

State of Disposal and Recycling in California 2017 Update



California Department of Resources Recycling and Recovery

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Executive Summary

For three decades, the California Department of Resources Recycling and Recovery (CalRecycle) has been tasked with reducing disposal of municipal solid waste and promoting recycling in California. During that time, the landscape and requirements for recycling and solid waste management have changed dramatically. In particular, CalRecycle now implements the statewide 75 percent source reduction, recycling, and composting goal by 2020. CalRecycle must also meet even more ambitious organics disposal reduction goals by 2020 and 2025 and recover 20 percent of edible food for human consumption by 2025.

As CalRecycle monitors progress in meeting the 75 percent recycling goal and other waste reduction targets, the amount of disposed waste remains a key metric in evaluating the State's success. California's overall disposal increased for a fourth consecutive year to 35.2 million tons of material disposed in landfills and 7.5 million tons of material used in a disposal-related activity in 2016, or 6.0 pounds per person per day. This corresponds to a recycling rate of 44 percent, which is the lowest rate since the statewide 75 percent recycling goal was established in 2011.

This report, which builds on previous *State of Disposal in California* and *State of Recycling in California* reports,¹ will provide an update on disposal and recycling trends using the most up-to-date data available. The report identifies some factors that likely influence these trends, including relatively low disposal costs, declines in global scrap values for recyclable commodities, and limited in-state infrastructure, and highlights next steps for the Department.

Introduction

Californians generate solid waste at their homes and workplaces every day. Currently, less than half of this material is source-reduced, recycled, or composted, and the remainder is disposed at landfills (buried), disposed at transformation facilities (burned to produce energy), or handled through another disposal-related activity. The majority of this disposed material could be diverted for higher and better uses to meet the 75 percent statewide recycling goal, although it is likely that there will always be a small percentage of material that needs to be disposed or managed by alternative methods.

In the nearly 30 years since the State was tasked with monitoring disposal, recycling, and composting through the California Department of Resources Recycling and Recovery (CalRecycle), the management of solid waste has changed tremendously, with greater emphasis placed on saving resources and reducing disposal. Even so, from initial generation to final disposition, 42.7 million tons of material went to disposal, or activities closely related to disposal, in California in 2016. That amounts to over one ton of solid waste for every resident in 2016.

California has multiple solid waste reduction and recycling laws that are overseen by CalRecycle, including:

- Beverage Container Recycling and Litter Reduction Act (AB 2020, Margolin, Chapter 1290, Statutes of 1986), which established a system through the Beverage Container Recycling Program to collect and recycle beverage containers.
- California Integrated Waste Management Act (AB 939, Sher, Chapter 1095, Statutes of 1989), which established a 50 percent diversion mandate for jurisdictions.
- AB 341 (Chesbro, Chapter 476, Statutes of 2011), which established a statewide 75 percent recycling goal through source reduction, recycling, and composting by 2020. AB 341 also required local jurisdictions to implement commercial recycling programs to divert recyclable material away from landfills and required commercial generators and multi-family residences to arrange for recycling services starting in 2012.
- AB 1826 (Chesbro, Chapter 727, Statutes of 2014), which required businesses and multi-family residences to recycle their organic waste on or after April 1, 2016 (start date varies depending on threshold), and required local jurisdictions to implement organic waste recycling programs to divert organic material away from landfills beginning on January 1, 2016.

- AB 901 (Gordon, Chapter 746, Statutes of 2015), which updated recycling and composting reporting requirements and streamlined diversion and disposal reporting requirements.
- SB 1383 (Lara, Chapter 395, Statutes of 2016), which established targets to achieve a 50 percent reduction in statewide disposal of organic waste by 2020 and a 75 percent reduction by 2025. The legislation directs CalRecycle to adopt regulations by 2022 to achieve those targets and to recover not less than 20 percent of currently disposed edible food for human consumption by 2025.

Much of the current infrastructure for managing solid waste in California was built in response to state incentives and market forces based on the Beverage Container Recycling Program and the 50 percent diversion mandate for jurisdictions. However, California has recently seen declines in the number of beverage container recycling centers and stagnation in the number of composting facilities. Even as California continues to push towards new and more aggressive recycling targets, CalRecycle has not seen a meaningful decrease in the total amount of disposal since 2009. In addition, 2016 marks the fourth consecutive year that total disposal has increased.

This report builds on previous *State of Disposal in California* and *State of Recycling in California* reports that were released in 2015 and 2016.¹ This report highlights major changes in disposal and recycling over the last two years, discusses factors that may impact those changes, and identifies additional tools that will be needed to reach the State's goals.

Update on Disposal, Diversion, and Recycling Data

Definitions

CalRecycle is tasked with reducing disposal at solid waste facilities and diverting that material to higher and better uses, including through source reduction, recycling, and composting. As described earlier in this report, there are several different mandates and goals that CalRecycle operates under, and each has a slightly different definition of what activities are covered under disposal, diversion, and recycling (see Table 1).

Under AB 939, which set the 50 percent diversion mandate for local jurisdictions, disposal includes landfilling, exported waste sent for disposal, and transformation (waste to energy), while diversion includes source reduction, recycling, composting, alternative daily cover (ADC), alternative intermediate cover (AIC), other beneficial reuse at solid waste landfills, transformation diversion credit, and related activities. In addition, material management practices such as approved land application, biomass conversion, or inert debris fill do not count as disposal because they reduce the amount disposed at landfills and transformation facilities. Instead, these activities count as de facto diversion for jurisdictions.

Under the statewide goal established by AB 341, CalRecycle uses a definition of recycling that differs from the AB 939 definition of diversion. The statewide 75 percent goal uses a non-technical definition of “recycling” as an umbrella term for just those activities that count toward the goal, which is limited to source reduction, recycling, and composting programs. Several activities that count toward diversion under AB 939 do not count toward recycling under AB 341, including ADC, AIC, other beneficial reuse at landfills, all transformation, and waste tire-derived fuel. These five activities are instead defined as “disposal-related activities.” In addition, changes in the amount of material sent to biomass conversion and land application can impact the recycling rate even though they are outside the scope of calculated generation, depending on how they affect the amount of material going to disposal.

In addition to using different definitions of recycling, AB 341 and AB 939 also use different historical time periods to determine baseline generation. As a result, the estimated waste generation and disposal targets under AB 341 are different than under AB 939. Table 1 provides a comparison of the different disposal definitions and goals between AB 939 and AB 341.

This report will focus on the activities and targets as defined by AB 341. In 2020, Californians must dispose (at home and at work) no more than 2.7 pounds per person per day on average statewide to meet the 75 percent recycling goal.² This corresponds to less than half of a ton of waste per resident each year.

Table 1. Comparison of disposal definitions and goals under AB 939 and AB 341.

	AB 939	AB 341
Goal	50 Percent Diversion (Jurisdictional Mandate)	75 Percent Recycling (Statewide Goal)
Activities that Count Toward Goal	<u>Diversion:</u> Source Reduction Composting Recycling ADC AIC Other Beneficial Reuse Transformation Credit	<u>Recycling:</u> Source Reduction Composting Recycling
Activities that Do Not Count Toward Goal	<u>Disposal:</u> Landfill (Including Exports) Engineered Municipal Solid Waste (EMSW) Transformation (Beyond Credit) Green Waste ADC (Beginning in 2020)	<u>Disposal:</u> Landfill (Including Exports) Engineered Municipal Solid Waste (EMSW) <u>Disposal-Related:</u> ADC AIC Other Beneficial Reuse All Transformation Waste Tire-Derived Fuel
Baseline Waste Generation in pounds per person per day (ppd) and Base Years	12.6 ppd (2003-2006)	10.7 ppd (1990-2010)
Statewide Disposal Target in pounds per person per day (ppd)	6.3 ppd	2.7 ppd

Disposal and Disposal-Related Activities

In 2016, 35.2 million tons of material were disposed in landfills in California or exported to out-of-state landfills (Figure 1). An additional 7.5 million tons of material were managed through disposal-related activities. With a population of 39.2 million residents, California had a per capita disposal rate of 6.0 pounds per person per day in 2016. This is the fourth consecutive year of increases in both overall and per capita disposal. This

suggests that increases in individual waste production drive increases in disposal, rather than just the continued increase in population.

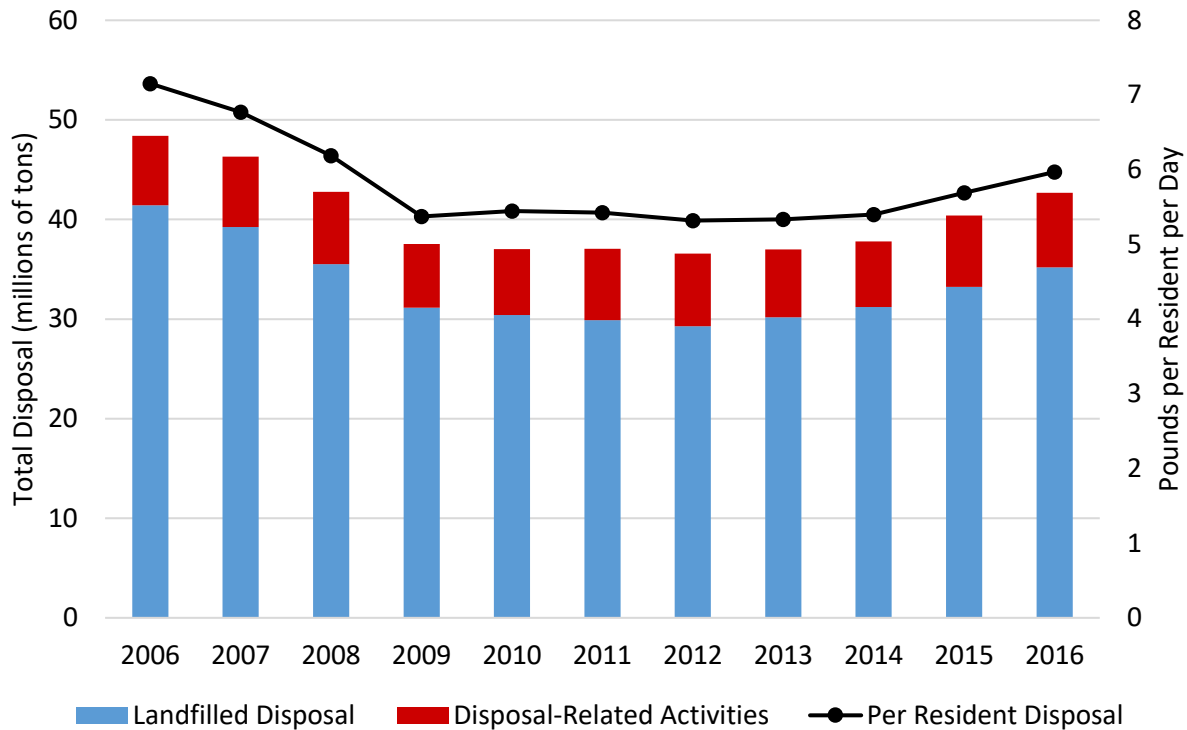


Figure 1. California's statewide per resident and total disposal (2006-2016). The vertical axes represents millions of tons of disposal in landfills (blue, left axis), millions of tons of disposal-related activities (red, left axis), and the number of pounds of disposal per resident per day (black, right axis). Data is from the Disposal Reporting System (DRS) and the Department of Finance.

Of the five types of disposal-related activities in the state in 2016, ADC was the most common, with 3.6 million tons used in 2016 (Figure 2). Almost 3.0 million tons were used for other beneficial reuse at landfills, and 78,000 tons were used for AIC. Transformation continued to process 800,000 tons of material annually, and 82,000 tons of waste tires were used as fuel in 2016.

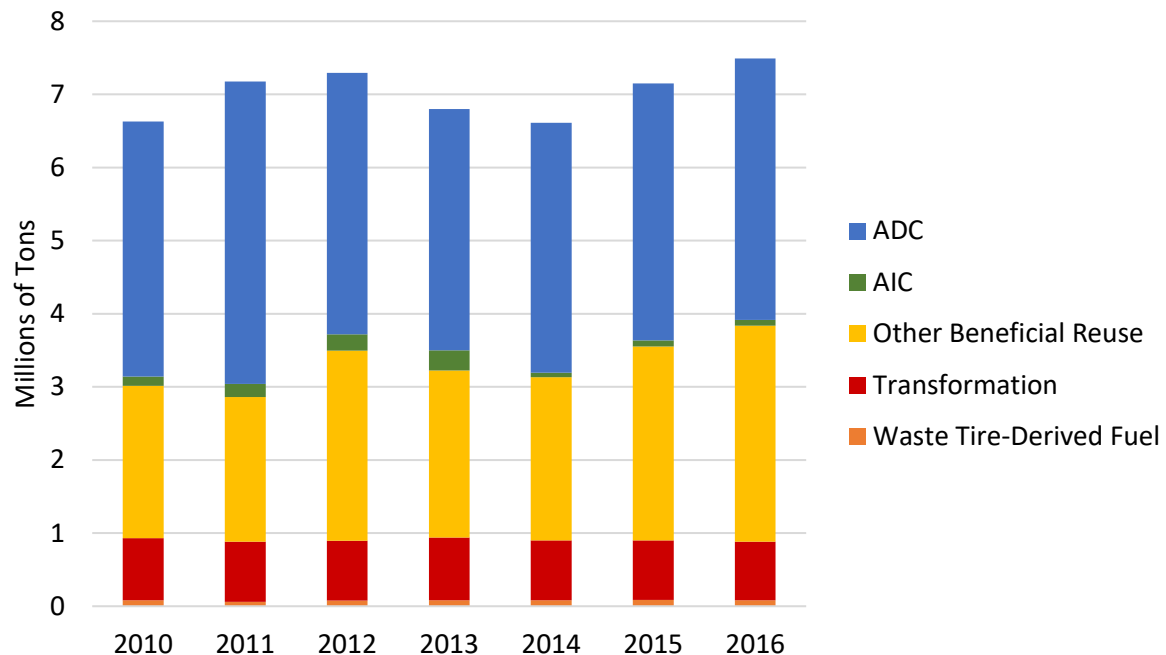


Figure 2. Disposal-related tonnage in California from 2010 to 2016. Data from DRS, except for waste tire-derived fuel, which is calculated based on data reported to CalRecycle.

As in prior years, the largest single component of ADC in 2016 was green waste (1.3 million tons), although other categories are becoming more common. The prevalence of green waste ADC is significant because beginning in 2020, green waste ADC will count as disposal for determining whether jurisdictions are meeting their AB 939 target.³ While this could mean jurisdictions will move away from using green material as ADC, current data shows the reclassification would not prevent many cities from meeting their AB 939 diversion mandate. In 2016, only 14 jurisdictions that used green material ADC would not have met the 50 percent disposal reduction target if the material had counted as disposal.

In 2016, other beneficial reuse at landfills reached its highest level of use in the ten years that CalRecycle has tracked this material management strategy (Figure 2). Although CalRecycle requests that landfills provide material-specific information on the material used for other beneficial reuse, roughly half of the material reported is classified as “other.” This limits the Department’s ability to understand current practices and to identify alternative uses for the material.

Material Management at Intermediate Facilities

In addition to tracking material handled at disposal facilities, CalRecycle has increased its efforts to monitor the material handled by intermediate facilities, such as transfer

stations, prior to disposal. Although facilities are required to report to the counties, there is no requirement for this data to be transmitted to CalRecycle.

In 2015, the most recent year for which data is available, 70 percent of transfer stations reported to CalRecycle on material sent to landfills or sent offsite for recycling. These reports account for only 40 percent, or 12.4 million tons, of landfilled disposal in 2015. These facilities also reported that 10.2 million tons of material were sent offsite for recycling, suggesting some or all of this material is at least minimally processing to separate recyclables prior to its disposal.

In contrast, CalRecycle has no information on the pre-processing of the remaining 60 percent of material sent to disposal in 2015, because CalRecycle does not currently have the ability to require all transfer stations to report this data. Under the new requirements of AB 901, all facilities must report to CalRecycle on the amount of material sent to recycling, composting, or landfill. Full implementation of AB 901 in 2019 will allow the Department to track material flows in order to identify and encourage best material recovery practices at every stage of collection and processing.

Recycling Rates

As local jurisdictions are not required to report on recycling tonnages, and CalRecycle will not have statewide tracking of recycling until 2019, progress towards the statewide recycling goal is determined using the amount of disposal and disposal-related activities, relative to a calculated base generation⁴ of solid waste. This analysis assumes that waste not disposed is source-reduced, recycled, or composted. CalRecycle uses this model to measure the state's progress toward the statewide 75 percent recycling goal.

Using the AB 341 definitions of waste generation, an estimated 76.5 million tons of waste were generated in California in 2016. As shown in Figure 3, current disposal and disposal-related activities account for 56 percent of the total generated waste, or 42.7 million tons. This corresponds to an estimated 33.8 million tons of material that were source reduced, recycled, or composted in 2016.

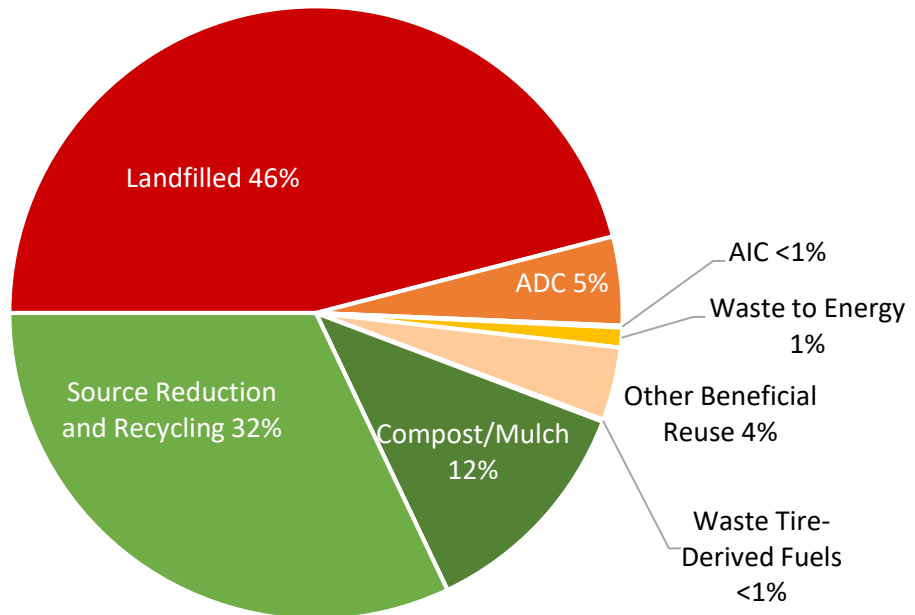


Figure 3. Estimated management of 76.5 million tons of waste generated in California in 2016 based on AB 341 definitions. The total generation is determined from the 1990-2010 per person baseline and the 2016 population in California. Quantities of landfilled waste, waste to energy, ADC, AIC, and other beneficial reuse are derived from DRS. Waste-tire-derived fuel is calculated based on data reported to CalRecycle. The estimate for amount composted or mulched is based on published reports for chip and grind facilities and internal calculations for composting facilities. Source reduction and recycling account for the remaining generated waste.

California's statewide recycling rate has fallen from 50 percent in 2014 to 47 percent in 2015, and now to 44 percent in 2016 (see Figure 4). In order for California to reach a statewide recycling rate of 75 percent, more than half of the solid waste that is currently disposed would need to be source reduced, recycled, or composted.

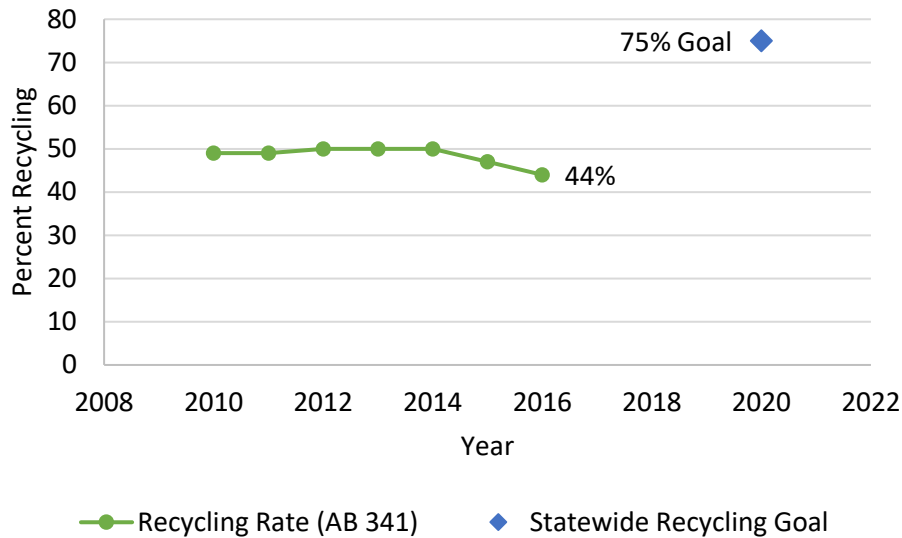


Figure 4. California statewide recycling rate since 2010. Data from www.calrecycle.ca.gov/75Percent/RecycleRate/default.htm.

Woody Biomass Waste

Woody biomass is a challenging waste material to handle and process in conventional composting facilities; as a result, a significant amount of this material is handled by biomass conversion facilities. These facilities take forest residues, agricultural waste, urban wood waste, and mill residue and process the material to produce energy.

Beginning in 2015, biomass conversion facilities were required to report on the amount and types of feedstock accepted or rejected, and the final disposition of resulting ash on an annual basis. For the 2016 reporting year, CalRecycle received reports from all 22 active facilities. The facilities accepted 3.7 million tons of woody biomass, and rejected less than 0.01 percent of the material, primarily due to contamination. As shown in Figure 5, roughly one-third of the woody waste sent to biomass facilities originated from urban sources (1.4 million tons); another third of the material originated from agricultural sources, and the remainder came from mill residue and forest sources. Although the distribution of sources has remained somewhat constant, there has been a 50 percent decline in total material sent to biomass facilities since 2014. Multiple facility closures, changes in facility capacity, and changing energy contracts have all contributed to this dramatic decline in handled material.

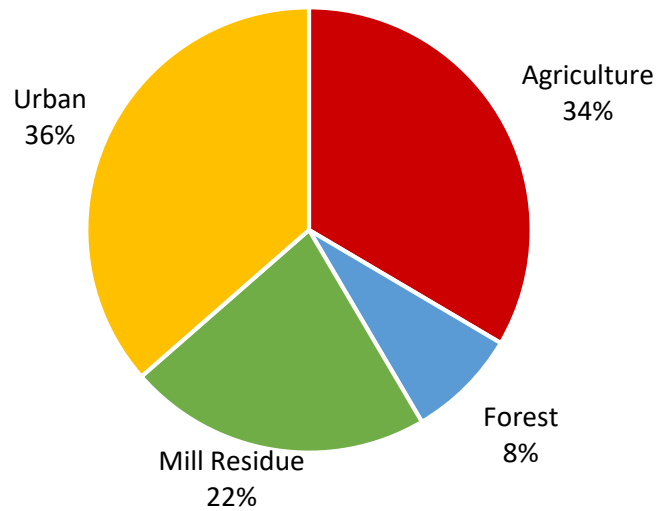


Figure 5. Source sector for 3.7 million tons of woody biomass sent to biomass conversion facilities in 2016. Data reported directly to CalRecycle pursuant to Public Resources Code Section 44107.

Additional changes in the biomass industry and woody waste management may affect the distribution of material sent to biomass facilities. The continuing tree mortality crisis covers an estimated 102 million dead and dying trees, which must be managed in order to avoid future forest fires. Since biomass facilities have a fixed capacity, an influx of this important material may displace woody biomass from urban and agricultural sources. In addition, new legislatively mandated purchasing requirements that favor forest-derived material over urban sources may further suppress the amount of urban-derived material handled at biomass facilities.

It is critical for the Department to evaluate the potential impacts of these changes on other facilities that handle urban-derived waste materials. Currently, material sent to biomass conversion is not included in the calculated generation of municipal solid waste; instead, it counts as de facto diversion under AB 939 and de facto recycling under AB 341. If urban-derived biomass is displaced by forest-derived material, or if additional biomass facilities close, this material may instead go to landfills or composting operations.

Exports of Recyclable Material

Recycling is a global industry, and many of the recyclable materials that are collected in California are exported for final handling. Although CalRecycle does not currently track the movement and destination of recycled or composted materials that are exported, the Department compiles information from the United States Census Bureau, Surface

Transportation Board, and Department of Transportation in an annual report⁵ which provides insight on the magnitude of the export of recyclable materials.

In 2016, 15.0 million tons of recyclable materials were shipped out of California's ports, compared to 16.4 million tons in 2015 and 18.0 million tons in 2014 (Figure 6). This includes material from both California and non-California sources. Over ninety percent of the exported materials were metals, paper, cardboard, and paperboard. The year 2016 marks the fifth consecutive year that CalRecycle has seen a decrease in the total amount of recyclable materials exported from California ports.

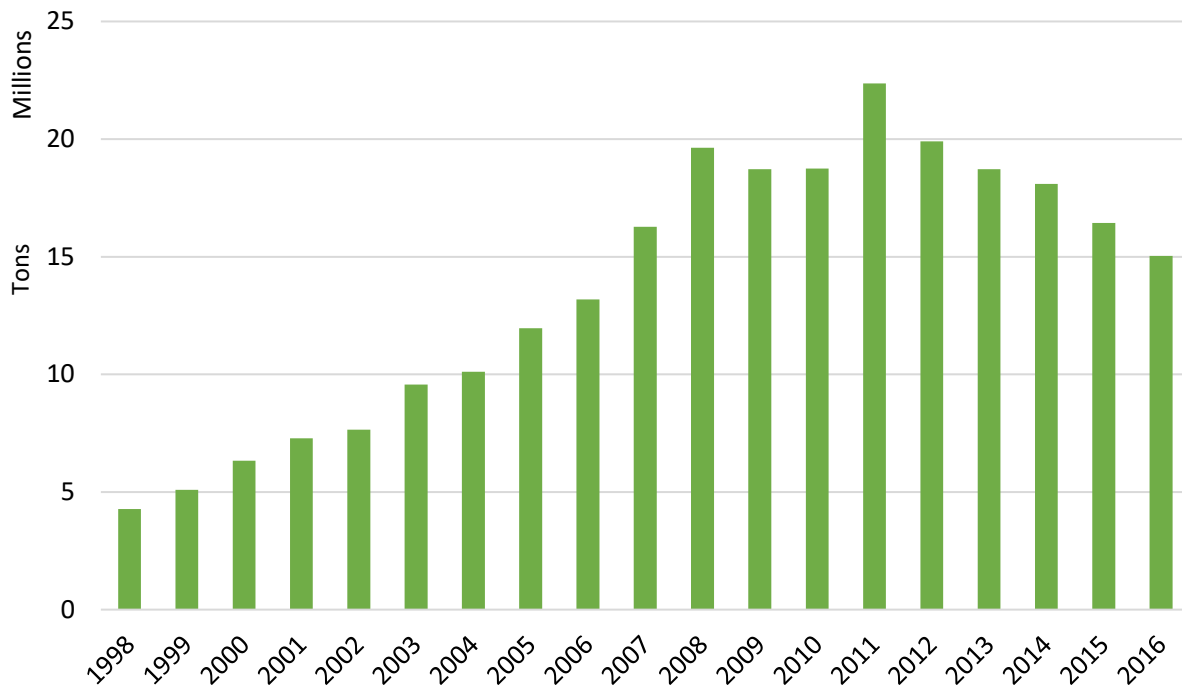


Figure 6. California seaborne export trends of recyclable materials in tons since 1998. Data is from WISERTrade, which aggregates U.S. Census Bureau data and other sources of information.

Although it is difficult to quantify how much of this material comes from California rather than neighboring states, it is likely that the majority (60 to 80 percent) originates in California. This is a significant amount of material (11 million tons) and accounts for approximately 14 percent of the total generated waste stream, assuming that 70 percent of exported recyclables originate in California (see Figure 7).

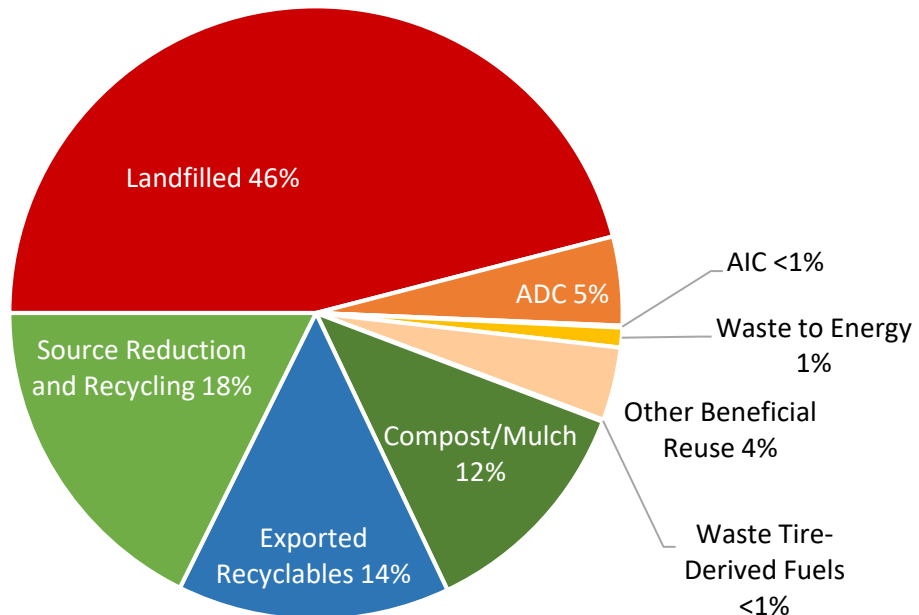


Figure 7. Estimated destination of 76.5 million tons of waste generated in California in 2016 based on AB 341 categories, including exports. The amount of exported recyclable materials is based on 70 percent of exported recyclable materials originating in California, or 11 million tons. The remaining amounts are calculated as described for Figure 3.

Given the substantial amount of recyclable material generated in California that is ultimately exported, it is critical to understand how much and what types of material are leaving the state. With several years of increasing landfilling and decreasing export, it is possible that more recyclable materials are being disposed. However, without more granular data, it is impossible to link those two trends. The start of reporting required under AB 901 in 2019 will provide a more accurate metric for California-based exports of recyclable material.

Projections for Disposal and Recycling

As a part of implementing the statewide 75 percent recycling goal, CalRecycle develops disposal projections to determine how much additional material needs to be diverted from landfills in future years. This report contains CalRecycle's most recent disposal projections, which are based on ten years of historical disposal data (2006-2015, including traditional disposal and disposal-related materials) and California's projected population. This method provides California's expected statewide disposal totals if the average per person disposal of 5.9 pounds per person per day, as seen over the last

ten years, remains unchanged and population grows at the anticipated rate. It is important to note that there is no sure way to project future disposal, as many factors influence the amounts of waste generated and ultimately disposed. Fluctuations in the economy, the introduction of new solid waste management laws, and the implementation of waste diversion programs will undoubtedly have an impact on the amount of waste disposed. This model serves as a business as usual projection and establishes a baseline against which CalRecycle can evaluate its efforts to reduce statewide disposal.

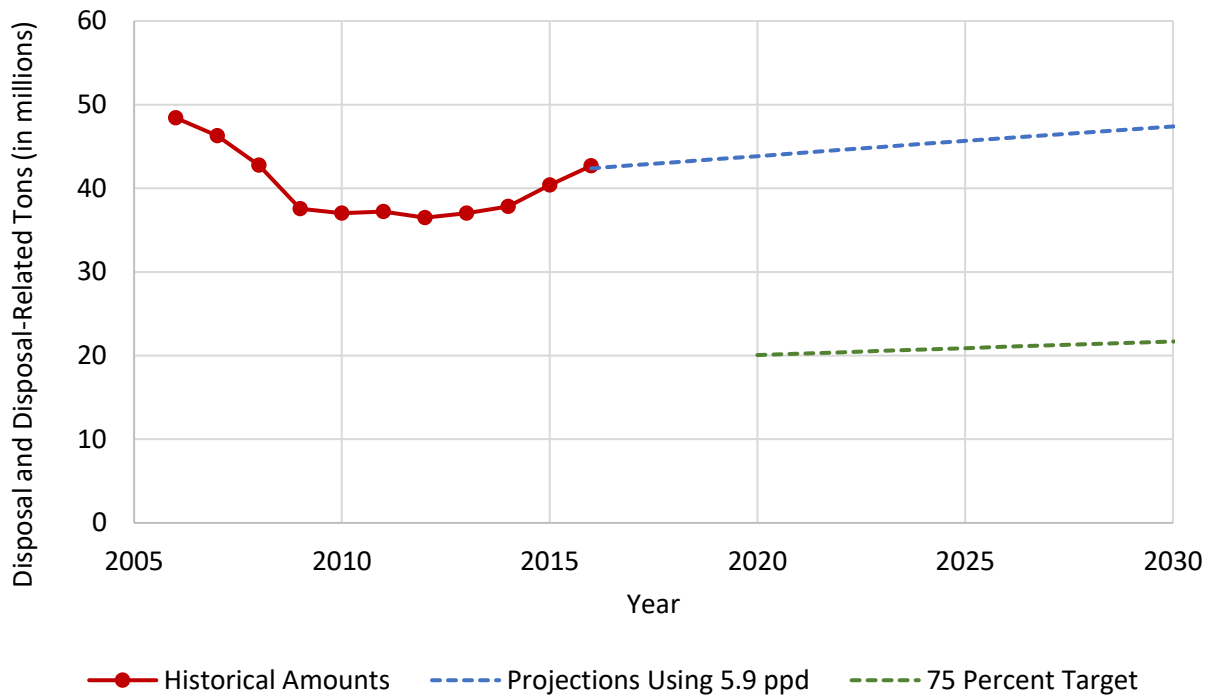


Figure 8. Statewide projected disposal and disposal-related activities through 2030, and statewide target for 75 percent recycling goal. The red line shows actual annual statewide disposal and disposal-related activities, in tons, from 2006 to 2016. The blue dotted line represents a business as usual projection for disposal and disposal-related activities, using 5.9 pounds per person per day and project population growth from The California Department of Finance. The green dotted line shows the target tons of disposal and disposal-related activities under AB 341.

Figure 8 shows CalRecycle’s current disposal projections alongside the historical data for traditional disposal and disposal-related materials. The projected total amount of disposal and disposal-related waste for 2016 was 42.4 million tons, which is within 1 percent of the amount of reported disposal of 42.7 million tons. This reflects the 2016 disposal-related tonnage being close to the ten-year average, rather than the strength of the predictive power of this model. Based on this model, in order to meet the disposal

target under the statewide 75 percent recycling goal, California would need to reduce its disposal by almost 24 million tons from the business as usual scenario in 2020.

As noted elsewhere in this report, corresponding projections for recycling are not currently available. Although CalRecycle has detailed reports on disposal, there is currently no mechanism to track or report on recycling in California. The passage of AB 901 provides clearer statutory authority for CalRecycle to begin collecting this data. Regulations are currently underway to implement this statute, and CalRecycle anticipates that formal reporting will begin in 2019. Once CalRecycle begins collecting this information, it will be possible to generate recycling projections in a similar manner to how the Department projects disposal under business as usual scenarios.

Analysis of Trends

As disposal continues to increase, it is critical that CalRecycle examines the forces that are contributing to this trend.

First, disposal costs in California continue to be relatively low. Inexpensive disposal creates an economic driver for businesses and individuals to dispose otherwise recyclable material, rather than developing new practices or paying additional costs to recycle. Based on CalRecycle's 2015 "Tipping Fees in California" report,⁶ California's publicly posted average tipping fee (\$54) was slightly higher than the national average (\$49). However, publicly posted fees only cover 20 percent of waste handled in the state and does not take into account the lower negotiated contract prices for disposal between waste management companies and local jurisdictions. In contrast, Europe's solid waste policies encourage higher landfill fees and landfill taxes as a strategy to drive material away from landfills; this makes source reduction, environmental product design, and alternative waste management options, such as composting and recycling, more economically competitive and helps reduce disposal.

A portion of the landfill tipping fee is the statewide tipping fee, which supports CalRecycle's broader regulatory activities. Apart from a small increase in 2002, California's statewide tipping fee of \$1.40 per ton has not been adjusted in nearly two decades. As more of the state's post-consumer resources are recycled, the cost of regulating an increasingly diverse set of solid waste facilities increases, as does ensuring their safe management upon closure. CalRecycle hosted two workshops in December 2015 to discuss raising the tipping fee to fund the State's cost of regulating an increasingly diverse set of solid waste facilities and provide incentives for additional recycling.

Second, economic indicators, such as wages, show a strong correlation with total disposal (see Figure 9). In an improving economy with high labor demands, wages tend to increase. From a practical standpoint, higher wages mean increased consumption and larger amounts of generated waste. Current projections show continued increases in wages. As a result, disposal will also increase unless there are policy and programmatic changes that start to decouple economic growth from growth in disposal.



Figure 9. Percent increase in disposal in California (red line) compared to the percent increase in wages (green line) and the projected percent increase in wages (dotted grey line). Projection for percent change in wages are from 2015 to 2020. Data is from the Bureau of Economic Analysis, California Department of Finance, and DRS.

Third, markets for recyclable materials have been slow to develop domestically and are declining internationally. In order for generated waste material to avoid disposal and be recycled into new products, there must be markets that accept the materials. Recent declines in global demand and scrap values for recyclable commodities have contributed to the closure of a few processing facilities and several hundred recycling centers in the state for handling beverage containers; however, these facilities manage only a small portion of the overall waste stream. In combination with a strong U.S. dollar, it is less profitable for collected recyclable material to be shipped overseas, and CalRecycle has received anecdotal reports of companies landfilling or stockpiling recyclable materials.

Fourth, in-state management options for organic materials are similarly challenging. Although managing organic material is not tied to global markets, it does require infrastructure and local markets. Currently, California does not have sufficient in-state infrastructure to properly handle all of the generated organic waste. In addition, the co-

benefits of using compost (such as improved soil health, water conservation, and increased soil carbon) do not have a monetary value and are not well accounted for in typical market transactions. Siting, permitting, and building new organic material management facilities are challenging due to cross-regulatory requirements and, in some cases, lack of public acceptance.

Finally, California saw reductions in biomass facility throughput and in recyclable materials exported to international markets in 2016, as well as a simultaneous decline in the State's recycling rate. CalRecycle does not have sufficient information to identify all the contributing factors for the increases in disposal and their relative impacts; however, CalRecycle will continue to monitor these changes in biomass and exports closely.

For CalRecycle to meet its various statewide goals, it is critical that the Department identify and implement new tools to decouple disposal and recycling from some of these economic drivers and to stimulate the development of markets for recyclable materials.

Moving Forward: Next Steps

CalRecycle has been tasked with implementing a variety of statutes that regulate solid waste. Some of these statutory goals, mandates, and programs come with enforcement provisions at the local level, some have enforcement provisions at the state level, and some lack enforcement altogether. In light of the continuing increases in disposal, the Department must evaluate what additional measures may be necessary to achieve its goals.

Implementing AB 341 and Mandatory Commercial Recycling

The statewide 75 percent recycling goal under AB 341 places the responsibility for achieving the goal on the state, rather than on the cities and counties that are directly responsible for waste disposal, recycling, land use planning, and economic development, or on the manufacturers of products and packaging that are increasingly difficult to manage through traditional material management systems. In addition, AB 341 prohibits CalRecycle from raising the 50 percent diversion mandate on local governments.

CalRecycle identified a number of internal and external measures that would be necessary to achieve the goal in its *AB 341 Report to the Legislature*,⁷ and many of these tools have been codified into law. However, the changes have been slow to show impact. Many efforts, such as those in the area of packaging, have thus far relied on voluntary measures to increase collection and recycling, which have not been effective. In addition, CalRecycle has limited statutory authority to address some key material or

activity types. For example, CalRecycle has few tools to halt or slow the increased use of disposal-related activities.

AB 341 also required commercial generators and multi-family residences to arrange for recycling services beginning in 2012. In addition, while individual jurisdictions are not required to meet the new recycling goal, they are required to implement mandatory commercial recycling (MCR) programs that include education, monitoring, and outreach to regulated generators. All jurisdictions have implemented MCR programs for businesses and multi-family residences. However, data from the 2014 waste characterization study suggests that this measure had not significantly impacted commercial disposal. Although commercial recycling services are more broadly available, many businesses in California may not have changed their recycling habits to accommodate increased recycling.

CalRecycle works extensively with local jurisdictions to provide assistance in meeting the requirements of AB 341, including site visits, trainings, and grants. As a result of significant local investment and CalRecycle partnership, most businesses are complying with the law. In the event that a business is out of compliance with AB 341, CalRecycle does not have the authority to take direct enforcement actions. Instead, CalRecycle broadly reviews jurisdiction program implementation under AB 939. During the 2012-2015 jurisdictional review cycle, CalRecycle identified thirty-six jurisdictions that had significant program gaps, primarily related to the implementation of MCR. CalRecycle concluded that the thirty-six jurisdictions had provided insufficient education, outreach, or monitoring related to MCR, or had low compliance rates for commercial businesses or multifamily groups within the jurisdiction. After a 30-day review period, twenty-six of the jurisdictions provided sufficient additional information to address the program gaps. The remaining ten jurisdictions were referred to CalRecycle's Jurisdiction Compliance Unit for further investigation and possible compliance orders.

Although CalRecycle is working to ensure that MCR is fully implemented in all jurisdictions, commercial recycling so far has not been sufficient to divert enough additional material from landfills in order to meet the statewide 75 percent recycling goal. This may be because many businesses already had recycling options available prior to the passage of AB 341, MCR does not target other major areas of the waste stream, such as food waste, or because collection of recyclable material does not ensure that it is ultimately recycled. In any case, CalRecycle needs additional tools to help achieve the 75 percent statewide recycling goal.

Implementing AB 1826 and Mandatory Commercial Organics Recycling

AB 1826 required commercial generators and multi-family residences that meet specified thresholds to recycle their organic waste, beginning in April 2016, and required

local jurisdictions to implement organic waste recycling programs beginning on January 1, 2016.

Mandatory commercial organics recycling is in the first stages of implementation, and CalRecycle is beginning to monitor compliance with the law and continues to assist jurisdictions in meeting the requirements. As in the case of MCR, however, there are few compliance tools in place to ensure that businesses recycle organic waste. The legislation provides several compliance options for business; however, there is no requirement at the state level to use the service. As with MCR, AB 1826 requires jurisdictions to implement mandatory commercial organics recycling programs that include education, outreach, and monitoring. Under both MCR and AB 1826, CalRecycle can assess compliance with these requirements at any time and refer jurisdictions to the Jurisdiction Compliance Unit for further investigation and possibly compliance orders.⁸

As noted earlier, additional infrastructure for processing organic materials will be key for diverting this material from landfills and providing a reasonable market for material collected as a result of AB 1826. One method that CalRecycle has used to help expand organics processing capacity in California is through grant programs funded by the Greenhouse Gas Reduction Fund. The Organics Grant Program, which is designed to lower overall greenhouse gas emissions by expanding existing capacity or establishing new facilities in California to handle green waste and food materials, provided \$14.5 million to five entities in its first cycle (2014-15) and was oversubscribed. The current cycle of this grant program (up to \$24 million for 2016-17), also oversubscribed, is currently under review, and awardees will be notified this summer.

New Programs, Tools and Goals

In support of the 75 percent statewide recycling goal, and particularly in light of the challenges of implementing current targets and goals, CalRecycle may need to consider new methods that require specific or mandatory action from local jurisdictions, the waste industry, the state, product and packaging manufacturers, and others, to increase the diversion of material from landfills and convert the material into new products. These include focused implementation of SB 1383, developing mandatory packaging requirements, additional waste characterization studies, new reporting requirements, stronger local requirements, procurement requirements, and renewed focus on construction and demolition waste. These methods build on the strategies identified in the *AB 341 Report to the Legislature*. Although CalRecycle has implemented changes suggested in the report consistent with its current authority, the strategies identified above are reflective of past efforts the Department has pursued and continues to believe are important for decreasing the amount of waste.

New Organics Recycling Requirements (SB 1383)

CalRecycle is currently engaged in an informal rulemaking period to help guide the requirements of SB 1383. CalRecycle believes that this will provide a critical new program for moving towards the 75 percent statewide recycling goal and strengthening the implementation of mandatory commercial organics recycling and mandatory commercial recycling. By focusing on organic waste, CalRecycle will be able to target as much as two thirds of the current disposal stream. In addition, the legislation places stronger requirements on local jurisdictions, the state, and other waste sector entities to achieve the goals of the legislation and provides stronger enforcement tools to CalRecycle.

CalRecycle intends to adopt regulations in late 2018 or early 2019. While the regulations will not become enforceable until January 1, 2022, early adoption will send a strong market signal to help develop additional infrastructure. Early adoption of regulations also provides jurisdictions, businesses, and haulers several years to make budgetary and programmatic decisions necessary to be in compliance by 2022.

Significant public and private investments in organics management infrastructure will be needed to meet the SB 1383 targets. Most organics processing facilities run at levels close to capacity; current facilities could only support approximately 1 million tons of additional material per year. In order to reach the SB 1383 goal, at least 20 million tons of additional organics processing capacity will be needed by 2025. As discussed above, there are several regulatory, infrastructure, and market barriers that will need to be addressed in order to reach this target, and CalRecycle is committed to developing strategies to bolster in-state capacity.

SB 1383 also broadens CalRecycle's efforts in food waste prevention, recovery, and diversion. SB 1383 strengthens California's emphasis on food recovery by requiring CalRecycle's regulations to ensure that 20 percent of currently disposed edible food is recovered for human consumption by 2025. One tool that CalRecycle is already using to fund this focus is the Organics Grant Program, which has included a focus on prevention and recovery of edible food waste. CalRecycle's new Food Waste Prevention and Rescue Grant Program will provide further support for these efforts.

The development of regulations under SB 1383 provides an opportunity for CalRecycle to enhance its management of the solid waste infrastructure. Four consecutive years of increasing disposal indicates the need for strong and comprehensive regulations to reverse this trend and achieve the legislatively mandated goals and targets.

Packaging Reform

Packaging comprises one quarter of California's disposed waste stream, and CalRecycle has hosted workshops exploring the role of packaging recovery in meeting the statewide 75 percent recycling goal since 2013. In September 2016, CalRecycle

began an effort to develop a comprehensive, statewide, mandatory packaging policy model guided by an extensive stakeholder engagement process. This process was initiated after a formal call from CalRecycle to product manufacturers and brand owners to voluntarily reduce the amount of packaging sent to landfills failed to result in meaningful and actionable measures. As CalRecycle works to generate a mandatory packaging policy model, CalRecycle will hold a packaging workshop in early fall of 2017 to solicit additional stakeholder feedback.

Increased Frequency of Waste Characterization Studies

CalRecycle periodically conducts statewide waste characterization studies in order to update information on the types and amounts of materials in California's waste stream. The most recent study,⁹ which was conducted in 2014, identified that 70 percent of material taken to disposal facilities could have been recovered through a recycling or composting program. As California's waste stream continues to evolve, it will be critical to understand what materials are still being disposed and whether programs exist to divert that material. Knowledge about the waste stream also allows state and local programs to focus their efforts on prevalent, recyclable materials. In order for this analysis to be most useful for the Department, it will be important for CalRecycle to perform more frequent waste characterization studies. A characterization study will begin in early 2018 to determine what materials are contributing most to the ongoing increases in disposal. In 2020, CalRecycle will need to conduct an additional study to assess the progress California has made toward its many goals and mandates.

New Reporting Requirements

Currently, disposal facilities must submit reports on tons handled to counties, which are in turn required to report that information to CalRecycle. Although this provides critical information on how waste is managed, CalRecycle has no enforcement authority to ensure timely and accurate reporting. In addition, recycling facilities are not required to report on the types and quantities of material that are handled in the state.

As mentioned earlier, CalRecycle is currently developing regulations to implement AB 901, which requires recycling and composting operations and facilities to report on materials that are handled, requires disposal facilities to report directly to CalRecycle, and provides enforcement authority to CalRecycle. Together, these changes will provide a clearer picture of the infrastructure surrounding solid waste and recycling in California and the flow of materials through solid waste and recycling facilities.

Sharing Responsibility with Local Government

Local governments have broadly been in compliance with AB 939's 50 percent diversion mandate since 2000; however, local governments do not bear the burden of the statewide 75 percent recycling goal. Although some local governments are proactive with their waste reduction and recycling goals, in the absence of a mandate on local

governments, there is little incentive for current local practices to continue to improve. CalRecycle expects new statewide requirements, such as the SB 1383 effort to improve organic waste management and to spur the development of new programs and infrastructure.

Procurement Requirements

California has historically used procurement requirements for recycled-content products to improve markets for recycled products, reduce energy consumption and manufacturing waste, and divert material from landfills. Currently, procurement requirements are limited to state agencies and cover only twelve percent of annual purchases. Although state law will increase the procurement targets for certain recyclable products in 2020, stronger requirements and enhanced enforcement could drive markets to use post-consumer recycled material.

Increased Focus on Construction and Demolition Materials

Waste materials from construction and demolition are a significant portion of the waste stream: typical materials from construction and demolition—such as inerts, roofing materials, and gypsum—accounted for 7.9 percent of the total waste stream; lumber accounted for an additional 11.9 percent of the total waste stream. In addition, increases in construction activity are generally correlated with increases in disposal, and California is currently in a period of significant new construction. Comparing the lowest part of the housing market in 2009 to the most recent data in 2016, new building permits for residential units have tripled, and the valuation of new commercial building permits have nearly quintupled.¹⁰

CalRecycle has relied on partnerships with local jurisdictions and other state agencies, such as CalTrans and the Building Standards Commission, to manage this material. One result of those efforts is that the California Green Building Standards Code (CALGreen) includes language mandating a minimum 65 percent diversion rate on most construction requiring a building permit. In addition, CALGreen encourages the voluntary use of recycled-content building materials including recycled aggregate, carpet, paint, compost, and mulch.

However, voluntary approaches may not be sufficient to manage items that are difficult or costly to divert. As the Department continues to work toward the 75 percent goal, it may be necessary for CalRecycle to increase its focus on construction and demolition materials.

Conclusions

California has made significant strides in recycling over the last 30 years. Jurisdiction- and industry-level efforts have led to the adoption of thousands of local recycling and diversion programs and the development of new facilities to sort and process recyclable materials. New initiatives, including the statewide 75 percent recycling goal and the organics waste reduction targets, continue to push California towards additional recycling and composting.

However, total landfilled waste, including disposal and disposal-related activities, continues to increase. Despite CalRecycle's commitment to achieving the statewide 75 percent recycling goal, existing programs and tools have not led to the desired result of increasing recycling and decreasing disposed waste. As a result, CalRecycle is looking toward strengthening existing programs as well as developing complementary and comprehensive measures, including SB 1383 and packaging reform, to decrease disposal and continue to promote the conversion of post-consumer recyclable material into new products.

California has long been a leader in waste reduction and prevention. By refocusing and recommitting to the goal of reducing disposal and conserving resources, CalRecycle and Californians can continue to lead through 2020 and beyond.

Abbreviations and Acronyms

AB – Assembly Bill

ADC – Alternative Daily Cover

AIC – Alternative Intermediate Cover

CALGreen – California Green Building Standards Code

CalRecycle – California Department of Resources Recycling and Recovery

DRS – Disposal Reporting System

EMSW – Engineered Municipal Solid Waste

MCR – Mandatory Commercial Recycling

SB – Senate Bill

Glossary of Terms

Alternative daily cover (ADC)/Alternative intermediate cover (AIC): The use of materials to cover disposed waste in a landfill cell at the end of the landfill operating day (daily cover) or at some other interval (intermediate cover) to control odors, fire, vectors, litter, and scavenging.

Biomass conversion: The process of using controlled combustion of specified types of organic materials (essentially wood, lawn, or crop residue) to produce electricity.

Chipping and grinding: The process that separates, grades, and resizes woody green wastes or used lumber to be sent to a composting facility, a landfill to be used for ADC, or miscellaneous end markets such as feedstock at biomass-to-energy plants.

Disposal Reporting System (DRS): The system used to track disposal information in California. For more information go to:

<http://www.calrecycle.ca.gov/LGCentral/DRS/default.htm>

Disposal: The process of collecting municipal solid waste and transferring it to a transfer station, landfill, or transformation facility. The types of activities that are considered disposal vary by regulatory program.

Green waste: Urban landscape waste generally consisting of leaves, grass clippings, weeds, yard trimmings, wood waste, branches and stumps, home garden residues, and other miscellaneous organic materials.

Inerts: Waste that includes concrete, asphalt, asphalt roofing, aggregate, brick, rubble, and soil.

Landfill: A permitted facility that provides a legal site for final disposal of materials including mixed solid waste, beneficial materials used for landfill construction, ADC, and specialized material sites such as waste tires and construction and demolition waste.

Municipal solid waste (MSW): Refuse that may be mixed with or contain nonorganic material, processed industrial materials, plastics, or other recyclables with the potential for recovery. It includes residential, commercial, and institutional wastes.

Organic materials management: Processes that grind, chip, and/or decompose organic wastes in a controlled process for intermediate or final use as a landscape material or soil amendment.

Other beneficial reuse: The use of a waste byproduct or other low-value material for a productive use, other than ADC/AIC, at a landfill within regulatory guidelines.

Per capita disposal: A numeric indicator of reported disposal divided by the population (residents) specific to a county, region, or state.

Tipping fee: The amount of money per ton of waste charged at the gate of a landfill.

Transfer station: A facility that receives, temporarily stores, and ships unprocessed waste and recyclables.

Transformation: The use of incineration, pyrolysis, distillation, or biological conversion (other than composting) to combust unprocessed or minimally processed solid waste to produce electricity.

Waste tire-derived fuel: Waste tires used as fuel in a power plant or cement kiln.

Source Reference Notes

¹ Previous reports can be found here:

CalRecycle, State of Disposal in California Updated 2016, February 9, 2016:

<<http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=1556>>

CalRecycle, State of Recycling in California Updated 2016, February 2, 2016:

<<http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=1554>>

CalRecycle, State of Disposal in California, March 20, 2015:

<<http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=1524>>

CalRecycle, State of Recycling in California, March 6, 2015:

<<http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=1522>>

² More information about recycling rate calculations can be found here:

<www.calrecycle.ca.gov/75Percent/Sept2012Wksp/WhyHowMeasur.pdf>.

³ Public Resources Code Section 41781.3.

⁴ A base generation level is calculated using the average per resident generation from 1990 to 2010 (10.7 pounds per person per day). For more information, please refer to previous reports referenced in [1].

⁵ CalRecycle, 2016 California Exports of Recyclable Materials, June 19, 2017:

<<http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=1611>>.

⁶ CalRecycle, Landfill Tipping Fees in California, February 24, 2015:

<<http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=1520>>.

⁷ CalRecycle, AB 341 Report to the Legislature, August 28, 2015:

<<http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=1538>>.

⁸ CalRecycle, Reviews of Jurisdiction Mandatory Commercial Recycling and Commercial Organics Recycling Programs, January 10, 2017:

<<http://www.calrecycle.ca.gov/recycle/commercial/JurisReview.pdf>>.

⁹ CalRecycle, 2014 Disposal-Facility-Based Characterization of Solid Waste in California, October 6, 2015:

<<http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=1546>>;

CalRecycle, 2014 Generator-Based Characterization of Commercial Sector Disposal and Diversion in California, September 18, 2015:

<<http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=1543>>.

¹⁰ Calculated from annual data on construction permits that is tabulated by the California Homebuilding Foundation and seasonally adjusted by the California

Department of Finance:

<http://www.dof.ca.gov/Forecasting/Economics/Indicators/Construction_Permits/>.