaging types. Without that surge in private company demand, local governments and recycling processors face two big challenges: price and cost.

Price

Recycling facilities or MRFs face the challenge of low prices relative to processing costs as they sell their commodity bales to the market. Assuming an average processing cost of \$100/ton, **Figure 12** to the right shows that pricing for recycled commodities over the past six years has generally fallen below cost, except for the period between Apr. '21 and Aug. '22. Potential reasons for pricing changes include shifts in international trade, declining consumer demand in a slowing economy, and recycled material competition with cheaper virgin materials.

Figure 12
**Blended Materials Values
 for Materials Recovery Facilities**
 November 2013–November 2023 (residues included)



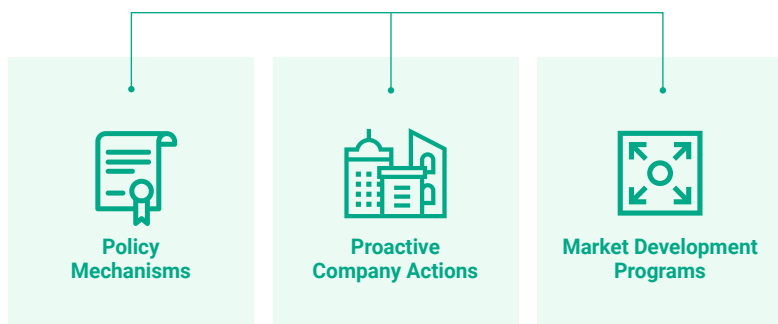
Cost

To weather this volatility and to protect the profitability of their processing investments, most privately-owned MRFs now charge processing fees to community recycling programs. Community recycling programs not only face the capital-intensive costs of collection that can easily exceed \$300/ton (i.e., operating trucks, collection containers, crews, and equipment maintenance), but also incur these processing fees, which are frequently in the \$100/ton range and higher than the cost of disposal. This total cost to communities directly affects their decisions on whether to offer or expand recycling services, and what materials to accept.

¹⁴ Examples of new facilities include: Pratt Industries' new paper mill in Henderson, KY, O-I's new bottle plant in Bowling Green, KY, and Novelis' upcoming aluminum plant in Bay Minette, AL. As these examples show, commodity industry stakeholders continue to plan and develop facilities that expand domestic recyclable market capacity.

How can we address these challenges?

There are several steps that could support market demand and possibly mitigate economic barriers to increase collection.



Policy Mechanisms

- As we will discuss further in Part 2, EPR policies are one of the best ways to close current gaps by using packaging fees that channel industry funding to improve the system. Some EPR policies directly or indirectly shift the cost of MRF processing fees to private companies, thus fully funding community recycling program budgets and removing the disincentive of high processing charges.
- State laws in New Jersey, Washington, and California will establish regulatory commitments to increase recycled content in plastics packaging, thus driving demand for recycled content and contributing to longer term stability in material pricing.
- In the 1980s and 1990s, policies created purchasing preferences for recycled content as recycling was ramping up and markets needed to be developed and boosted. Public and private sector stakeholders could return to these policies to pave the way for another wave of increased collection, such as the federal government's recent announcement for a [program of sustainable product purchasing](#).

Proactive Company Actions

- As private companies ramp up demand for recycled content, they can take a range of actions to foster market stability and growth, including supply agreements that reach deeper into the recycling system, and formation of consortiums that create scaled demand.
- Private MRF contracts could include revenue sharing with communities, as most privately-operated MRFs now have ample support for processing costs and profitability built into their processing charges. Revenue sharing is an easy way to motivate local programs and other suppliers to maintain and increase collected tonnage.

Market Development Programs

- State market development programs have been instrumental in marshalling economic development tools to enhance market capacity. In addition to long-standing programs in states like California, Indiana, Massachusetts, Michigan, Minnesota, North Carolina, Pennsylvania, South Carolina, and Washington, new programs such as the [Colorado Circular Economy Development Center](#) are being launched to enhance regional markets. More states could be encouraged to develop programs of their own.

Key Takeaways

- Company demand for recycled content is a key driver of sufficient end markets. In the absence of that demand, local governments must absorb the cost of processing recyclables.
- A combination of proactive company action, policy, and economic development can address end market challenges.



Residential Recycling Rates



What does it mean for material to be “recycled”?

For the purposes of this report, we focus on what happens to material from the household to the processing facility to end markets. Therefore, “recycled” material refers to all recyclables sold by MRFs to end markets. While additional material loss may occur after materials leave the MRF, and must also be addressed, that is beyond the scope of this report. “Recycled” material also includes material captured through state deposit return systems (also known as “bottle bills”).

What is the total amount of available recyclable material?

A large pool of available residential recyclable material – over 47 million tons— is generated annually. What’s included in this number that other recycling rate calculations may not consider?¹⁵

- **All Recyclables Generated by Both Single-Family and Multifamily Homes**
Approximately 7.5 million tons—are lost each year because multifamily homes are not adequately supported to participate in recycling ([see page 13](#)).
- **Film and Flexible Material**
Very few curbside programs accept this material for collection today, and we capture less than one percent of the nearly 4.8 million tons generated annually. However, as film and flexible material becomes more prevalent in products, investment in the recyclability of this material is needed, and stakeholders are [working to make that a reality](#).

Bearing in mind the five essential requirements of an effective recycling system and our methodology for determining residential recycling rates, we can see how much material is being recycled annually both by material type and by state.

[Figure 13](#) on the next page shows the fate of material: how much is being recycled, how much is thrown away at home, and how much is lost at processing facilities at the national level annually.

[Figure 14](#) on page 24 shows national residential recycling estimates by major material category in tons per year, including material captured through state deposit return systems.

[Figure 15](#) on page 25 is a heat map showing state-by-state residential recycling rates.

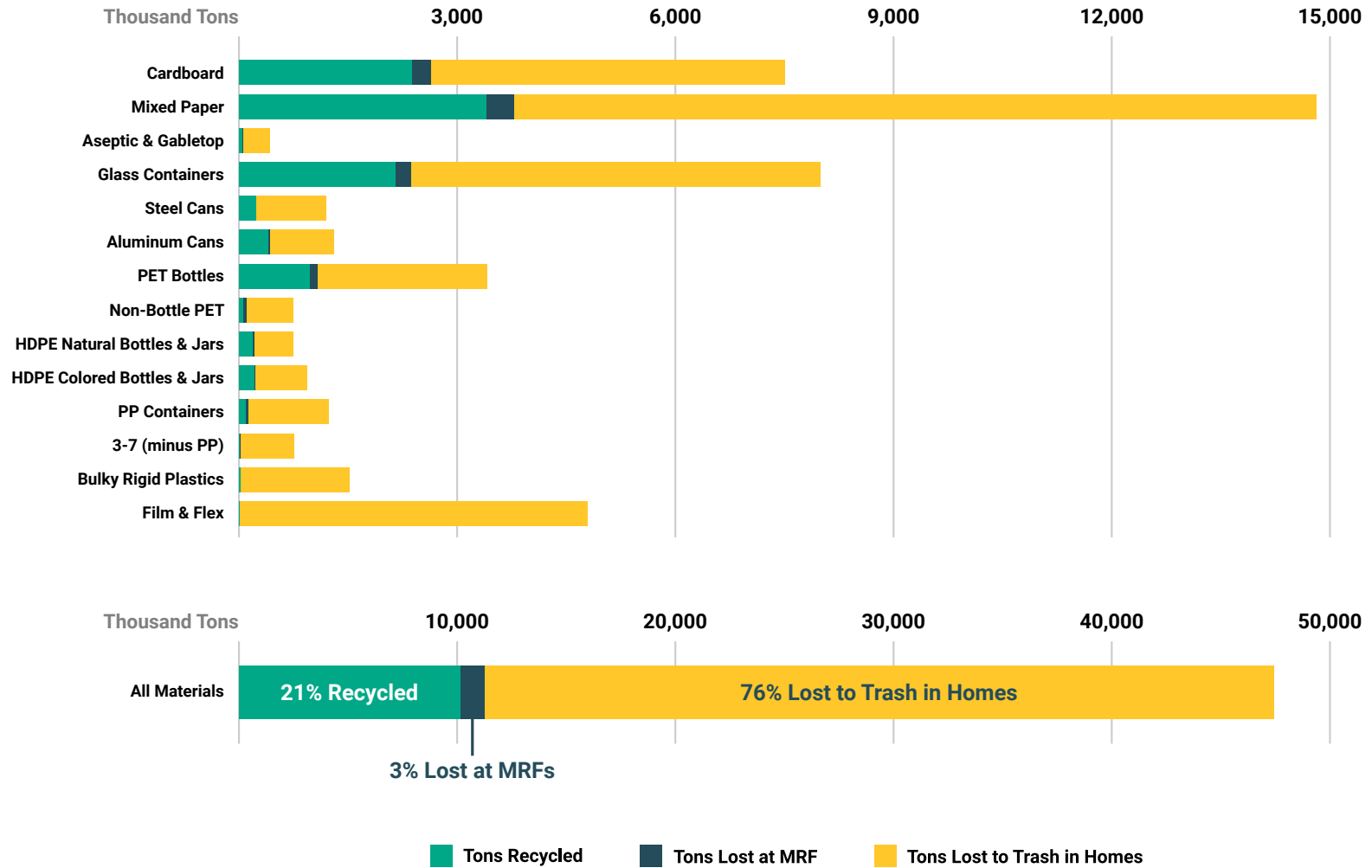
[Figure 16](#) on page 26 is a heat map showing state-by-state levels of recyclable material lost in tons per year.

[Figure 17](#) on page 27 provides an additional perspective on material lost by each state.

[Figure 18](#) on pages 28 and 29 shows state-by-state residential recycling rates by commodity.

¹⁵ Our prior reports ([Paying it Forward](#); [2020 State of the Curbside](#)) did not include these factors in calculating recycling rates.

Figure 13
Fate of Material by Major Material Category*
 (in Tons Per Year)



*Includes material captured through state deposit return systems

Figure 14

National Residential Recycling Rates by Material Category*

(in Tons Per Year)

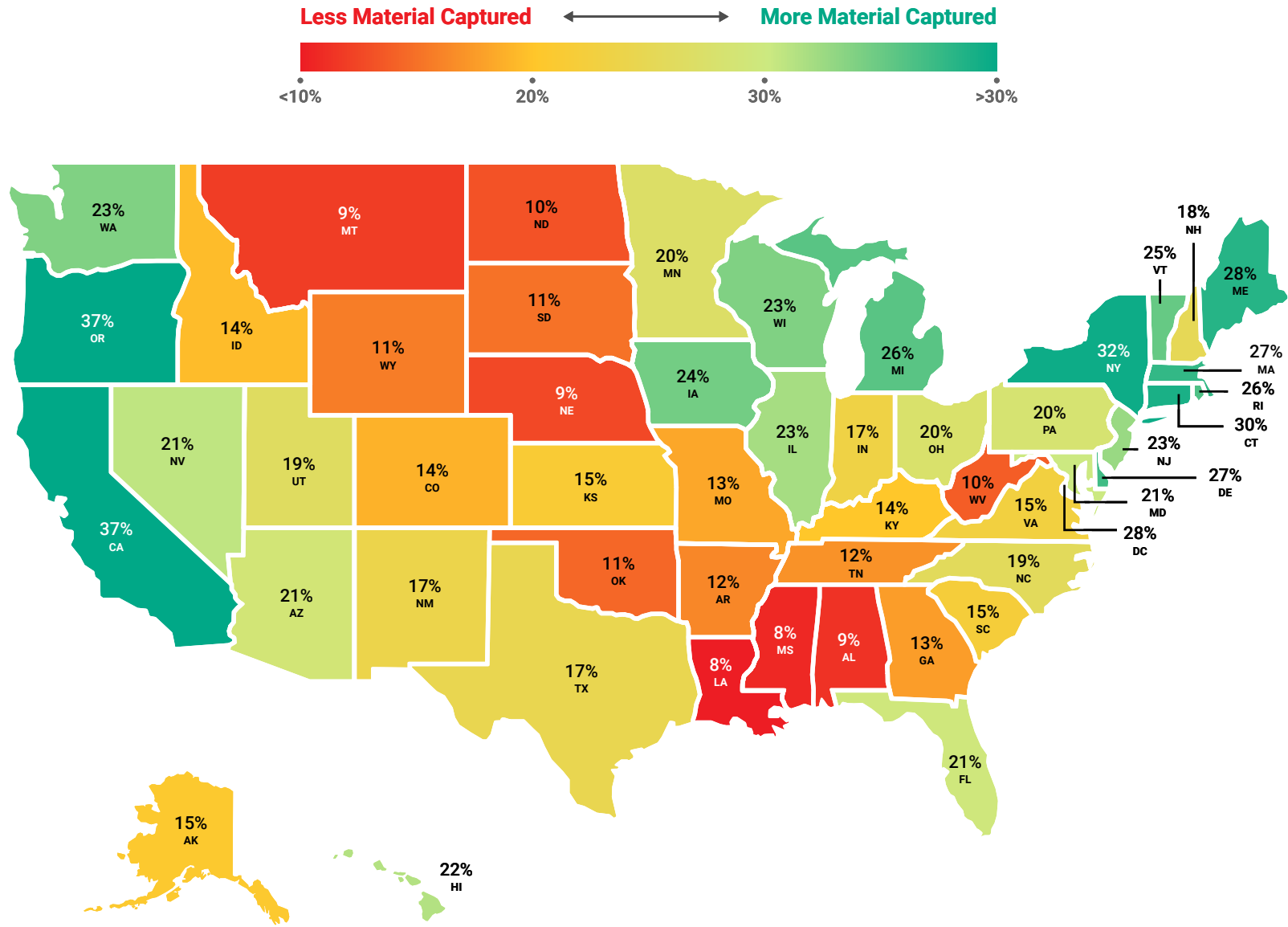
Material	Tons Generated	Tons Recycled	Recycling Rate	Total Tons Lost (homes & MRFs)	% Lost (homes & MRFs)
Cardboard	7,509,483	2,371,572	32%	5,137,912	68%
Mixed Paper	14,814,158	3,401,524	23%	11,412,635	77%
Aseptic & Gabletop	422,553	35,762	8%	386,791	92%
Glass Containers**	8,000,677	2,152,303	27%	5,848,374	73%
Steel Cans	1,198,282	231,156	19%	967,126	81%
Aluminum Cans**	1,308,956	393,488	30%	915,469	70%
PET Bottles**	3,412,310	971,215	28%	2,441,095	72%
Non-bottle PET	748,974	58,443	8%	690,531	92%
HDPE Natural Bottles	739,178	188,704	26%	550,474	74%
HDPE Colored Bottles	928,780	208,624	22%	720,155	78%
Polypropylene Containers	1,225,325	94,881	8%	1,130,444	92%
Plastics 3-7 (minus Polypropylene)	754,006	8,909	1%	745,097	99%
Bulky Rigid Plastics	1,516,711	17,231	1%	1,499,479	99%
Film & Flexible	4,787,126	4,569	<1%	4,782,556	>99%
TOTAL	47,366,519	10,138,381	21%	37,228,139	79%

* out of tons generated

**includes material captured through state deposit return systems

Figure 15

State-by-State Residential Recycling Rates*



*includes material captured through state deposit return systems

Figure 16

State-by-State Residential Recyclable Material Lost (in Tons Per Year)

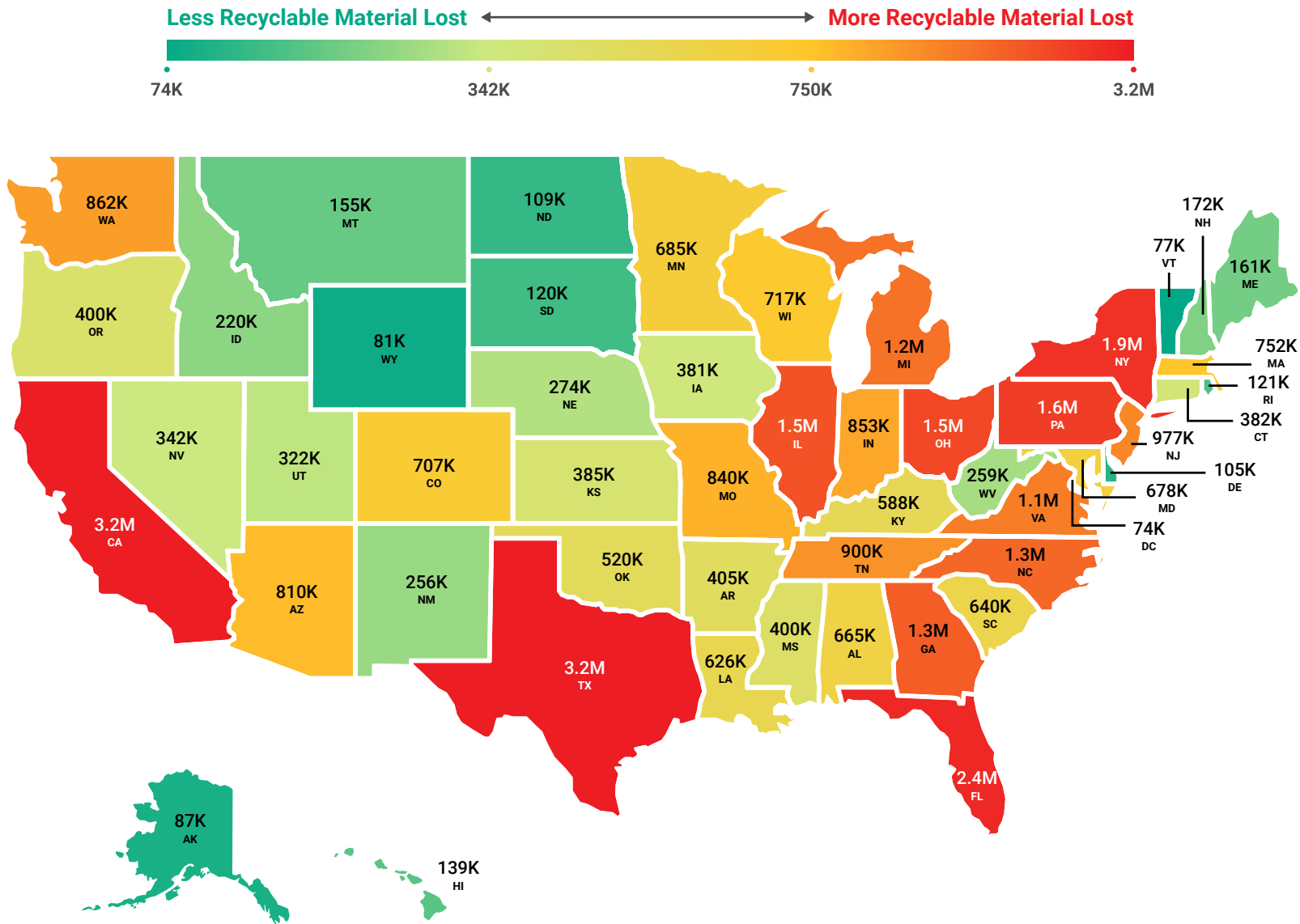


Figure 17
Tons Lost Per State Annually

Figure 17 on the right provides an additional perspective on recyclable material lost by each state highlighting the states that lose the largest quantities of residential recyclable material in tons per year, and those that lose the smallest quantities of residential recyclable material.

- 2M+
- 1.5M - <2M
- 500K - <1.5M
- <500K

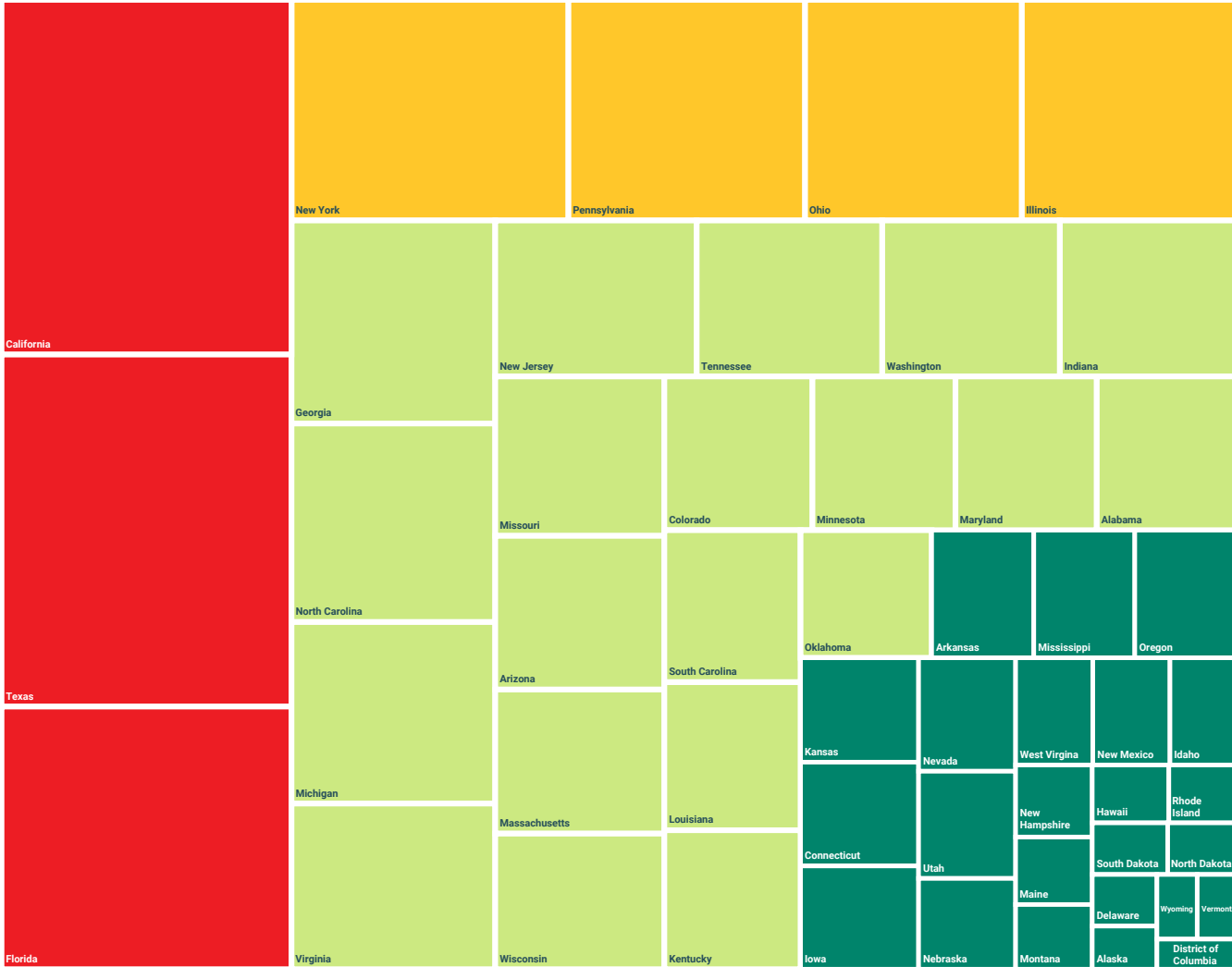


Figure 18

State-by-State Residential Recycling Rates by Commodity*

	Cardboard	Mixed Paper	Aseptic & Gabletop	Glass Containers	Steel Cans	Aluminum Cans	PET Bottles	Non-bottle PET	HDPE Natural Bottles & Jars	HDPE Colored Bottles & Jars	PP	Plastics #3,4,6,7	Bulky Rigid Plastics	Film
Alabama	18%	13%	1%	2%	11%	12%	11%	3%	15%	13%	2%	1%	0%	0.2%
Alaska	29%	21%	9%	2%	16%	20%	18%	1%	23%	20%	2%	1%	0%	0.3%
Arizona	35%	25%	11%	18%	21%	24%	22%	10%	28%	25%	8%	0.3%	0.1%	0.01%
Arkansas	22%	15%	2%	5%	13%	15%	14%	2%	18%	16%	1%	0.4%	0%	0.04%
California	46%	34%	14%	58%	28%	64%	61%	14%	37%	33%	13%	2%	2%	0.5%
Colorado	23%	17%	8%	15%	14%	16%	14%	6%	18%	16%	7%	3%	1%	0.1%
Connecticut	38%	28%	14%	46%	23%	49%	47%	12%	31%	27%	12%	2%	1%	0.01%
Delaware	42%	31%	20%	32%	26%	29%	27%	15%	35%	30%	14%	1%	0%	0.1%
District of Columbia	43%	32%	21%	33%	27%	29%	28%	15%	35%	31%	14%	0%	16%	0%
Florida	34%	25%	11%	23%	21%	23%	22%	7%	27%	24%	8%	2%	0.2%	0.03%
Georgia	23%	17%	3%	8%	14%	16%	15%	5%	19%	16%	4%	1%	0.01%	0.1%
Hawaii	36%	1%	0%	53%	20%	58%	55%	10%	27%	24%	0%	1%	0%	0%
Idaho	28%	21%	1%	2%	17%	19%	15%	4%	19%	16%	5%	0.04%	0%	1%
Illinois	36%	26%	13%	24%	22%	24%	23%	11%	29%	26%	11%	1%	0.3%	0.02%
Indiana	27%	20%	6%	18%	17%	18%	17%	8%	22%	19%	7%	2%	0%	0.1%
Iowa	25%	17%	6%	50%	15%	47%	45%	8%	20%	18%	8%	2%	0%	0.1%
Kansas	25%	18%	5%	11%	15%	17%	16%	7%	20%	18%	8%	1%	0%	0.1%
Kentucky	23%	16%	7%	13%	14%	15%	15%	5%	18%	16%	5%	0.1%	2%	0.01%
Louisiana	16%	11%	1%	2%	10%	11%	9%	2%	12%	10%	2%	1%	0%	0.05%
Maine	24%	18%	6%	60%	15%	82%	65%	7%	18%	16%	6%	2%	1%	0.1%
Maryland	33%	25%	14%	25%	20%	23%	21%	6%	27%	24%	11%	0.02%	4%	0%
Massachusetts	37%	28%	4%	41%	23%	35%	34%	11%	30%	27%	12%	1%	0.4%	0.01%
Michigan	29%	21%	7%	51%	18%	50%	47%	9%	23%	21%	8%	2%	1%	0.1%
Minnesota	32%	24%	11%	23%	20%	21%	20%	10%	26%	23%	9%	1%	0.2%	0.04%
Mississippi	14%	10%	1%	5%	7%	10%	9%	3%	12%	10%	3%	0.3%	0.2%	0.04%

*includes material captured through state deposit return systems

Figure 18 (continued)

State-by-State Residential Recycling Rates by Commodity*

	Cardboard	Mixed Paper	Aseptic & Gabletop	Glass Containers	Steel Cans	Aluminum Cans	PET Bottles	Non-bottle PET	HDPE Natural Bottles & Jars	HDPE Colored Bottles & Jars	PP	Plastics #3,4,6,7	Bulky Rigid Plastics	Film
Missouri	21%	15%	5%	11%	13%	14%	13%	6%	17%	15%	6%	0.5%	0.1%	0.03%
Montana	18%	12%	1%	3%	11%	12%	10%	3%	12%	11%	2%	0.03%	0%	0.2%
Nebraska	18%	11%	6%	1%	11%	12%	11%	6%	14%	13%	5%	1%	0%	0.02%
Nevada	35%	25%	11%	22%	21%	23%	22%	10%	28%	25%	10%	1%	0.1%	0%
New Hampshire	29%	21%	4%	20%	17%	19%	18%	9%	22%	20%	7%	2%	0.4%	0.03%
New Jersey	37%	27%	7%	28%	23%	25%	24%	10%	30%	27%	7%	0.4%	0.2%	0.01%
New Mexico	32%	23%	10%	2%	19%	22%	20%	10%	25%	22%	9%	6%	6%	0.02%
New York	35%	26%	11%	57%	22%	61%	59%	10%	29%	25%	10%	1%	7%	0.02%
North Carolina	31%	22%	9%	21%	19%	21%	20%	6%	25%	22%	7%	1%	0.3%	0.001%
North Dakota	17%	12%	5%	10%	10%	11%	10%	5%	13%	11%	5%	1%	0%	0.02%
Ohio	31%	24%	12%	22%	20%	22%	21%	5%	26%	23%	8%	0.5%	0.03%	0.02%
Oklahoma	19%	14%	2%	10%	11%	13%	12%	5%	15%	13%	4%	0.4%	0%	0.1%
Oregon	42%	31%	10%	65%	26%	79%	75%	2%	34%	30%	9%	0.03%	0.4%	0%
Pennsylvania	33%	23%	6%	21%	21%	23%	21%	7%	27%	24%	6%	1%	0.1%	0.03%
Rhode Island	41%	30%	16%	31%	25%	27%	26%	14%	33%	29%	13%	0.1%	0%	0%
South Carolina	26%	19%	5%	12%	15%	17%	16%	5%	21%	18%	5%	0.4%	0.3%	0.03%
South Dakota	19%	11%	2%	11%	12%	13%	13%	5%	16%	14%	5%	0.3%	0%	0%
Tennessee	22%	16%	5%	8%	13%	15%	14%	5%	17%	15%	4%	2%	2%	0.01%
Texas	27%	20%	7%	16%	16%	18%	17%	7%	22%	19%	7%	2%	2%	0.04%
Utah	37%	26%	2%	2%	22%	25%	24%	8%	30%	26%	6%	0.4%	0%	0.01%
Vermont	27%	18%	0.3%	58%	16%	42%	40%	7%	22%	19%	6%	0.3%	0.4%	0.1%
Virginia	26%	19%	8%	12%	16%	17%	16%	3%	21%	18%	3%	0.2%	1%	0.1%
Washington	38%	28%	8%	21%	23%	25%	24%	7%	30%	27%	10%	0.1%	2%	0.1%
West Virginia	18%	14%	2%	5%	10%	13%	10%	3%	12%	11%	2%	0%	0%	0.2%
Wisconsin	36%	27%	11%	26%	22%	25%	23%	9%	29%	26%	10%	2%	0.2%	0.01%
Wyoming	22%	16%	1%	3%	12%	15%	14%	5%	17%	15%	2%	2%	0%	0.1%
National	32%	23%	8%	27%	19%	30%	28%	8%	26%	22%	8%	1%	1%	0.1%

*includes material captured through state deposit return systems

Figure 19

How Material Gets Lost in the System: Example of PET Thermoforms in California



Figure 19 above illustrates how a type of recyclable material can be lost at different stages of the recycling system. In this case we look at PET thermoforms, a type of packaging that includes clamshells, cups, tubs, lids, boxes, trays, and egg cartons made from PET (#1) plastic resin in the State of California. This example illustrates the fate 100% of the PET thermoforms sold to households in California:

- Although 95% of Californians have access to recycling, when material acceptance ([see page 14](#)) is factored in – meaning the percentage of communities that accept PET thermoforms for recycling, **an estimated 78% of Californians have access to recycling PET thermoforms**, indicating that the material has demonstrated market demand in California.
- We then look at recycling engagement – how many people participate in recycling and how many put their PET thermoforms in their recycling container – **the percentage of PET thermoforms collected from Californians drops to an estimated 23%**. This decline underscores the importance of recycling engagement in California.

→ Next, when we consider the percentage of PET thermoforms that are lost during processing and sortation, **our analysis estimates that 14% of PET thermoforms actually leave recycling facilities as baled commodities**. This stands in contrast with California’s EPR law that will require recycling at a rate of 65% by 2032.

Key Takeaways

- **Every material type is under-recycled**; seven out of ten cardboard boxes, four out of five steel cans, three out of four tons of mixed paper, and seven out of ten glass, aluminum cans, and PET bottles are lost to trash in homes.
- **The greatest source of material loss is at home**, emphasizing the importance of investment in recycling access and engagement.



Part 2

Where We Need to Go

Three Strategies for Recycling System Success



Three Strategies for Recycling System Success

Part 1 describes the major gaps that must be addressed in the current residential recycling system. We contrast current levels of packaging recyclability, recycling access, recycling engagement, processing and sortation, and end markets, with the targets for a thriving recycling system.

Part 2 looks at three strategies that, implemented together, can help to fill those gaps. These strategies are based on the following principles:

- **Private industry shares the cost** of closing these gaps.
- **Investment should be targeted** in locations where the gains are greatest.
- **Funding is especially needed to support** recycling engagement.

Figure 20 on the next page provides examples of how these principles come together in the form of local solutions that drive maximum impact.

Figure 20

Targeted Investments for Maximum Impact

Data-driven, local solutions are key to overhauling the U.S. system



Impact on Two EPR States

Oregon & Colorado: In addition to Maine & California, Oregon & Colorado's recent passage of EPR could bring more than 645,000 tons of recyclables to these two states. Needs assessments, single and multi family access, engagement, and expanded MRF processing activities are areas of need.



Regional System Change

Gulf Coast & Great Lakes: These two regions collectively lose nearly 10.6M tons of recyclables annually. Comprehensive regional investment in single and multi family access, engagement, and MRF processing to expand recyclables accepted could bring big change for the country as a whole.



Future EPR Opportunities

Connecticut, Illinois, Maryland, Minnesota, New York & Washington: These states, like many, could benefit from future EPR legislation, boosting recovery by more than 3.3 million tons annually.



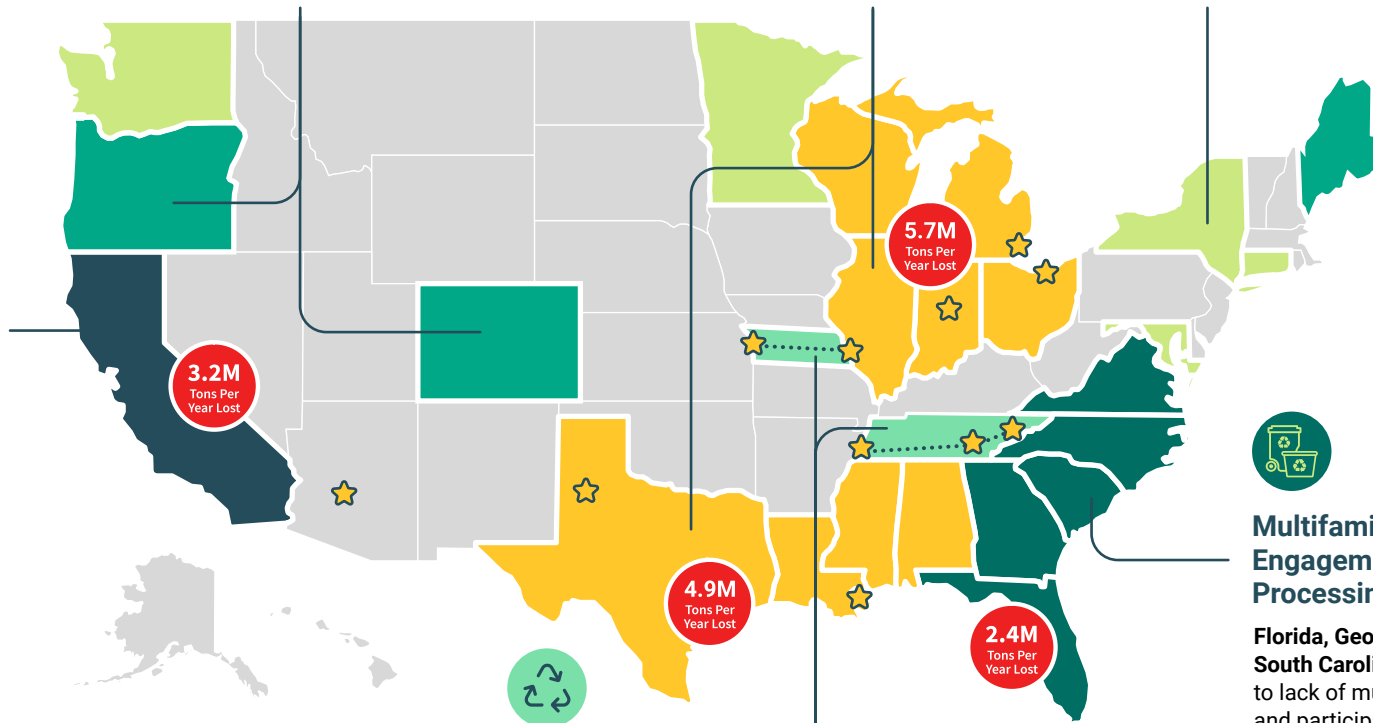
Increase in Participation

California loses 3.2 million tons per year largely due to lack of engagement. 95% of Californians have recycling access, but state recycling rate is 37%. As part of its EPR implementation engagement will be key.



Linchpin Cities

Because there are strong end markets and yet limited recycling in **Cleveland, Detroit, Indianapolis, Lubbock, Phoenix, & New Orleans**, these cities are critical for unlocking the regions that surround them. By focusing on access, engagement, and processing in these cities, the greater regions could likely see increased recovery of recyclables.



Multifamily Access, Engagement, and Processing

Florida, Georgia, North Carolina, South Carolina, & Virginia: Due to lack of multi-family access and participation, these states have big opportunities to increase recycling rates. For example, Florida has 90% access for single-family homes, but only 16% for multifamily homes, and loses 2.4 million tons per year.



Micro-Regional System Change

St. Louis - Kansas City Corridor and the Memphis, Chattanooga, & Knoxville Region: Although processing and end markets exist, these metropolitan corridors generate large quantities of unrecovered recyclables. Focusing on access and participation in these regions could produce significant tonnage.

Extended Producer Responsibility (EPR) Adoption

What is EPR?

EPR policies address the gaps in the current residential recycling system by using packaging fees to channel industry funding to improve the system and motivating private industry to make their packaging recyclable.¹⁶ For a recycling system that has faced stagnation in material recovery for more than a decade, EPR has strong potential to foster substantial leaps forward in recycling rates, even in states that are relatively strong performers already. EPR requires companies that produce materials to take financial and environmental responsibility for the full lifecycle of their products. It is a policy approach that has had success in the U.S. for years for items like electronics, but states have more recently started to adopt EPR for paper and packaging products (PPP). Since June 2021, four states have passed EPR laws for PPP: California, Colorado, Maine, and Oregon.

¹⁶ Deposit Return Systems (DRS) are a specific type of EPR for beverage packaging where consumers have a financial incentive to return beverage packaging to be recycled. DRS policies are in place in 10 states and saw significant legislative interest in 2022 and 2023, with more than a dozen states proposing new DRS policies and several program expansions proposed in existing DRS states. Our memo on the [Interplay and Integration of Deposit Return Systems and EPR](#) describes how EPR and DRS models can operate in a complementary fashion.



Maine became the first U.S. state to pass an EPR law for PPP. Since then, Oregon, Colorado, and California also have also passed PPP EPR laws.

What is the Impact?

Figure 21 to the right shows the estimated impact of EPR in the four states where it has recently been adopted, bringing in an additional 2.4 million tons of material out of disposal and into the circular economy and doubling of the combined amount of material recycled in those states today. This also represents a 24% increase in the national recycling rate.

Capturing an additional 2.4 million tons of recycled material is the equivalent of...

AVOIDING 5.2 MILLION METRIC TONS OF CO₂e = ELIMINATING EMISSIONS FROM 1.1 MILLION PASSENGER VEHICLES**

Projected Impact of EPR in Four Adopting States*

Figure 21

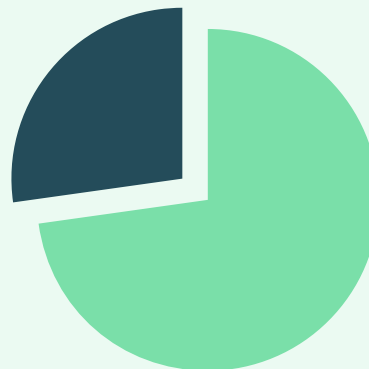


Before implementation of EPR

34% of material recycled

2.25M tons

of recyclables on average projected to be recycled in California, Colorado, Maine, and Oregon annually.



After implementation of EPR

69% of material recycled

4.65M tons

of projected recyclables on average will be recycled in California, Colorado, Maine, and Oregon annually.

**Implementation of EPR Policies takes 3-5 years following passage of legislation.*

***The Recycling Partnership used EPA's WARM Model Version 15 for the calculations regarding GHG impacts and passenger vehicle equivalents.*

EPR legislation is also being considered in several other states.

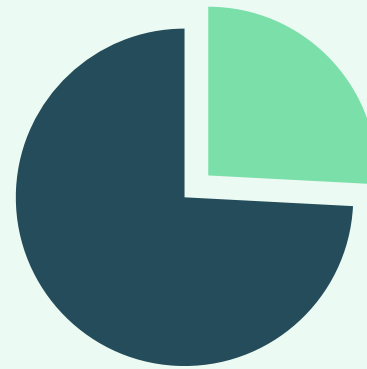
Figure 22 to the right shows the estimated impact of those policies in Connecticut, Illinois, Maryland, Minnesota, New York, and Washington – states where EPR is actively being considered, and potentially bringing in an additional 3.3 million tons of material out of disposal and into the circular economy while raising recycling rates for these states from 26% to 67%.

Capturing an additional 3.3 million tons of recycled material is the equivalent of...

AVOIDING 7.1 MILLION METRIC TONS OF CO₂e = ELIMINATING EMISSIONS FROM 1.5 MILLION PASSENGER VEHICLES**

Figure 22

Projected Impact of Potential EPR States*

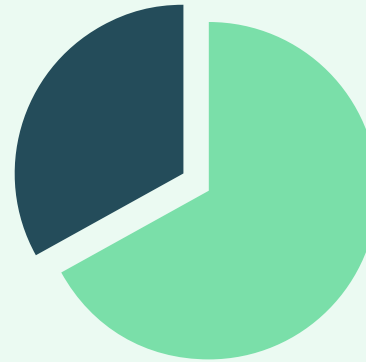


Before implementation of EPR

26% of material recycled

2.1M tons

of recyclables on average are recycled in Connecticut, Illinois, Maryland, Minnesota, New York, and Washington annually.



After implementation of EPR

67% of material recycled

5.4M tons

of recyclables on average projected to be recycled in Connecticut, Illinois, Maryland, Minnesota, New York, and Washington annually.

**Implementation of EPR Policies takes 3-5 years following passage of legislation.*

***The Recycling Partnership used EPA's WARM Model Version 15 for the calculations regarding GHG impacts and passenger vehicle equivalents.*

How Does EPR Improve the Recycling System?

Without EPR, local governments and taxpayers bear the financial and operational responsibility for recycling. Collecting recyclables is an intensive and expensive exercise with significant costs to operate and maintain recycling trucks, equipment, and facilities. As the case studies on [page 13](#) demonstrate, recycling works best when it is resourced appropriately.

EPR would help to close gaps in the five key areas:

→ **Recyclable Packaging Design Incentives**

EPR policies create strong incentives for companies to design their packaging to be recyclable either through mandates or through fee setting (with lower fees payable for recyclable packaging through eco-modulation).

→ **Better Access and Material Acceptance**

EPR provides financial support to local recycling systems, helping ensure universal recycling access and greater acceptance of recyclable materials across communities.

→ **Better Recycling Engagement**

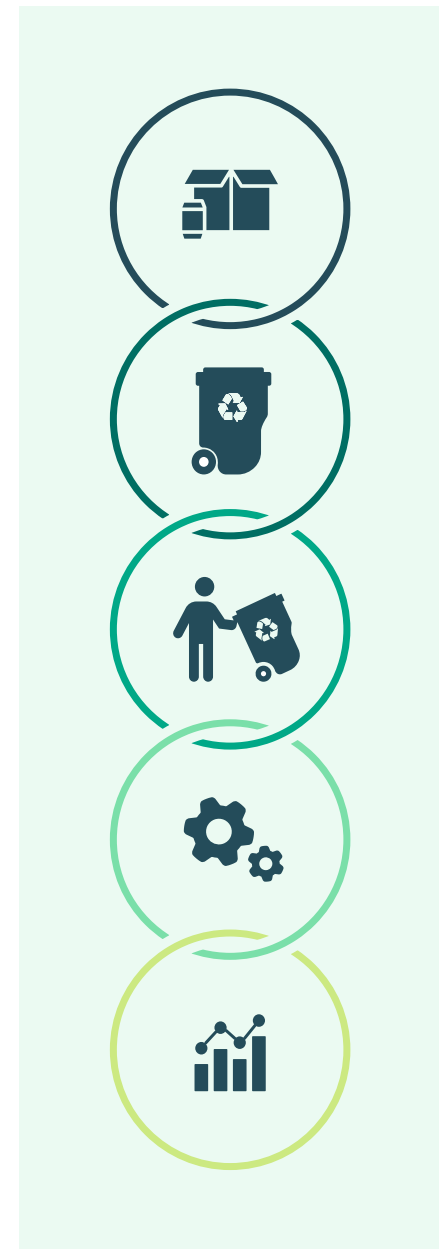
Without EPR, funding for communication and outreach is dependent on municipal efforts, state and federal grants, or nonprofits. According to a 2019 survey,¹⁷ 75% of survey respondents that have education budgets reported spending an average of \$0.95 per household annually, and less than half of communities nationwide have dedicated outreach budgets. EPR unlocks funding to boost clear, consistent communication and outreach so that more households participate in recycling and put more of their recyclables in their recycling containers.

→ **Optimized Processing**

Municipally-funded recycling programs have a limited capacity for new investment. EPR incentivizes companies to invest in collection, sorting, and end-market infrastructure to meet high recycling performance standards.

→ **Greater Market Stability**

EPR helps protect recycling programs from market downturns. The current U.S. recycling system is dependent on the value of materials to determine material acceptance and capture at recycling facilities. Low material values might lead local governments to stop recycling or a private recycling facility to stop accepting materials. EPR maintains high collection rates by requiring producers to meet recycling performance goals regardless of material value and market fluctuations.



¹⁷ [State of Curbside Report 2020, Municipal Measurement Program](#)



Collecting recyclables is an intensive and expensive exercise with significant costs to operate and maintain recycling trucks, equipment, and facilities.

How Would EPR Benefit all States?

Figure 23 on the following pages shows the estimated benefits of EPR-style policies for states that have yet to implement EPR.¹⁸

Recycling has proven to be a strategy that transcends political divides.¹⁹ A high-performing recycling system calls for both bipartisan and industry support for EPR.

- **EPR would reduce disparities in recycling services across the nation**, and address underserved populations and regions with less recycling access through better system financing from industry investment.
- **Recycling depends on paper mills, glass plants, plastic reclaimers, and aluminum and steel mills.** Bolstered by access to new and expanded supply from EPR, businesses can grow and hire more workers, supporting local economies.
- **An increasing number of manufacturers and commodity industry companies are supporting policies like EPR** to meet supply chain demands, both by rethinking and minimizing packaging and helping fund recycling systems.
- **EPR motivates companies to design their packaging for recyclability** through eco-modulated fees or mandates.
- **Through EPR, companies directly invest in recycling systems and packaging innovation to reduce waste.** This also helps reduce government spending, relieving pressure on local jurisdictions to raise taxes to fund and support recycling services.

EPR is a game-changing step forward. However, thus far it has been adopted in a few states, most of which were already performing well relative to national standards. Even as more states continue the trend of adopting EPR, it will take several years to see the positive gains in recycling access, engagement, and processing. Broader impact will come from the complementary strategies, described below.

¹⁸ The Partnership's report [Increasing Recycling Rates with EPR Policy](#) also included estimates of projected new tonnage from EPR implementation for CO, CT, FL, MD, WA, and WI. This report's projections of new EPR-induced tonnage align fairly closely with those projections, with the exception of Washington, where projections are notably higher in this report. The projections of new tonnage in this report use a more detailed analysis based on the main factors of residential collection performance (access, material acceptance, participation, participant capture) and account for MRF material losses.

¹⁹ [Consumer Insights on Packaging, Labels, and Claims for Recycling](#) (see page 2)

Figure 23

Estimated Benefits of EPR-Style Policies in Remaining States*

	Total Generated Residential Tons	Current Recycled Tons w/ Deposit	Current Recycling Rate	Additional Recycled Tons from an Ideal System	Recycling Rates with an Ideal System	% Increase in Recycling Rate
Alabama	732,578	67,622	9%	417,222	66%	617%
Alaska	101,666	14,786	15%	53,077	67%	359%
Arizona	1,022,387	211,969	21%	463,562	66%	219%
Arkansas	457,654	53,086	12%	251,117	66%	473%
Delaware	144,525	39,565	27%	56,314	66%	142%
District of Columbia	103,002	29,297	28%	35,653	63%	122%
Florida	3,004,814	635,338	21%	1,327,148	65%	209%
Georgia	1,483,057	193,824	13%	786,714	66%	406%
Hawaii	178,006	39,027	22%	83,877	69%	215%
Idaho	256,596	36,380	14%	135,168	67%	372%
Indiana	1,024,120	170,963	17%	512,110	67%	300%
Iowa	501,143	119,961	24%	232,425	70%	194%
Kansas	450,899	66,038	15%	235,272	67%	356%
Kentucky	680,968	93,255	14%	358,491	66%	384%
Louisiana	681,462	54,966	8%	396,719	66%	722%
Massachusetts	1,030,275	278,471	27%	419,464	68%	151%
Michigan	1,564,625	411,140	26%	684,813	70%	167%
Mississippi	434,199	33,818	8%	253,933	66%	751%
Missouri	960,652	120,621	13%	520,297	67%	431%
Montana	170,894	15,562	9%	98,183	67%	631%
Nebraska	300,020	26,441	9%	173,088	67%	655%

* Excludes the states highlighted in Figures 21 and 22

Figure 23 (continued)

Estimated Benefits of EPR-Style Policies in Remaining States*

	Total Generated Residential Tons	Current Recycled Tons w/ Deposit	Current Recycling Rate	Additional Recycled Tons from an Ideal System	Recycling Rates with an Ideal System	% Increase in Recycling Rate
Nevada	434,783	92,571	21%	193,880	66%	209%
New Hampshire	209,955	37,629	18%	101,632	66%	270%
New Jersey	1,276,698	299,699	23%	547,985	66%	183%
New Mexico	307,044	51,227	17%	151,815	66%	296%
North Carolina	1,557,432	295,770	19%	732,627	66%	248%
North Dakota	120,837	12,148	10%	66,508	65%	547%
Ohio	1,855,298	368,672	20%	868,483	67%	236%
Oklahoma	585,751	66,128	11%	323,866	67%	490%
Pennsylvania	2,022,383	398,554	20%	955,054	67%	240%
Rhode Island	163,517	42,784	26%	66,398	67%	155%
South Carolina	754,571	114,413	15%	382,689	66%	334%
South Dakota	134,485	14,292	11%	74,554	66%	522%
Tennessee	1,027,385	127,279	12%	553,956	66%	435%
Texas	3,804,886	629,027	17%	1,875,375	66%	298%
Utah	395,058	73,178	19%	190,418	67%	260%
Vermont	103,366	25,941	25%	46,774	70%	180%
Virginia	1,240,428	187,308	15%	635,197	66%	339%
West Virginia	287,270	28,420	10%	162,601	66%	572%
Wisconsin	929,714	213,034	23%	404,944	66%	190%
Wyoming	91,253	10,201	11%	50,480	66%	495%
Total	32,585,656	5,800,404	18%	15,879,884	67%	274%

* Excludes the states highlighted in Figures 21 and 22

Proactive Regional Investment

What are the risks to industry of a low-performing recycling system?

With greater commitments to sustainability from private industry, companies must meet those commitments by investing more in the recycling system than what is required by legislation. Legislation alone will not deliver the materials needed to meet the commitments that are looming on the near horizon, nor will legislation ensure that packaging recyclability claims hold true across all regions of the country. The current community-financed collection infrastructure places real physical limitations on the amount and type of recyclable material available. Recycled content goals, shifting operations to post-consumer versus virgin feedstocks, and innovations for recycling facilities are all positive steps. However, without investment in collection, companies will find they lack the recyclable material needed to fill capacity and meet both internal and regulatory targets. The risks of not investing are not theoretical.

Where should private industry invest?

Companies have much to gain by channeling private funding toward boosting recycling in places where large amounts of recyclable materials are lost that could be a valuable source of supply. Our [Louisiana case study \(page 45\)](#) highlights the gains and opportunities for private industry from implementing a more robust residential recycling system in that state. [Figure 20](#) on page 33 identifies some examples of areas with large quantities of lost material where investment could create a large, positive impact.

What's in it for private industry?

Private industry should be motivated to make this investment for three key reasons:

- 1 Customers expect companies to make sustainable packaging choices and are loyal to those that do.**
84% of consumers expect packages to be recyclable and made from recycled material, and 71% will go out of their way to support sustainable companies.²⁰ More broadly, the public is aware of how much waste is generated by product packaging and consumers expect companies to address this.
- 2 Companies have committed to use recycled content and make their packaging recyclable.**
If they are to adhere to these commitments, they will need adequate supply of recycled material, which can only come from a well-functioning residential recycling system. Moreover, current and emerging recycled content regulations require corporations to comply and failure to do so poses a serious business risk.
- 3 Companies rely on interstate commerce and will increasingly need recycling to function effectively in all states, including those with and without EPR policies in place.**
By investing in areas that may lag in policy adoption, especially where there is large-scale disposal of recyclable materials, industry could complement the recovery increases in EPR states with substantial new tonnage elsewhere.

Adhering to public commitments, meeting consumer expectations, and fulfilling legal requirements create powerful incentives to invest in building and enhancing collection capacity, as well as end-use processing and manufacturing capabilities.

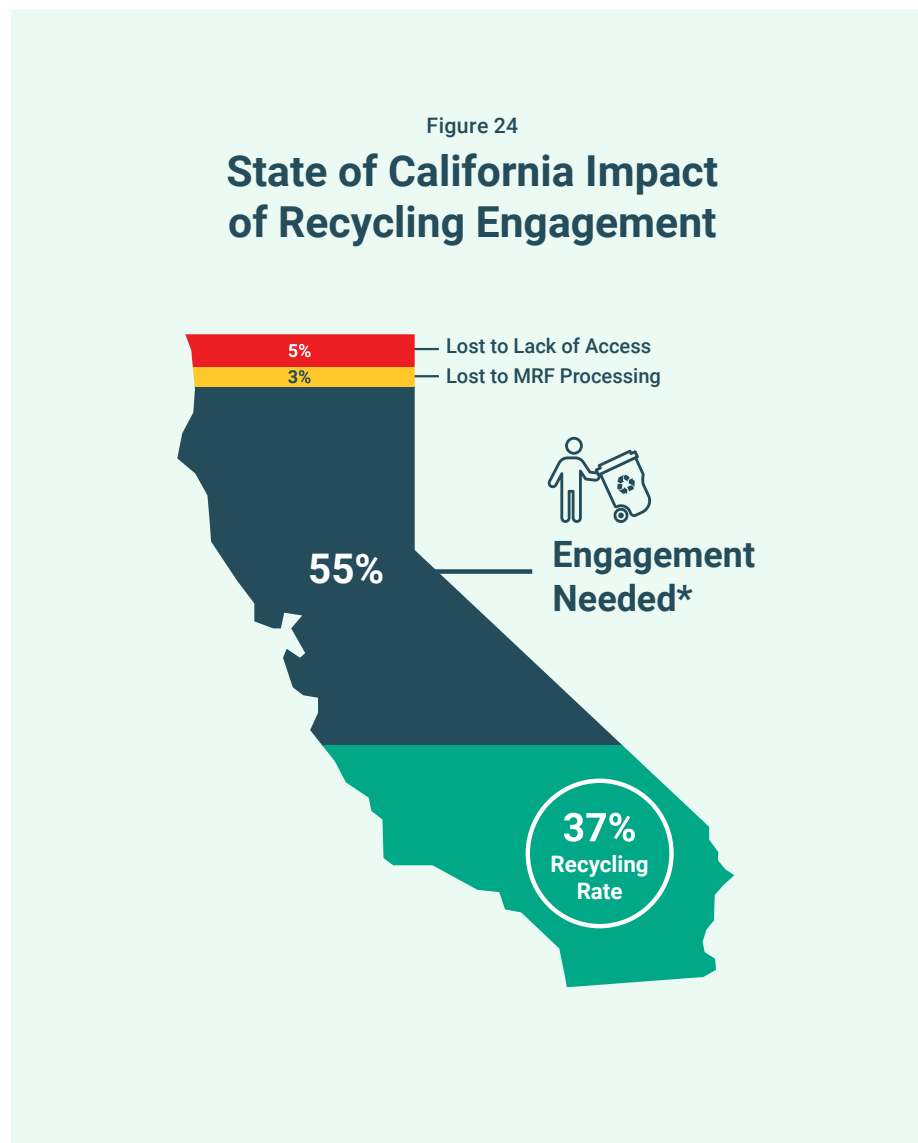
²⁰ [SWNS Survey](#) results demonstrate that Americans prefer sustainable companies.

Invest in Recycling Engagement

Why is recycling engagement so important?

In Part 1, we showed that **an estimated 43% of all U.S. households participate in recycling** against a target of 90%. Although closing the participation gap relies on expanding access so more people can recycle, even where people have access, half of recyclables are lost because of engagement issues. Human behavior is an essential component of recycling. If there is confusion, lack of confidence, or other barriers and friction points, households are less likely to recycle. Encouraging individual action requires clear, consistent, ongoing communication and targeted support. Our research has consistently shown that people want to recycle and understand the importance of recycling, but they lack confidence to do so and are confused about the latest recycling rules. Whether through EPR fees or proactive investment, private industry needs to support communication, public engagement, and in-home tools to help overcome these barriers. Industry funding to improve recycling engagement can help companies adhere to their public commitments, meet consumer expectations, and fulfill legal requirements.

The importance of engagement becomes clear when looking at California, where **95% of residents have access to recycling yet 37% of material is recycled**. While the state's recycling rate is better than the national average, California shows us that access only gets us part of the way. Closing the remaining gap requires significant investment in communication, education, and public engagement tactics to shift recycling behaviors in the home.



*Full engagement encompasses the ability to recycle all recyclable materials, including through material acceptance.

What do we know about residential recycling engagement today?

People *intend* to recycle, but do not always act on their intent.

The vast majority of people believe recycling makes a difference (77%), and has a positive impact (77%),²¹ but over half of household recyclables still end up in the trash instead of the recycling bin due to lack of engagement.

Confidence in recycling is in decline.

Surveys conducted for our [2022 Recycling Confidence Index](#) show a lack of public trust in recycling. **Less than half of those surveyed for the Index said they believe the items they place in their recycling bin are made into new products** and very few people (17%) feel well-informed about what happens to their recycling. This is important because there is a significant correlation between confidence and positive recycling behaviors. If people don't think recycling is worth the effort, they are much less inclined to do it. People are looking for reassurance that their recyclables are actually recycled.

Confusion around how to recycle is high.

Our research and pilots show that many people *think* they know how to recycle, but when tested are often mistaken due to outdated information, confusion about labels, and uncertainty about accepted materials. **For example, only 60% of people know food does not belong in recycling bins** and 50% say plastic bags can go in bins, even though very few programs accept plastic bags and they are a hazard for recycling facility sorting machinery.²²

People do not have the information they need to recycle right.

The pace of improvements in packaging and the recycling system mean recycling rules change and residents need frequent, systematic communications to stay up-to-date. Unfortunately, our Recycling Confidence Index research shows that most Americans (75%) do not recall receiving any kind of communication from their local program in the past year. On a more positive note, **those who do recall receiving communications report higher satisfaction and stronger recycling participation behaviors.**

Figure 25

Recycling Communication



6 out of 8 Americans (75%) do not recall receiving any kind of communication from their local recycling program in the past year.²¹

Need for messaging and tools that go beyond “one size fits all”.

Because human behavior is nuanced, recycling messaging and tools need to be nuanced as well. We must move beyond the “one-size-fits-all” approach and use modular solutions that can scale rapidly (see our [Ethnography Report](#)).

In short, if we want to improve recycling, households must be set up for success to fully engage in recycling. EPR policies will only increase this need because manufacturers will soon be held responsible for reaching ambitious recycling targets and incorporating post-consumer recycled content into their packaging.

²¹ [Recycling Confidence Index Research Report](#)

²² [Consumer Insights on Packaging, Labels, and Claims for Recycling](#)

How can we improve recycling behaviors?

Our research reveals a huge opportunity to better support recyclers by investing in communications at a level on par with our investments in collection, processing, and end markets. We can move the needle on household engagement by:

Providing frequent visuals of what can and cannot be recycled at home.

Ideally, these communications come in the form of mailers or recycling container signage and focus on common trouble materials like plastic bags, food contamination, foam packaging, and batteries.

Tailoring messaging and levels of information for different types of recyclers.

There is a lot of variability in recycling behavior. Our research shows that people come to recycling from very different perspectives (see our [Segmentation Research](#)). Therefore, we need to move away from blanketed messaging and toward a suite of materials for different types of recyclers, including effective communications for multicultural audiences. People just getting started with recycling may benefit most from support with setting up an in-home system to capture material, while more proficient, committed recyclers may want specifics, including what happens to the materials they set out at the curb and where to go for “drop-off only items”.

Activating positive feelings to increase trust and enthusiasm for recycling.

Recycling success stories show how and why the system works and build trust that recycling right is worth people’s time. Even something as simple as a bin decal reading, “Headed off to a new life, not the landfill” provides encouragement and reassurance.

Guiding people on how to correctly interpret packaging and product labels.

People need to understand what labels really mean. This includes supporting policies to make labels less confusing, such as removing chasing arrows, and proposing new solutions, such as our [Recycle Check tool](#) that uses QR codes on products to give people community-specific recycling information.

But does it really work?

We’ve seen targeted recycling engagement and behavior interventions cut contamination in half and increase materials collected by as much as one-third. For example, as noted earlier in the report, in Reynoldsburg, Ohio, a series of cart tags that used empathetic messaging to destigmatize confusion about recycling drove a 38% increase in average recycling route tonnage. This proves not only that increases in household engagement are possible – they are *happening*.

Invest in Recycling Behaviors



Provide Visuals



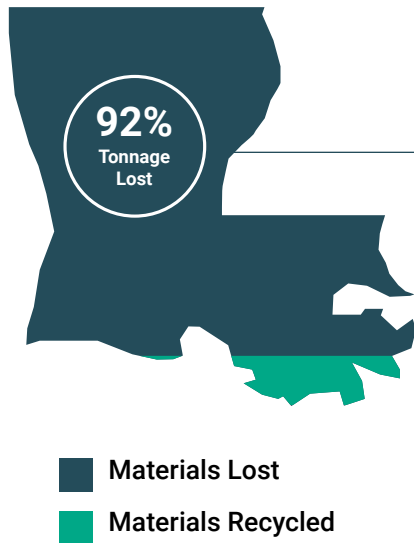
Tailor Messaging



Activate Trust



Clear Labeling



Louisiana Case Study

The Opportunity

The State of Louisiana provides an interesting example of how each of these strategies could work. Louisiana residents generate roughly 681,000 tons of recyclables annually, representing a market value of roughly \$64.6 million.²³ However, we estimate that a total of **626,000 tons of residential recyclables are currently being landfilled** instead of recycled. Louisiana is also located in a region with many end markets for recyclable materials. This combination of untapped material and strong end markets creates an excellent opportunity²⁴ for the state.

EPR

The fees collected through a well-designed EPR program would provide a sustainable funding source for residential recycling access, recycling engagement, and processing and sortation in all communities — rural and urban. Beyond that, the EPR capital infusion could create new jobs, strengthen the supply of sustainable raw materials, while reducing waste, conserving natural resources, and lowering greenhouse gas emissions.

Proactive Investment

Louisiana’s location on the Gulf Coast gives it an advantage in processing and in manufacturing new products. Regions all over the United States ship recyclables to the Gulf Coast for raw materials. In calendar year 2022, the annual regional prices for recyclables in the Gulf Coast were frequently higher than that of the annual national average.²⁵ We estimate that there are 11 end market sites in and directly outside of Louisiana. However, currently, there are not enough processing facilities in the state. Private investment in recycling facilities and additional processing methods, such as Hub and Spoke systems,²⁶ could unlock recycling opportunities for Louisiana.

Investment in Engagement

A major barrier to improving Louisiana’s recycling landscape is the lack of access, education, and outreach. Currently, recycling education and program outreach in Louisiana are limited or non-existent. This leads to a lack of awareness about recycling programs, lower levels of participation, reduced confidence in recycling, and poor program performance. Investment in recycling education and program outreach can build confidence in recycling statewide, bolster participation, improve recycling rates, and drive program growth and development.

²³ Based on average national commodity values between December 2022 and November 2023 from RecyclingMarkets.net

²⁴ In September 2023, the city of New Orleans was awarded a \$3.9 million grant from the EPA for a solid waste plan and universal carting with community outreach and education. The Partnership will be working with the city to help implement the plan and provide educational resources; we also committed to providing grant dollars.

²⁵ Based on summarized calendar year 2022 data from RecyclingMarkets.net

²⁶ Hub and Spoke systems enable materials to be consolidated at a centralized transfer facility, and then sent to the nearest Material Recovery Facility (MRF).

Conclusion

What You Need To Do

By comparing the current state of residential recycling with the requirements of a truly efficient system, it becomes clear where the gaps are greatest, and where policy, investment, and action will have the largest impact.

Policymakers



- **Adopt EPR. It is the most effective strategy to drive** improvement at every step of the recycling system because it channels packaging-based financing to improve access, engagement, and processing, while incentivizing packaging recyclability and supporting end markets. EPR also provides industry funding to help close the gap in recycling engagement, the area most in need of improvement.
- **For policymakers at the Federal level, national EPR can** establish much needed harmonization and achieve change at the highest level across the country.
- **For policymakers at the State level, in the absence of** national policy, as you pursue EPR aim to harmonize new legislation with policies that have already been adopted.
- **For policymakers in States not currently contemplating** EPR, consider the data and projections in this report as compelling reasons to pursue EPR.
- **In addition to EPR, drive additional change through** deposit return systems, recycled content requirements and recycled content preferences, as ways to strengthen end markets.

Companies



- **Support EPR – it is the most effective policy mechanism to enable the private** sector to reap the economic benefits of recycling, adhere to public commitments, and meet consumer expectations.
- **Harvest the opportunities of investment in recycling in locations with large** amounts of untapped recycled raw materials as noted on [page 33](#).
- **In addition to EPR, fund improvements in the system where the gaps are greatest** – especially recycling access and engagement. Without investment in collection, companies will not have the recyclable material they need to fill any new capacity they create and meet both internal and regulatory targets.
- **For consumer-packaged goods companies, lead the way to a future where all** packaging is designed for recyclability. It will help to meet expectations for recycled content, and also strengthen end markets for recycled commodities.

State and Community Recycling Leaders



- **Use the data and findings from this report and turn them into action, especially** through communication, education, and public engagement. Increasing participation and participant capture (see [pages 17](#) and [18](#)) lowers the cost per ton to collect recyclables.
- **Help develop and advocate for strong policies to push real improvements in** recycling in your state and community.

For those who believe in recycling as a strategy for combating our climate and waste crises:



- **Consider the impact on greenhouse gas emissions and waste reduction alone from** the implementation of EPR in just four states – and support EPR as a way to unlock these gains nationwide.
- **Act with a sense of urgency to help push for a high-performing recycling system.** Widescale change takes time to implement and the time to start is now.

This report underscores the importance of data as an essential ingredient for assessing the performance of recycling. There are, however, data gaps in areas where deeper understanding would lead to greater progress. We therefore look forward to working with all recycling stakeholders to share and improve data and analytics.

Appendix: Methodology

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Appendix Introduction

The Recycling Partnership's [State of Recycling Report](#), published in January 2024, finds that 79% of recyclable material is lost to disposal. A new methodology—more comprehensive than that of previous reports—reveals that every material type is under-recycled and too many households lack access to residential recycling programs.

This companion to the State of Recycling Report outlines how The Recycling Partnership combined data and modeled assumptions to analyze the fate of recyclable packaging and printed paper. We followed recyclable materials life cycle from their entry as products in households to their exit as commodities from materials recovery facilities (MRFs). The data is gathered from our own material capture studies, publicly available capture data, hundreds of recycling programs we work with directly, our grants and technical assistance projects with MRFs, and extensive research into local material collection and acceptance data.

The report provides new data, analysis, and perspectives on where we are today, where the weak spots are, and where investment and action will have the biggest impact. We then explore **three strategies for recycling system success**:

- 1 **Extended Producer Responsibility (EPR) Adoption**
- 2 **Proactive Regional Investment**
- 3 **Investment in Recycling Engagement**



What is New About the 2024 State of Recycling Report Methodology

This report departs from previous The Recycling Partnership analyses in two key respects. First, we include both single-family and multifamily homes, noting that only 37% of the latter have recycling access, defined as access to recycling on-property. Second, we incorporate film and flexible packaging, which is becoming more prevalent, even though very few curbside recycling programs accept this material. With this more comprehensive look at the fate of materials in the system, we find 21% of recyclable material is being recycled—a lower benchmark than used in previous reports, but one that encapsulates where funding and action can drive the most progress.

How to Use This Document

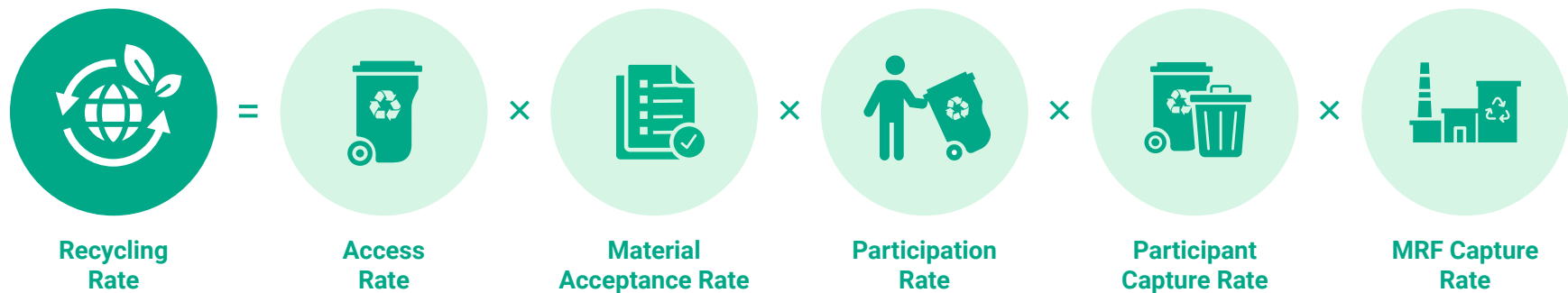
All stakeholders can use this document to better understand how The Recycling Partnership arrived at the status of residential recycling, and the approach and results to catalyze discussion on how to assess system performance. Brand companies and specific material stakeholders can use this document to understand how different factors combine to affect the fate of their packaging. Municipalities, counties, regional authorities, and states can use the methods described here to understand the current level of material recovery in their jurisdiction or geographical area and which factors matter most for their programs.

For example, a jurisdiction with longstanding curbside recycling may find work to do on material acceptance and participation, whereas another community might find multifamily access key to increasing material recovery. In many cases, The Recycling Partnership has data to share to support analysis and can provide technical assistance to assist with the process.

Metrics Described

The fate of materials generated from households is determined by the residents' access to recycling, material acceptance, household participation, participant capture, and the ability of MRFs to process these materials. The State of Recycling Report focuses on packaging material in the residential waste and recycling stream, as most packaging material is found in the home, and this sector of the waste stream is severely under-resourced. The only exception is cardboard. The majority of cardboard is found in the commercial sector. However, it continues to grow in the residential stream due to e-commerce.

On a high level, the factors that determine the fate of materials were combined, as depicted below, to model the state and national recycling rates shared in the report.



By capturing each factor in the equation, The Recycling Partnership's goal was to highlight the importance of increasing material recovery and providing a roadmap where each factor plays a vital role in system improvement.

Each factor that determines the fate of materials, from recycling access to MRF capture rates, is described here, with details regarding the data source and the assumptions made for the analysis.

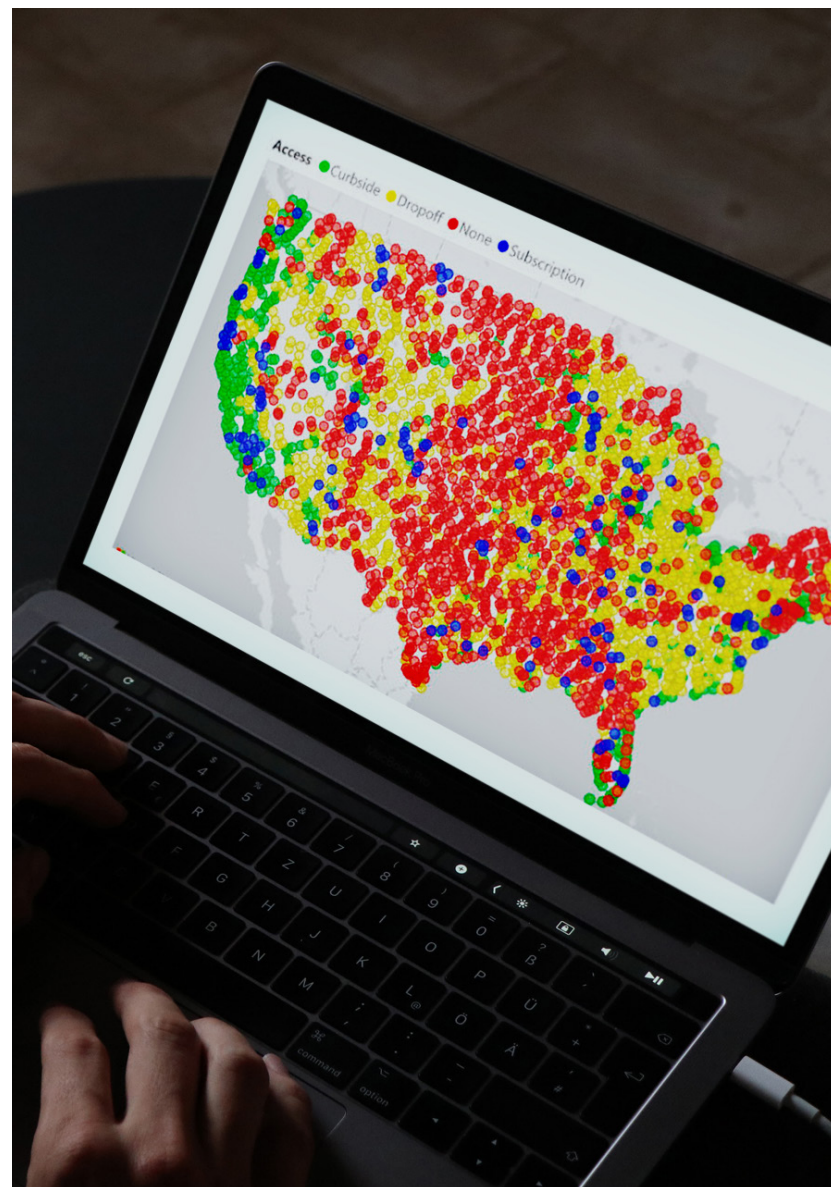


Access Rate: Who Can Recycle?

The Recycling Partnership tracks information for over 9,000 U.S. recycling programs in our [National Recycling Database](#). The access type for each community in the database is determined by a combination of manual research, direct work with communities, and data entries from community recycling program managers through either the Municipal Measurement Program (MMP) or the Recycling Program Solutions Hub (RPS Hub).

Data used in the report analysis was pulled from the database on October 20, 2023. We use the 2020 [American Community Survey \(ACS\)](#) 5-year averages from the U.S. Census Bureau as the source of community locations and the number of occupied single-family and multifamily households in each community.

We include all buildings with up to four units as single-family households. Buildings with more than four units are assumed to be multifamily households. Mobile homes and other housing types are also assigned to the multifamily category.





Single-Family Access Categories

To determine access for single-family households, we look at what kind of program is available to residents and, if it is curbside, whether they are automatically enrolled in the program or required to sign up, and what type of container a resident receives. We classify programs for single-family households into the following categories:

→ Curbside With Carts

Residents in these communities are automatically given a recycling cart for curbside recycling.

→ Curbside Without Carts

Residents in these communities are automatically enrolled in curbside recycling and are given a container other than a cart (such as bins or barrels), provide their own container, or bag their recycling.

→ Subscription

Residents in these communities must enroll in the recycling program and are not required to subscribe to a recycling program. This category encompasses free and paid opt-in programs within a community and open market where residents can hire a hauler of their choice for their recycling. For this report, we assumed that 30% of households in a community with a subscription program would sign up for the program and, therefore, have access to recycling. This is based on data from the 2020-21 Sustainable Packaging Coalition Centralized Study on Availability of Recycling.

→ Drop-Off

Residents in these communities only have access to recycling at one or multiple drop-off sites—no curbside service is available. These could be staffed or unstaffed drop-off sites.

→ None

Residents in these communities have no active program, or the program is a mixed waste program where all trash is sorted to extract recyclables, and residents don't have access to recycling drop-offs.

→ Not Researched

No information about the community program has been found. This category covers only 1% of the U.S. household total.

With both cities and counties operating and supporting recycling programs, we have researched both. Especially with small communities, defined in our research as less than 2,500 total households, it is common for the county to provide a recycling program. If we have not researched a small community, we assign the households to the county program, if it exists.



Multifamily Access Categories

To determine access for multifamily households, we examine whether the state or community has an ordinance requiring recycling for residents in multifamily buildings. If there is no evidence of regulations, then we research the community to see if they provide some support to residents and property managers through education or technical assistance. We classify multifamily programs into the following categories:

→ **Mandatory**

The community has an ordinance in place requiring collection for multifamily residences.

→ **Some Oversight**

There is no ordinance requiring collection for multifamily residences, but the community offers education or technical support to residents and property managers of multifamily properties.

→ **Open Market**

This is the default value, with the assumption that property managers in most markets can hire a hauler to provide recycling for multifamily residences.

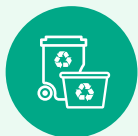
→ **None**

Local haulers do not provide recycling services to multifamily properties in this category.

For this report, multifamily households were determined to have access only if on-property recycling collection is available. Drop-off access for multifamily households was not included in the analysis, as multifamily properties typically provide on-site waste collection, and only a small percentage of multifamily households would choose to take their recyclables to an off-site location.

For each multifamily category above, we estimated the percentage of occupied households with a recycling container at their residence, based on data collected from The Recycling Partnership’s survey of communities in four states with a mix of state and local ordinances. The number of households in each category was multiplied by the respective on-property access factor below.

	% of HH with On-Property Access
Mandatory	90%
Some Oversight	30%
Open Market	6%



MF On-Property Recycling Access Rate

=

HHs in Mandatory Category x 90%

+

HHs in Oversight Category x 30%

+

HHs in Open Market Category x 6%

Total Occupied Multifamily Households

MF = Multifamily, HHs = Households



Material Acceptance Rate: What Can Be Recycled?

For each program, we also research the materials accepted for collection. For this report, we used general, representative categories and not the full level of detail available in the National Database. This data is kept up to date with each community researched at least once per year.

If a community has both a curbside and drop-off program, the material list is only for the curbside program. Therefore, if a material is not accepted curbside but is accepted at a drop-off, it is assumed to be not accepted for the program. Similarly, we prioritize the local program over a county program. If a local program does not accept a material, we will not override the acceptance within a county or state program. For this analysis, the curbside program material list was used for multifamily.

Fourteen (14) material categories were analyzed in this report:

- Cardboard
- Mixed Paper
- Aseptic And Gable-Top Cartons
- Glass Containers
- Steel Cans
- Aluminum Cans
- PET Bottles
- Non-Bottle PET
- HDPE Natural Bottles
- HDPE Colored Bottles
- Polypropylene (PP)
- Plastic #3, 4, 6, and 7
- Bulky Rigid Plastics
- Film & Flexible Packaging

The acceptance rate for each material type in each state or nationally is calculated by dividing the number of households in communities that accept the material that have access to recycling by the total households that have access in that state or nationally.

$$\text{Material Specific Acceptance Rate (\%)} = \frac{\text{\#HHs with Access in Communities that Accept Material}}{\text{Total Single Family \& Multifamily Households with Access}}$$

To calculate overall state and national material acceptance rates, we total the occupied households for each program that accepts the material and weigh each material type by the proportion of that material type in the total household generation of all material types. Households without access are excluded from the calculation. We calculated the acceptance rate with and without plastic film. In the calculation of material acceptance without film, the number of households that can recycle film curbside and the proportion of film generated from homes are excluded.

$$\text{Overall Material Acceptance Rate (\%)} = \frac{\left(\frac{\text{\#HHs with Access that can Recycle Cardboard} \times \frac{\text{HH Cardboard Generation}}{\text{Total Material Generation}} \right) + \left(\frac{\text{\#HHs with Access that can Recycle Mixed Paper} \times \frac{\text{HH Mixed Paper Generation}}{\text{Total Material Generation}} \right) + \dots}{\text{Total Single Family \& Multifamily Households with Access}}$$



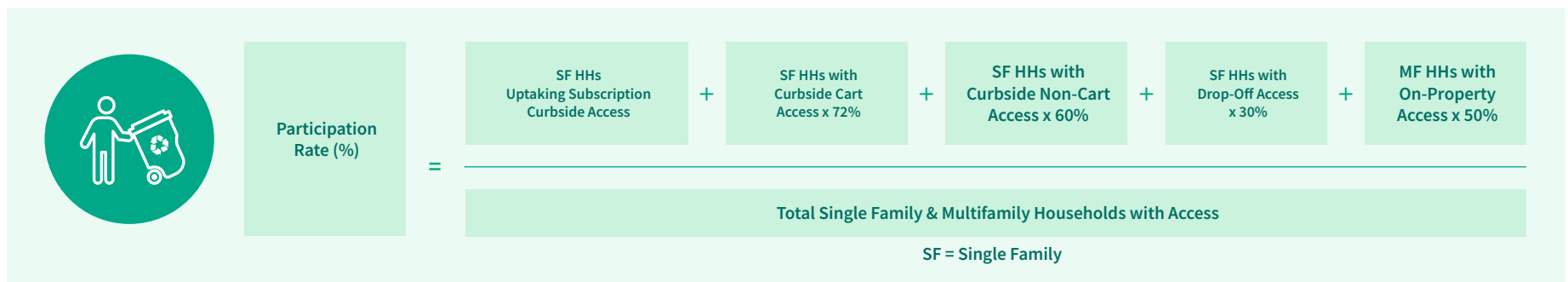
Participation Rate: Who Is Recycling?

We define participation in the recycling program as a household that places a recycling container out at the curb or drops off material at a drop-off site or in an on-property recycling container at least once per month. Participation for curbside programs can be measured by collecting set-out data for each household over four weeks. Households that set out their recycling container curbside at least once during that period are counted as participants, and the ratio of the number of participating households over the total number of households in the study area is the participation rate. Simply counting the number of recycling containers at the curb on a given collection day only provides a set-out rate and cannot be converted to a participation rate without household-specific set-out data over four weeks. Participation rate helps account for households that don't generate enough material to bring their container out every collection day, during vacations, or when not at home for other reasons.

For this report, we used the same single-family participation rate for programs with carts that we included in our [2020 State of Curbside Recycling Report](#): 72%. This was an average from over 100 programs that reported participation rates in our survey. This data indicates a lower participation rate for curbside programs without carts, and for this report we have assumed a 60% participation rate based on past project experience.

Summary of Participation Rates Used in the Report	
Single-Family Subscription	100%
Single-Family Curbside with Carts	72%
Single-Family Curbside (not Carts)	60%
Single-Family Drop-Off	30%
Multifamily	50%

We do not have comprehensive data on participation rates for multifamily programs but have seen lower rates than single-family programs in places we have studied. For this report, we assumed a 50% participation rate for multifamily households that have on-property access. For drop-off programs, we assumed a 30% participation rate based on the performance of communities with only drop-off to ones with curbside that have reported their tons collected to the MMP and RPS Hub. The number of households in each access type was multiplied by the respective participation rate to calculate the overall number of participating households. Participating households were divided by the total number of occupied households for the state and national participation rate.





Household Generation Rate: What is in the Waste Stream?

We assumed a uniform generation of each category of recyclable material for each single-family household in the country. This household generation rate by material is an average of 57 data points collected through capture studies conducted from 2017 through 2022 in 33 cities and counties across the U.S.

Although the generation rates we collected between 2020 and 2022 were higher than in previous years for many of the material types, excluding data from 2020 to 2022 only results in a 5% decrease in overall generation of materials from households, and the difference is negligible for majority of materials. Our datasets over six years are not from the same locations, and it is difficult to attribute the difference solely to the pandemic. We felt that having additional data points made the data more representative and reflective of current status.

Material Category	Single-Family Generation (lb/HH/yr)	Multifamily Generation (lb/HH/yr)
Cardboard	131.0	98.2
Mixed Paper	258.4	193.8
Aseptic & Gable-Top Cartons	7.4	5.5
Glass Containers	139.5	104.7
Steel Cans	20.9	15.7
Aluminum Cans	22.8	17.1
PET Bottles	59.5	44.6
Non-Bottle PET	13.1	9.8
HDPE Natural Bottles & Jars	12.9	9.7
HDPE Colored Bottles & Jars	16.2	12.1
PP	21.4	16.0
#3,4,6,7	13.2	9.9
Bulky Rigid Plastics	26.5	19.8
Film	83.5	62.6
TOTAL With Film	826.2	619.6
TOTAL Without Film	742.7	557.0

These studies characterize the waste and recycling generated by a sample of households in parallel, so that all generation is examined at the same time from the same households. Household generation of each material type in pounds per household per year (lb/HH/yr) is calculated by multiplying the composition of waste and recycling samples by the tonnage collected from each respective stream in a year and dividing by the number of households representing the tonnage. We average the data by material category across all the studies for an average household generation rate. The studies currently only have enough data points for a generation profile for single-family households. For multifamily households, we assumed that the generation rates are 75% of the single-family rate.

These per-household rates of material generation are multiplied by the number of occupied households by household type (single-family v. multifamily) to produce overall total material generation estimates for each state and nationwide. The figure used to calculate the denominator in the report's calculation of a 21% U.S. recycling rate is 47 million tons, a product of the number of all occupied U.S. households times the material generation rates to the left.





What is a Capture Study?

In a residential capture study, samples of waste and recycling streams are collected from the same collection route or individual households from the same time period and sorted into predetermined categories. Samples can be collected from “back of truck,” meaning samples are taken once a collection truck empties materials from their collection route, or directly from carts set out at the curb. These samples are then sorted to determine the composition of the trash stream and the recycling stream. The composition of each stream is then applied to the tonnage collected to understand the total weight of material generated from a home and how much of each material is in each stream. When the samples are collected only from households that are setting out both their trash and recycling at the curb, the resulting capture rate of a recyclable material is called participant capture rate. Residential capture studies allow us to understand:

- 1 **Total generation of materials from households with residential collection access**
- 2 **The amount of recyclables (for each type of recyclable material category) captured in the residential recycling program;**
- 3 **The amount of recyclables (for each type of recyclable material category) lost in the waste stream;**
- 4 **Contamination rate and the categories of contaminants that are most prevalent in the recycling stream;**
- 5 **A distribution of households that behave in a certain way (for example, X% of households have more than 20% contamination), if samples are collected directly from households with both trash and recycling set out and each household's sample is sorted separately.**



Participant Capture Rate: How Much Recycling is Collected from Homes?

The primary goal of a capture study is to understand how much of each material type ends up in the trash stream versus the recycling stream, which is critical for assessing program performance. The weight of the material in the recycling stream divided by the total weight of the material generated from a household is called a capture rate, measuring how much of residents' recyclables are collected by the recycling program. When samples are collected only from households with both trash and recycling set out at the curb, the capture rate from these samples is called a "participant capture rate." The analysis in the report used an average of 29 single-family participant capture rates collected from 2017 through 2022 from 15 cities and counties. The same participant capture rates were used for single-family and multifamily households.

Material Category	Participant Capture Rate
Cardboard	81.2%
Mixed Paper	60.1%
Aseptic & Gable-Top Cartons	50.0%
Glass Containers	61.7%
Steel Cans	46.9%
Aluminum Cans	54.7%
PET Bottles	55.3%
Non-Bottle PET	43.5%
HDPE Natural Bottles & Jars	63.9%
HDPE Colored Bottles & Jars	56.2%
PP	30.1%
#3,4,6,7	32.0%
Bulky Rigid Plastics	38.7%
Film	20.0%
TOTAL With Film	56.5%
TOTAL Without Film	60.7%



MRF Capture Rate: How Much Recycling Reaches the Secondary Market?

Recyclable commodities that enter MRFs from collection trucks suffer some loss during the material sorting process. The MRF capture rate is the percentage of inbound commodity materials successfully making it into outbound commodity streams to markets. Little formal data is available on individual commodity MRF capture rates.

The Recycling Partnership used its extensive interaction with MRFs and MRF equipment companies, in addition to a few existing studies for some specific materials, to produce a set of assumed factors of average MRF capture rates for this report. MRFs also receive contaminants or materials that are not accepted and do not constitute commodities; those materials were not included in the factors below, as the focus was on the recyclable commodities.

Material Category	% of Material Sorted and Sold to an End Market
Cardboard	90%
Mixed Paper	90%
Aseptic & Gable-Top Cartons	70%
Glass Containers	90%
Steel Cans	96%
Aluminum Cans	90%
PET Bottles	85%
Non-Bottle PET	60%
HDPE Natural Bottles & Jars	93%
HDPE Colored Bottles & Jars	93%
PP	80%
#3,4,6,7	65%
Bulky Rigid Plastics	70%
Film	40%
TOTAL With Film	87%
TOTAL Without Film	89%



Deposit-Return Systems: What is the Collection Rate for Cans and Bottles?

In states with deposit-return systems (DRS), also commonly known as bottle bills, a significant amount of recyclable material is collected through this system. For this report, The Recycling Partnership wanted to account for residential materials that are collected through the DRS in 10 states that currently offer this collection system to residents: California, Connecticut, Hawaii, Iowa, Maine, Massachusetts, Michigan, New York, Oregon, and Vermont.

To conduct the analysis, The Recycling Partnership used published data available from the Container Recycling Institute (CRI), the DRS states, and other industry sources. DRS programs primarily focus on beverage containers, and most DRS-covered materials are PET, aluminum, or glass. Although some containers made of other materials (for example, HDPE) are covered in some states, they were assumed to represent only small tonnages and not included in the analysis.

The Recycling Partnership took the overall material generation rates of PET, aluminum, and glass for each state and made informed estimates of what percentage of each stream were composed of beverage products: PET, 85%; aluminum, 90%, and glass, 77%. We then used CRI and state data from 2022 to estimate what percentage of the beverage products were subject to deposit in each state. Finally, we used either overall or material specific redemption rates, where available, to estimate the recovery rate for each material type in each state.

The amount of PET, aluminum, and glass containers redeemed from single-family and multifamily sources were estimated separately and then combined to estimate DRS recovery from both residential sources. The resulting figures were added to the recycling estimates from curbside, drop-off, and multifamily collection sources that would be sold to end markets by MRFs. The amount of PET, aluminum, and glass containers available for curbside, drop-off, and multifamily collection were discounted by the redemption rate (RR) in these states to prevent double counting.

	% PET Subject to Deposit	RR of PET Beverage Bottles	RR of All PET Bottles	% Aluminum Subject to Deposit	RR of Aluminum Beverage Cans	RR of all Aluminum Cans	% Glass Subject to Deposit	RR of Glass Beverage Bottles	RR of All Glass Containers
California	88%	60%	45%	88%	60%	48%	79%	60%	37%
Connecticut	77%	45%	29%	77%	45%	31%	73%	45%	25%
Hawaii	88%	58%	43%	88%	58%	46%	79%	58%	35%
Iowa	63%	65%	35%	63%	65%	37%	87%	65%	44%
Maine	92%	76%	59%	92%	85%	70%	100%	67%	52%
Massachusetts	40%	38%	13%	40%	38%	14%	60%	38%	17%
Michigan	55%	76%	36%	55%	76%	38%	66%	76%	39%
New York	78%	70%	46%	78%	70%	49%	79%	70%	43%
Oregon	88%	89%	66%	88%	89%	70%	79%	89%	54%
Vermont	46%	72%	28%	46%	72%	30%	87%	72%	48%



Recycling Rate: How Much is Recycled Overall?

For each commodity type and residential type (single family v. multifamily), the tons of materials recycled were calculated using the factors described above. To calculate the tons of materials recycled, these factors were applied to the total generation of each material type in each state and nationwide. DRS and glass separate collection recovered materials were added where applicable.

$$\begin{aligned}
 \text{Tons of Material Recycled (in non-DRS states)} &= \left[\begin{aligned} &\text{Tons of Material Generated From All Occupied SF Households} \times \text{SF Access Rate (\%)} \times \text{SF Material Acceptance Rate (\%)} \times \text{SF Participation Rate (\%)} \times \text{SF Participant Capture Rate of Material (\%)} \\ &+ \\ &\text{Tons of Material Generated From All Occupied MF Households} \times \text{MF Access Rate (\%)} \times \text{MF Material Acceptance Rate (\%)} \times \text{MF Participation Rate (\%)} \times \text{MF Participant Capture Rate of Material (\%)} \end{aligned} \right] \times \text{MRF Capture Rate (\% of Material)}
 \end{aligned}$$

$$\begin{aligned}
 \text{Tons of Material Recycled (in DRS States)} &= \left[\begin{aligned} &\left[\text{Tons of Material Generated From All Occupied SF Households} - \text{Tons of SF Material Subject to Deposit} \right] \times \text{SF Access Rate (\%)} \times \text{SF Material Acceptance Rate (\%)} \times \text{SF Participation Rate (\%)} \times \text{SF Participant Capture Rate of Material (\%)} \\ &+ \\ &\left[\text{Tons of Material Generated From All Occupied MF Households} - \text{Tons of MF Material Subject to Deposit} \right] \times \text{MF Access Rate (\%)} \times \text{MF Material Acceptance Rate (\%)} \times \text{MF Participation Rate (\%)} \times \text{MF Participant Capture Rate of Material (\%)} \end{aligned} \right] \times \text{MRF Capture Rate (\% of Material)} + \text{Tons of Material Collected Through DRS}
 \end{aligned}$$

$$\text{Recycling Rate (\%)} = \frac{\text{Tons of Material Recycled}}{\text{Tons of Material Generated From All Occupied Households}}$$



Extended Producer Responsibility: What Is the Projected Impact?

For states that have passed EPR laws and for those considering EPR, we assumed that successful implementation would result in each factor described above reaching the target levels for an effective recycling system. To project the potential quantity and rate of recycling possible at this ideal state, we assumed the following conditions would be met in each state. The same calculations described above were repeated with these ideal rates to estimate the recycling rate and additional tons recovered from the successful implementation of EPR.

Ideal Recycling Rates with EPR

