State of Disposal in California
Updated 2016

California Department of Resources Recycling and Recovery

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STATE OF CALIFORNIA

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Executive Summary

Since 1989, the California Department of Resources Recycling and Recovery (CalRecycle) has been tasked with monitoring municipal solid waste and promoting recycling in California. The amount of waste disposed has been the key metric in California's efforts to reduce landfilling and other disposal, minimize the generation of waste, and maximize source reduction, recycling, and composting as the state strives for the 75 percent statewide recycling goal by 2020 under Assembly Bill 341 (AB 341, Chesbro, Chapter 476, Statutes of 2011). This report discusses the disposal of solid waste in California, including the amounts and types of materials that are disposed, the infrastructure that supports the handling of solid waste, the types of facilities in the infrastructure, the flow of materials into, out of, and within California, and how disposal is tracked. The report is paired with a report titled "State of Recycling in California Updated 2016," which focuses on California's recycling and composting infrastructure.

This report addresses the following questions related to disposal in California:

- What is the current amount of statewide disposal, and how is it changing?
- How is disposal tracked and reported?
- How does waste flow in the state?
- What is the composition of the waste stream?
- What is the role of the disposal infrastructure?
- What is the impact of disposal-related materials?
- How much landfill capacity does the state have?
- How do landfill fees and funding mechanisms for solid waste programs affect disposal?

For each question, this report discusses the available data, any changes in data, or issues since the last State of Disposal report and conclusions that can be drawn from the data. The report highlights new research or changes in disposal issues, including the following topics:

- California disposal increased for the second straight year by a million tons in 2014 to a total of 31 million tons of overall disposal. It is likely that the improving economy may be a strong factor in the increase in disposal.
- CalRecycle research found that several economic indicators including wages, real personal consumption expenditures, taxable sales, unemployment, and housing starts correlate with disposal. This report looks at how the growing economy will affect future disposal.

- The adoption of AB 901 (Gordon, Chapter 746, Statutes of 2015) in 2015 added new Disposal Reporting System (DRS) requirements including new enforcement authority provisions for late, incomplete, or falsified reports, direct reporting by facilities to CalRecycle, and other requirements. This report looks at how these requirements will address many of the accuracy and reporting issues in DRS.
- The closure of one of the largest landfills in the state (Puente Hills Landfill) allowed CalRecycle to research the effect a landfill closure had on waste flow and the waste stream. Staff found that waste flowed across county borders to nearby counties, mirroring the dynamic nature of waste flow among counties statewide.
- The first waste composition study in California in six years showed that 40 percent of the disposed waste stream is made up of materials that could be composted or mulched, including food, and another 30 percent is made up of recyclable materials that could be recovered such as paper, metal, or glass. This report summarizes findings from the 2014 waste characterization study.
- Since 2006, there has been a 29 percent decrease in CalRecycle funding dollar for dollar, and if the state meets its future recycling goals, funding is likely to decrease by an additional 30 to 50 percent from current levels. This report looks at the effectiveness of the Integrated Waste Management Fee (IWMF) and any funding developments in the last year.

In addition to new disposal issues or research discussed earlier, this report updates areas discussed in the last report including disposal infrastructure trends, landfill capacity, and disposal-related material use.

In 2014, CalRecycle estimated that of the total of 31 million tons of waste sent to landfills, roughly 19 million tons was processed through transfer stations and material recovery facilities (MRFs), and 12 million tons of waste was hauled directly to landfills. Recent and upcoming changes to the state's disposal infrastructure include the closing of Puente Hills Landfill at the end of 2013, an approved landfill expansion at Newby Island landfill, a proposed landfill expansion at Forward Inc. landfill, and the approval of two new landfills that are expected to begin operation in the next few years.

Lifetime remaining landfill capacity in California remains sufficient at the state and regional level even with disposal increasing. CalRecycle projects that under a business-as-usual disposal scenario, California has sufficient statewide disposal capacity to handle landfilled waste until 2057. If California achieves its 75 percent statewide recycling goal, then landfill capacity is sufficient to last into the 2080s.

In 2014, the five disposal-related activities—alternative daily cover (ADC); alternative intermediate cover (AIC); other beneficial reuse at landfills; transformation; and waste tire-derived fuel—showed little change in use from 2013 and totaled 6.6 million tons of material. Of the five activities, ADC continues to see the most change with the use of green material ADC continuing to decline (38 percent of total ADC) and other material

types such as auto shredder fluff and construction and demolition (C&D) increasing in use (20 percent and 18 percent of total ADC use respectively).

The state of disposal in 2014 showed that factors affecting disposal such as the improving economy and increasing population will make it challenging to achieve the 75 percent recycling goal in 2020. Current projections suggest that in order to meet the recycling goal, the amount of per capita disposal will need to be cut in half by 2020. CalRecycle will continue to monitor the disposal infrastructure and the waste stream to show trends and help policymakers at the local, county, and state level develop programs to reduce the amount of materials going to landfills.

Background

Californians generate solid waste at their homes and workplaces every day. Currently, about half of this material is source-reduced, recycled, or composted, and half is disposed at landfills (buried), disposed at transformation facilities (burned to produce energy), or handled in another disposal-related activity. While almost all of this material could and should be source-reduced, recycled, or composted, it is likely there will always be some remaining 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 much more emphasis on saving resources and reducing disposal. The solid waste collection, handling, and disposal infrastructure has also evolved. Even so, from initial generation to final disposition, about 37 million tons of material goes to disposal, or activities closely related to disposal, in California each year. That is nearly 1 ton (2,000 pounds) of solid waste for every resident every year.

Legislation

Beverage Container Recycling and Litter Reduction Act – AB 2020

In 1986 California passed AB 2020, the Beverage Container Recycling and Litter Reduction Act (AB 2020, Margolin, Chapter 1290, Statutes of 1986) which established a system for financial incentives and convenient return systems to help ensure the efficient and large-scale recycling of beverage containers. In the intervening three decades, the program has been amended by more than 75 bills. These include changes to processing and handling fees, enforcement authority, and eligible beverage containers. The original goal of the Act was to achieve an 80 percent recycling rate for all aluminum, glass, plastic, and bimetal beverage containers sold in California, thereby reducing the beverage container component of litter in the state.

Integrated Waste Management Act – AB 939

California adopted its first comprehensive solid waste management program in 1989. The California Integrated Waste Management Act (AB 939, Sher, Chapter 1095, Statutes of 1989) created a comprehensive statewide system for permitting, inspecting, and enforcing requirements for solid waste facilities to ensure public and environmental health and safety. The Act also required jurisdictions to implement programs to achieve 25 percent diversion of all solid waste from disposal by January 1, 1995, and 50 percent diversion by January 1, 2000. AB 939 has shaped the solid waste management landscape in California for the last 25 years with an emphasis on implementing local government (jurisdiction) diversion programs.

AB 2494 and SB 1016

With the passage of AB 2494 (Sher, Chapter 1292, Statutes of 1992), the system used to measure annual progress became disposal-based, and since 1995 CalRecycle has used the Disposal Reporting System (California Code of Regulations §18809.6,18810.6, and 18811.6) to track solid waste disposal amounts and jurisdiction of origin. Prior to 2007, diversion rates were calculated using an adjustment method that relied on a complicated formula involving the amount of disposed waste, employment, population and taxable sales adjusted for inflation.

Since the passage of SB 1016 (Wiggins, Chapter 343, Statutes of 2008), disposal rates are now calculated using a per capita disposal system that relies on existing reporting systems to determine whether the 50 percent mandate has been met based solely on disposal and population. Under this system, waste generation is set based on the calendar years 2003 to 2006. This period corresponds to the time when California achieved 50 percent diversion statewide and to a boom in the housing market and strong economic activity. This base generation rate is then compared to the disposal rate for a given year. Statewide, the base waste generation level is 12.6 pounds per person per day, so on average California residents must (at home and at work) dispose of less than 6.3 pounds per person per day to meet the 50 percent diversion mandate. In practice, each jurisdiction has its own generation estimates and per capita disposal targets and its own unique waste generators and waste stream, so these targets cannot be compared to each other or to the statewide numbers.

AB 341

In 2011, the Legislature implemented a new approach to the management of solid waste. AB 341 (Chesbro, Chapter 476, Statutes of 2011) required that CalRecycle oversee mandatory commercial recycling and established a new statewide goal of 75 percent recycling through source reduction, recycling, and composting by 2020. This paradigm adds to the policies in AB 939 in several significant ways.

First, AB 341 established a statewide policy goal, rather than a jurisdictional mandate. This places the onus for achieving the goal on the state rather than on the cities and counties that are directly responsible for waste disposal and recycling. Under the law, individual jurisdictions are not required to meet the new policy goal.

Second, CalRecycle uses different metrics to calculate the statewide recycling rate. Under the 75 percent recycling goal, a base generation level is calculated using the average per resident generation from 1990 to 2010 (10.7 pounds per person per day). This estimated solid waste generation is lower than the statewide generation estimate of 12.6 pounds per person per day under AB 939, which was based on a near peak time (2003 to 2006) of historical generation. For AB 341 all years for which data existed at the time were included in the generation estimate. This takes into account both high and low years of estimated generation and creates a more representative picture of California's average generation by minimizing the impacts of economic swings.

Finally, for the new statewide goal, CalRecycle uses a definition of recycling that differs from the AB 939 definition of diversion as described in the "What Counts as Diversion, Recycling, and Disposal" section below.

AB 341 also required commercial generators of more than 4 cubic yards of waste per week, and multifamily residences of five or more units to arrange for recycling services. This was later changed to 4 cubic yards or more by SB 1018 (Committee of Budget and Fiscal Review, Chapter 39, Statues of 2012). Furthermore, AB 341 requires jurisdictions to implement a commercial recycling program for those businesses subject to the law.

AB 1826 and AB 876

In 2014, AB 1826 (Chesbro, Chapter 727, Statutes of 2014), was signed into law. This law requires businesses to recycle their organic waste on and after April 1, 2016, depending on the amount of waste they generate per week, as described in Table 1.

Table 1. Organic waste recycling requirements for businesses that will be phased in starting in 2016.

On and After:	Business that Generates per Week:	Of Material:
4/1/2016	8 cubic yards or more	Organic waste
1/1/2017	4 cubic yards or more	Organic waste
1/1/2019	4 cubic yards or more	Solid waste
At CalRecycle's discretion if organic waste has not been reduced to 50 percent of 2014 disposal levels:		
1/1/2020	2 cubic yards or more	Solid Waste

AB 1826 also requires local jurisdictions on and after January 1, 2016 to implement organic waste recycling programs to divert this waste away from landfills.

Beginning in August of 2017, AB 876 (McCarty, Chapter 593, Statutes of 2015) requires counties and regional agencies to include in their Electronic Annual Reports (EARs) an estimate of the amount of organic waste in their area over a 15-year period. It also requires an estimate of how much additional organic waste recycling facility capacity will be needed to process that material, and for counties and regional agencies to identify locations for new or expanded facilities.

AB 1594

Beginning in 2020, green material ADC will no longer count as diversion under the 50 percent diversion mandate for local jurisdictions established by AB 939. Green material ADC will instead count as disposal from that year forward due to the passage of AB 1594 (Williams, Chapter 719, Statutes of 2014). Despite being counted as disposal,

green material ADC will not, however, be charged the state tipping fee for solid waste disposed at disposal sites.

AB 901

The passage of AB 901 (Gordon, Chapter 746, Statutes of 2015) changes reporting requirements for disposal, recycling, and composting operations and facilities. These facilities will be required to submit information directly to CalRecycle rather than to counties who currently submit that information to CalRecycle. In addition, exporters, brokers, and transporters of recyclables or compost would also be required to submit periodic information to CalRecycle on the types, quantities, and destinations of materials that are disposed of, sold, or transferred inside or outside the state. CalRecycle also gains enforcement authority to collect this information. The development of regulations to implement this law will begin in 2016.

What Counts as Diversion, Recycling, and Disposal?

The definition of what counts as diversion for local jurisdictions and recycling for the statewide recycling goal differs under the various laws listed above. One must consider the context under which solid waste is discussed when thinking about what materials count as diversion, recycling, or disposal.

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, ADC, AIC, other beneficial reuse at solid waste landfills, transformation diversion credit, and related activities. In addition, material management practices such as approved land application or inert debris fill do not count as disposal. However, because they reduce the amount disposed at landfills and transformation facilities, these activities count as de facto diversion for jurisdictions.

Under the new 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, composting, and recycling 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, transformation credit, and waste tire-derived fuel. These five activities are instead defined as “disposal-related activities.”

Because of the different base period used and definition of recycling, the estimated waste generation and disposal targets under AB 341 are different than under AB 939. 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[1]. Table 2 provides a comparison of the different disposal definitions and goals between AB 939 and AB 341.

Table 2. 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	*Diversion:* Source Reduction Composting Recycling ADC AIC Other Beneficial Reuse Transformation Credit	*Recycling:* Source Reduction Composting Recycling
Activities that Do Not Count Toward Goal	*Disposal:* Landfill (Including Exports) Some Transformation Engineered Municipal Solid Waste (EMSW) Green Waste ADC (Beginning in 2020)	*Disposal:* Landfill (Including Exports) Engineered Municipal Solid Waste (EMSW) *Disposal-Related:* ADC AIC Other Beneficial Reuse All Transformation Waste Tire-Derived Fuel
Baseline Waste Generation and Base Years in pounds per person per day (ppd)	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

There are several material types and handling processes that require special consideration in what counts as disposal, diversion, and recycling, including source reduction, construction and demolition, biomass conversion, certain types of recyclable materials, certain types of beneficial reuse at landfills, and engineered municipal solid waste.

Source Reduction

Source reduction is any action that causes a net reduction in the generation of solid waste. This includes reusing materials, reducing the use of non-recyclable materials, replacing disposable goods with reusable goods, reducing packaging, food rescue and donations, and increasing the efficient of use of paper, cardboard, glass, metal, plastic, and other materials. Source reduction is considered by the United States Environmental Protection Agency (U.S. EPA) to be the most preferred method for managing waste.

Construction and Demolition

Although the U.S. EPA does not include construction and demolition (C&D) materials in its definition of municipal solid waste, thereby excluding their reuse from its recycling calculations, California does include C&D in its definition of solid waste. Numerous facilities in the state process C&D for recycling, and accept materials including lumber, drywall, metals, masonry, brick, concrete, carpet, plastic, pipe, rocks, dirt, paper, cardboard, or green waste related to C&D projects.

Biomass Conversion

Biomass conversion has not been part of the waste stream for goal measurement purposes, so it is not included in either column in Table 2. Biomass conversion is the production of energy by the controlled combustion of, or use of other non-combustion thermal conversion technologies on, non-food green waste. Under either law, biomass conversion was not considered in the base year generation calculation and does not count toward recycling or disposal-related activities; thus this process is outside the scope of the laws. In practice, increases in the amount of material sent to biomass conversion count as de facto diversion.

Other Recyclable Materials

There are several materials that CalRecycle oversees that are not considered part of the municipal solid waste (MSW) stream. These include used oil, paint and certain types of electronics, which cannot be landfilled due to hazardous waste laws. However, their management provides insight into broader recycling practices.

Alternative Daily Cover and Alterative Intermediate Cover

Under AB 341, alternative daily cover (ADC) and alternative intermediate cover (AIC), including green waste, sludge, ash, compost, and C&D, do not count toward the 75 percent recycling goal. Furthermore, with the passage of AB 1594, green material ADC will no longer be counted toward diversion for local jurisdictions as of 2020. This declassification of ADC for the purposes of recycling and diversion may have consequences for jurisdictions as they implement the 50 percent diversion mandate and to the state as a whole for the 75 percent recycling goal. For example, based on the 2014 per capita disposal calculations, nine additional jurisdictions would not have met their 50 percent mandate if green material ADC had not counted as diversion.

Engineered Municipal Solid Waste

Tires and biomass that are processed by engineered municipal solid waste (EMSW) facilities in order to generate energy count as de facto diversion under AB 341. However, other types of solid waste processed at EMSW facilities count as disposal.

How Is Disposal Tracked and Reported?

Disposal is the primary state metric for determining progress toward the state's diversion goals at the jurisdiction and the state level. The Disposal Reporting System (DRS) was developed as California's main tool for tracking disposal and how it changes each year. In 2014, DRS data showed that disposal increased for a second straight year. This section will look at how much is being disposed statewide and how the increase in disposal impacts the state's progress toward diversion goals under AB 939 and 75 percent recycling statewide under AB 341. With disposal increasing, CalRecycle looked at economic indicators in the state and their relationship to disposal to see if the economy is affecting disposal change. Finally, while DRS provides valuable data for tracking disposal, there have been many issues with late reports, incomplete data, and fraud, which have impacted the accuracy and timeliness of the data. The passage of AB 901 changes reporting requirements for disposal, recycling, and composting facilities. These facilities will be required to submit information directly to CalRecycle rather than to counties, which in turn currently submit that information to CalRecycle. In addition, exporters, brokers, and transporters of recyclables or compost would also submit periodic information to CalRecycle on the types, quantities, and destinations of materials that are disposed of, sold, or transferred inside or outside the state. CalRecycle also gains enforcement authority to collect this information. Regulation development to implement this law will begin in 2016. This law fundamentally changes DRS requirements in an effort to improve the Disposal Reporting System.

What Is Tracked Statewide?

California tracks the amount of material sent to landfills for disposal, transformation facilities, or out of state to other facilities. Disposal data is used to measure jurisdiction progress for AB 939 requirements and overall disposal for the state. At the state level, California does not currently require ongoing systematic reporting of throughput from recycling and composting facilities. Facilities are required to keep records, and local enforcement agencies review them, but that information is not transmitted to CalRecycle. While source reduction is at the top of the hierarchy and source reduction programs are the most effective at eliminating waste disposal, it is very hard to quantify it in a meaningful way, especially at a macro level. As a result, disposal data from disposal facilities is the only part of the California waste stream that is systematically tracked and measured.

How Much Is Being Disposed Statewide?

How Much Is Disposed Under AB 939?

Using AB 939 definitions, California generated more than 88 million tons of waste in 2014. Approximately 35 percent of the total generation, or 31.2 million tons of material, were disposed in landfills in California or exported to out-of-state landfills (Figure 1). With a population of about 38.4 million residents, California had a per capita disposal

rate of 4.5 pounds per resident per day in 2014. This puts California well below the statewide target of 6.3 pounds per person per day needed to meet the 50 percent diversion mandate. However, in 2014, disposal increased for the second consecutive year, increasing by about 1 million tons over 2013 (Figure 2). Before 2013, statewide disposal had declined from 42.5 million tons in 2005 to 29.5 million tons in 2012.

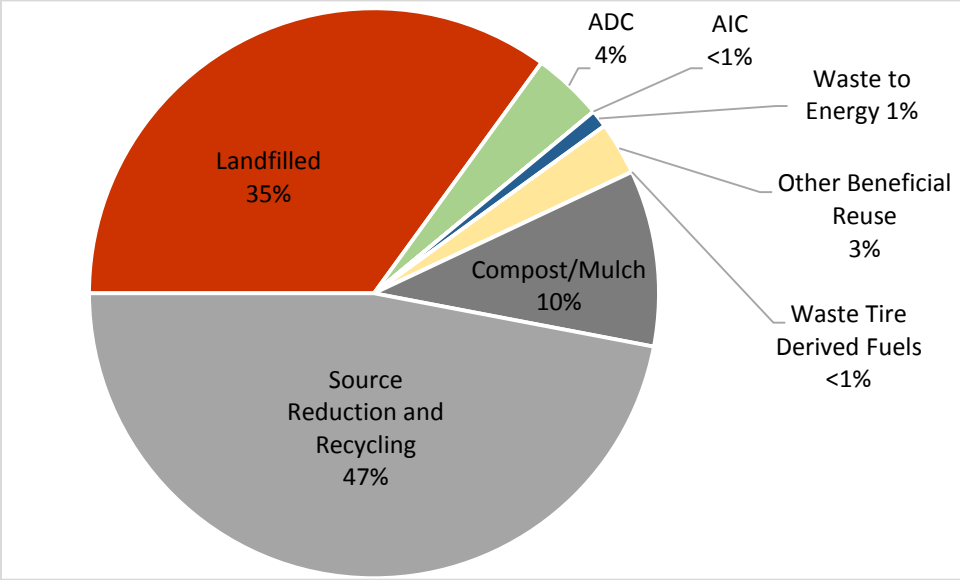

Figure 1. *Estimated destination of 88 million tons of waste generated in California in 2014 based on AB 939 definitions. The total generation is determined from the 2003–2006 per person baseline and the 2014 population in California. Quantities of disposal, waste to energy, ADC, AIC, and other beneficial reuse are derived from the Disposal Reporting System (DRS). Waste tire-derived fuel is calculated based on numbers reported to CalRecycle. Estimate for amount composted and mulched is based on published reports for chip and grind facilities and internal calculations for composting facilities. Source reduction and recycling accounts for the remaining generated waste. Amounts may not add to 100 percent due to rounding.*

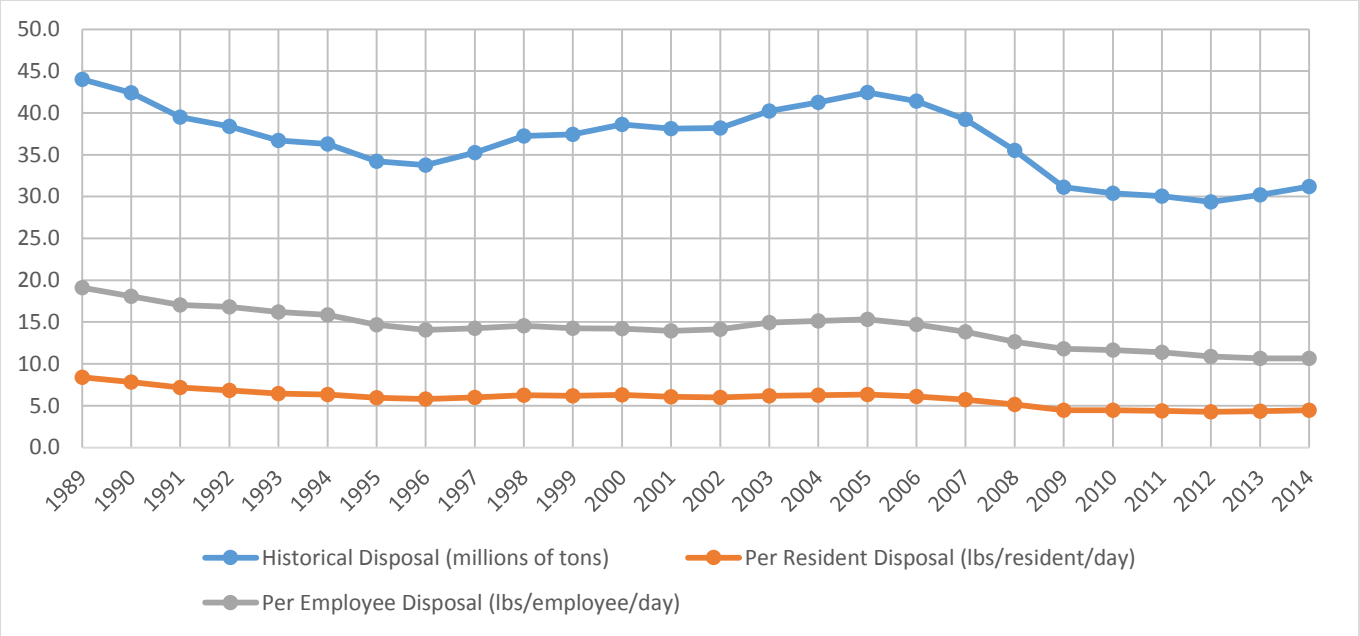

Figure 2. California's statewide per resident, per employee, and total disposal (1989–2014). The Y-axis represents both the number of pounds of disposal (per employee per day and per resident per day) and millions of tons disposed for historical annual disposal. Data from DRS, the Department of Finance, and the Employment Development Department.

How Much Is Disposed Under AB 341?

In 2011, AB 341 established a new statewide goal of 75 percent recycling, composting, or source reduction of solid waste by 2020. Under this program, a base generation level is calculated using the average per resident generation from 1990 to 2010 (10.7 pounds per person per day). This value was chosen to minimize the impacts of economic swings on generation. Residents and businesses must dispose of no more than 2.7 pounds per person per day on average statewide to meet this goal. Disposal under AB 341 includes traditional landfilling as well as disposal-related activities including ADC, AIC, other beneficial reuse at landfills, transformation, and waste tire-derived fuel.

Using the base generation under AB 341 metrics, California generated 74.9 million tons of materials in 2014. Landfilled waste at 31.2 million tons and disposal-related activities at 6.6 million tons account for 37.8 million tons of the 74.9 million tons of generated waste (Figure 3). Landfill, disposal-related activities, and waste to energy account for 50 percent of the generated waste stream, rather than 35 percent under AB 939.

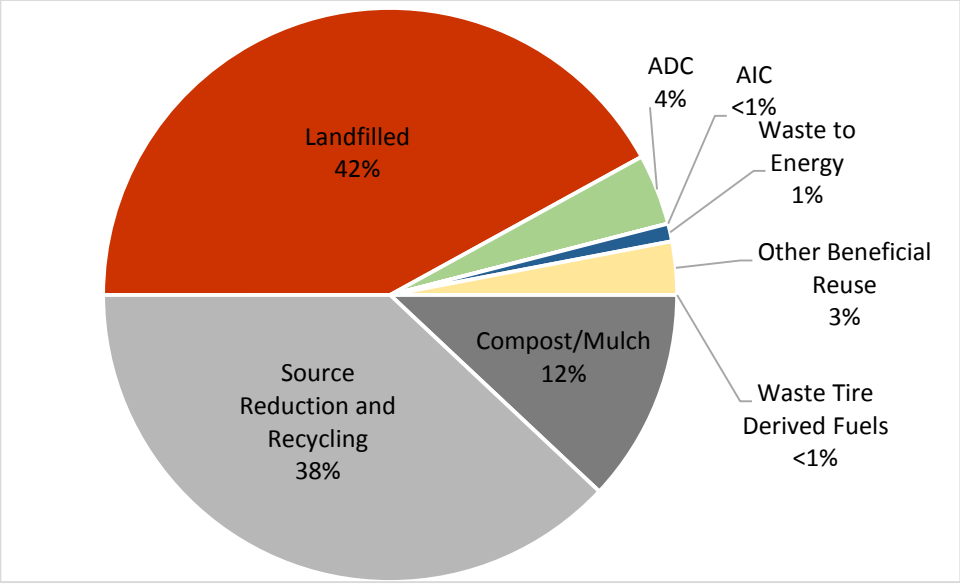

Figure 3. Estimated destination of 74.9 million tons of waste generated in California in 2014 based on AB 341 definitions. The total generation is determined from the 1990–2010 per person baseline and the current population in California. The remaining values were determined as described for Figure 1. California's recycling rate in 2014 was calculated to be 50 percent. Amounts may not add to 100 percent due to rounding.

The disposal increase in the last two years is likely due to California's improving economy and a growing population. With an improving economy, construction activity increases, and people buy more things and generate more garbage at their homes and workplaces.

Will California's disposal decrease or increase in the next decade? CalRecycle developed three models to predict future disposal—high, medium, and low growth factor models—that project future disposal from 2015 to 2025 (Figure 4). Comparing historical disposal from 2010 to 2014 to the disposal projections indicates that disposal may be following a medium growth projection in which disposal continues to increase each year. Under this projection, California would expect to see a total of 36 million tons of traditional disposal (as defined under AB 939) in 2020. After adding in the 7 million tons of disposal-related activity, current estimates project about 43 million tons of potential disposal and disposal-related activity in 2020.

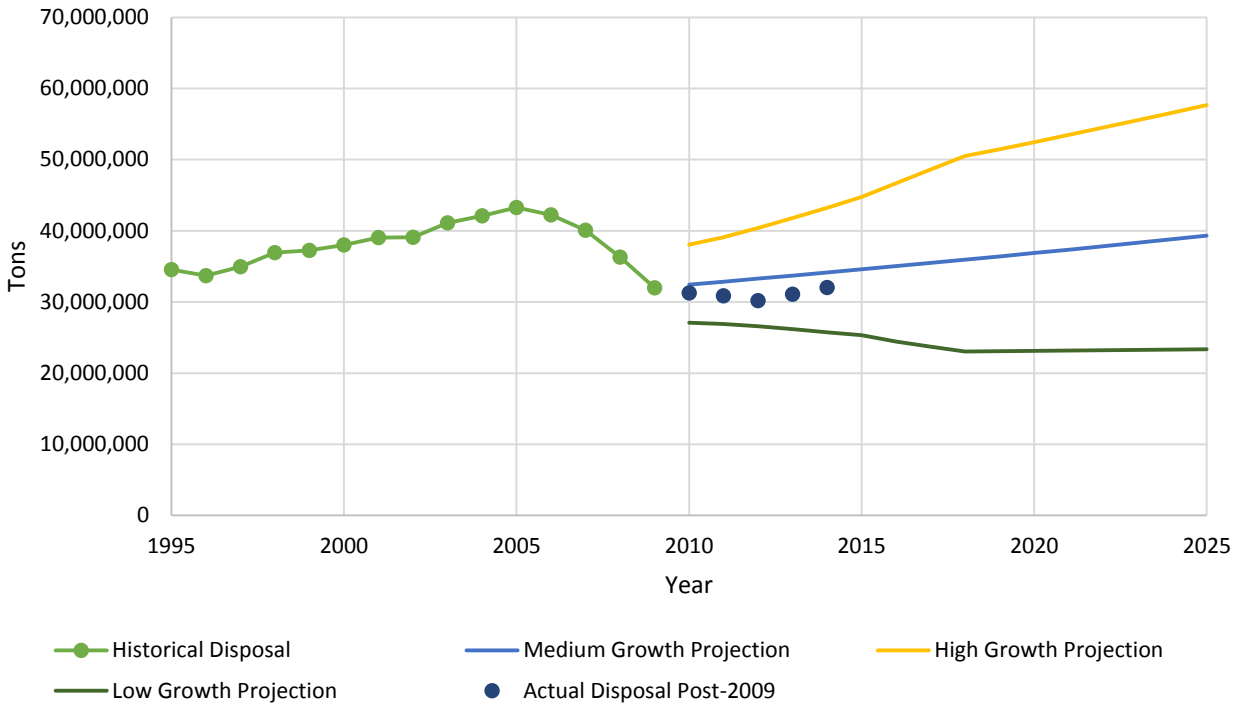

Figure 4. Historical and Projected Disposal starting in 2009 with actual disposal since 2009. 1. Historical 1995-2009 solid waste disposal (landfilled, transformed, or exported for disposal) originating in California as reported to CalRecycle's Disposal Reporting System (connected green dots); 2. Projected 2010 to 2025 solid waste disposal using Woods and Poole Inc. econometric data to generate high (yellow line), medium (blue line), and low (green line) growth factors; and 3. Historical disposal (dark blue dots) for 2009 through 2014 for comparison purposes (material disposed after 2009 was not used in the projection calculations). Data from the Facility Information Toolbox (FacIT) and DRS.

How Much Waste Do We Have to Divert from Landfills to Reach the State Diversion Goal?

California's jurisdictions are doing an excellent job of meeting their AB 939 50 percent diversion requirements. Under AB 341, the goal is to reach 75 percent recycling in California in 2020. California will have to divert more materials from landfills in the next five years to reach this goal by the target year of 2020. As mentioned earlier, if disposal continues on a medium-growth projection, there will be a total of 43 million tons of material sent to disposal and disposal-related activities in 2020. In 2020, California must divert 22 million tons of this 43 million tons of material from reaching landfills or transformation facilities or being used for disposal-related activities to meet the statewide 75 percent recycling goal. To reach the goal in 2020, traditional disposal—which does not include disposal-related activity—would probably have to drop from the current level of about 31 million tons of disposal a year to between 15 million and 18 million tons a year.

Does the Economy Drive Disposal Change?

Does the economy drive changes in disposal? With disposal reversing its downward trend from 2007 to 2012 and increasing over the last two years, CalRecycle examined a variety of economic indicators to see if there is some correlation between California's improving economy and the recent increase in disposal. CalRecycle found several economic indicators that showed a correlation with the change in disposal including wages, real personal consumption expenditures, taxable sales, and housing starts. It is important to note that CalRecycle's research only included an examination of historical economic indicators compared to disposal, not a statistical analysis.

Economic Indicators and Disposal Change

Wages are the money that is payed or received for work or services. Wages differ among nations, regions, occupations, and individuals, but generally, wages will be higher when the demand for labor is greater than the supply.[2] In an improving economy when the demand for labor is usually greater, wages tend to increase; in a recession, wages tend to stagnate. Changes in wages appeared to correlate closely with the change in disposal both nationally and statewide. Historically for California, the percent change in wages tended to correlate with the change in disposal since disposal tracking began in 1990 (Figure 5).

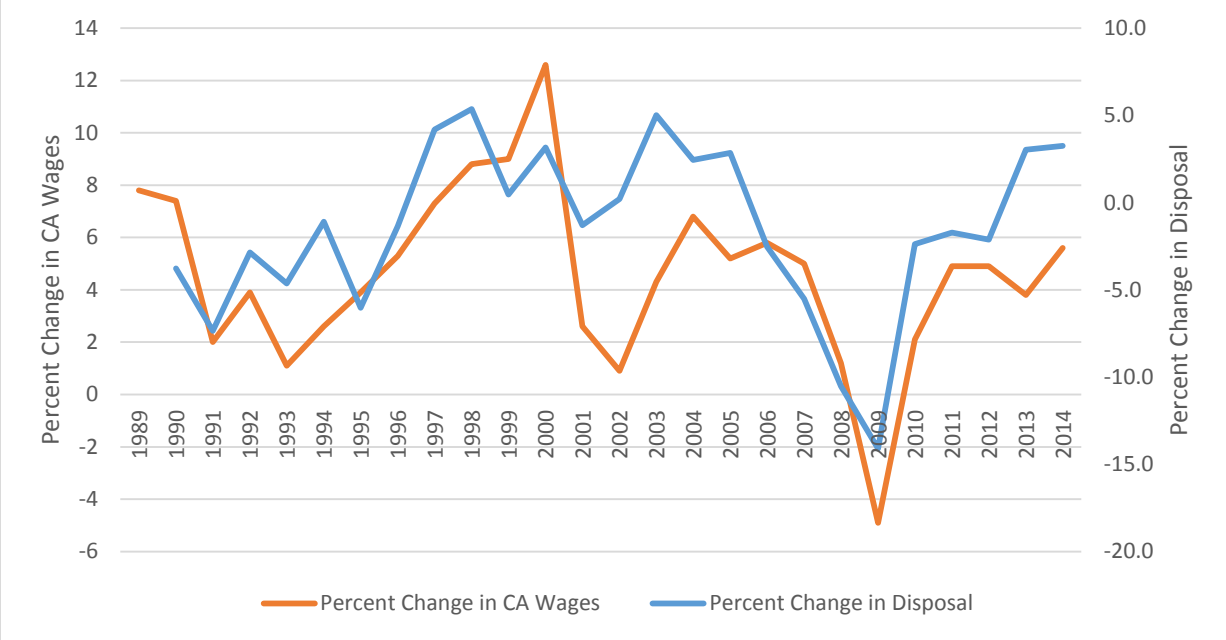

Figure 5: California's yearly percent change in wages from 1989 to 2014 compared to the yearly percent change in disposal from 1990 to 2014. Data from DRS and Bureau of Economic Analysis.

Nationally, changes in wages from 1960 to 2013 also seem to suggest a correlation with the change in U.S. disposal over the same time period (Figure 6).

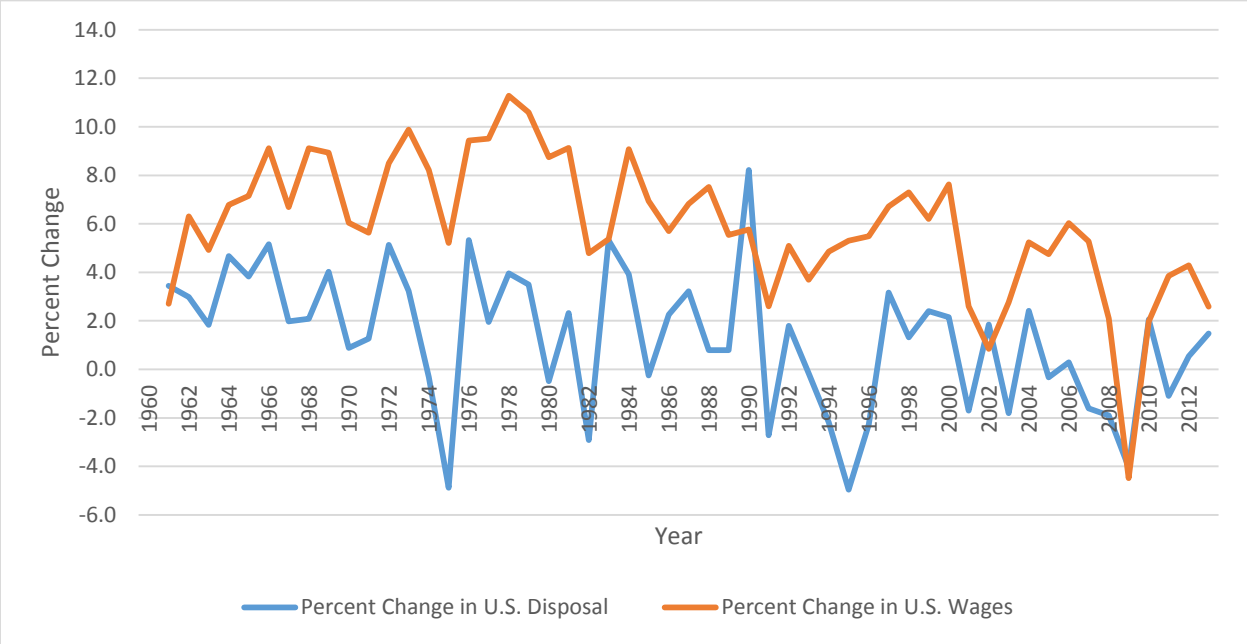

Figure 6. U.S. yearly percent change in wages compared to the yearly percent change in U.S. disposal from 1962 to 2012. Data from Bureau of Economic Analysis and the U.S. Environmental Protection Agency (U.S. EPA).

Increases in wages and consumption mean more people buying products and may mean more materials being generated for disposal. Real personal consumption expenditures (PCE), an indicator that tracks wages and consumption, consists of the actual and imputed expenditures of households; the measure includes data pertaining to durables, non-durables, and services. It is essentially a measure of goods and services targeted toward individuals and consumed by individuals.[3] California's percent change in PCE from the prior year compared to its disposal rate change indicates a strong correlation from 1999 to 2012 (Figure 7). The U.S. EPA also suggests this indicator has a strong affect on the change in waste generation: More consumption likely leads to more waste generation and disposal.[4]

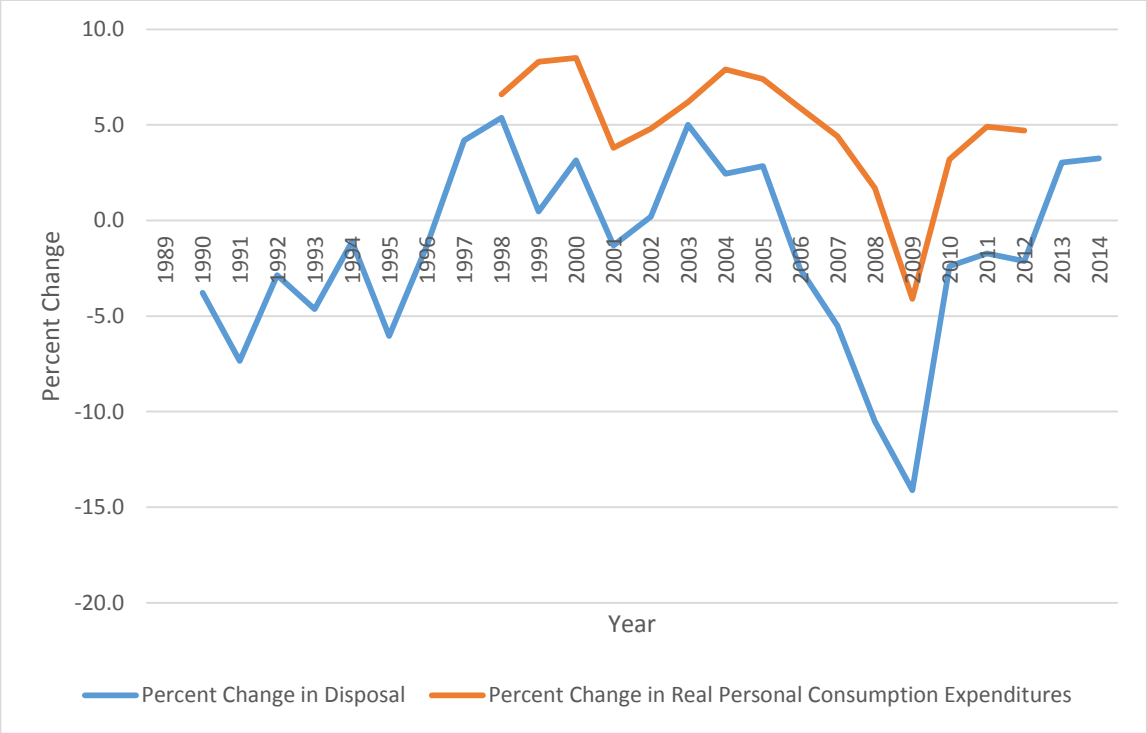

Figure 7: California's yearly percent change in real personal consumption expenditures from 1988 to 2012 compared to the percent change in disposal from 1990 to 2014. Data from DRS and U.S. Bureau of Economic Analysis.

Other indicators related to economic growth also showed some correlation with disposal change. Taxable sales are the total sales of taxable goods—the sale of real property and most retail merchandise, and services—including a variety of professional functions by a particular business for a given period of time. As the economy improves, the percent change in taxable sales tends to increase as consumers buy more products. The percent change in California's annual taxable sales appears to correlate with the percent change in disposal (Figure 8).

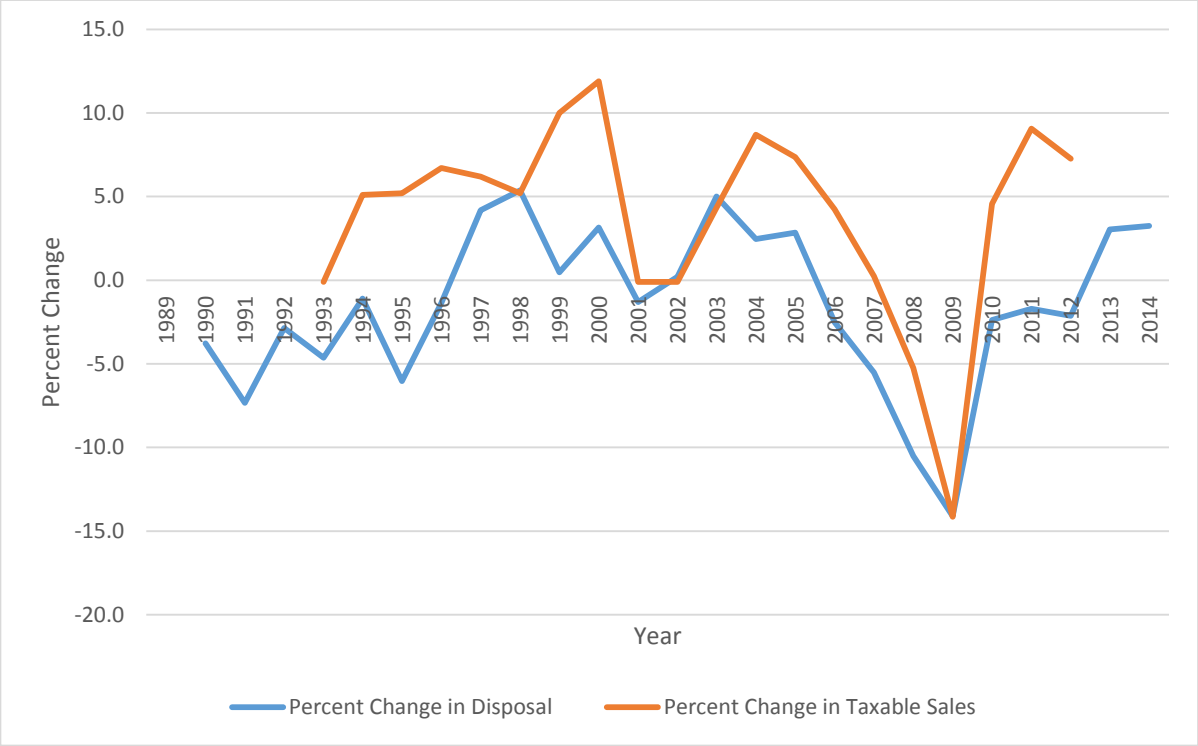

Figure 8. California yearly percent change in taxable sales from 1993 to 2012 compared to yearly percent change in disposal from 1990 to 2014. Data from the Board of Equalization and DRS.

The number of housing starts appears to have some correlation with disposal, as seen in the following chart tracking single-family housing starts compared to disposal (Figure 9). However, the recent recession caused a much greater decline in housing starts than in disposal. Less construction likely leads to less waste generation.

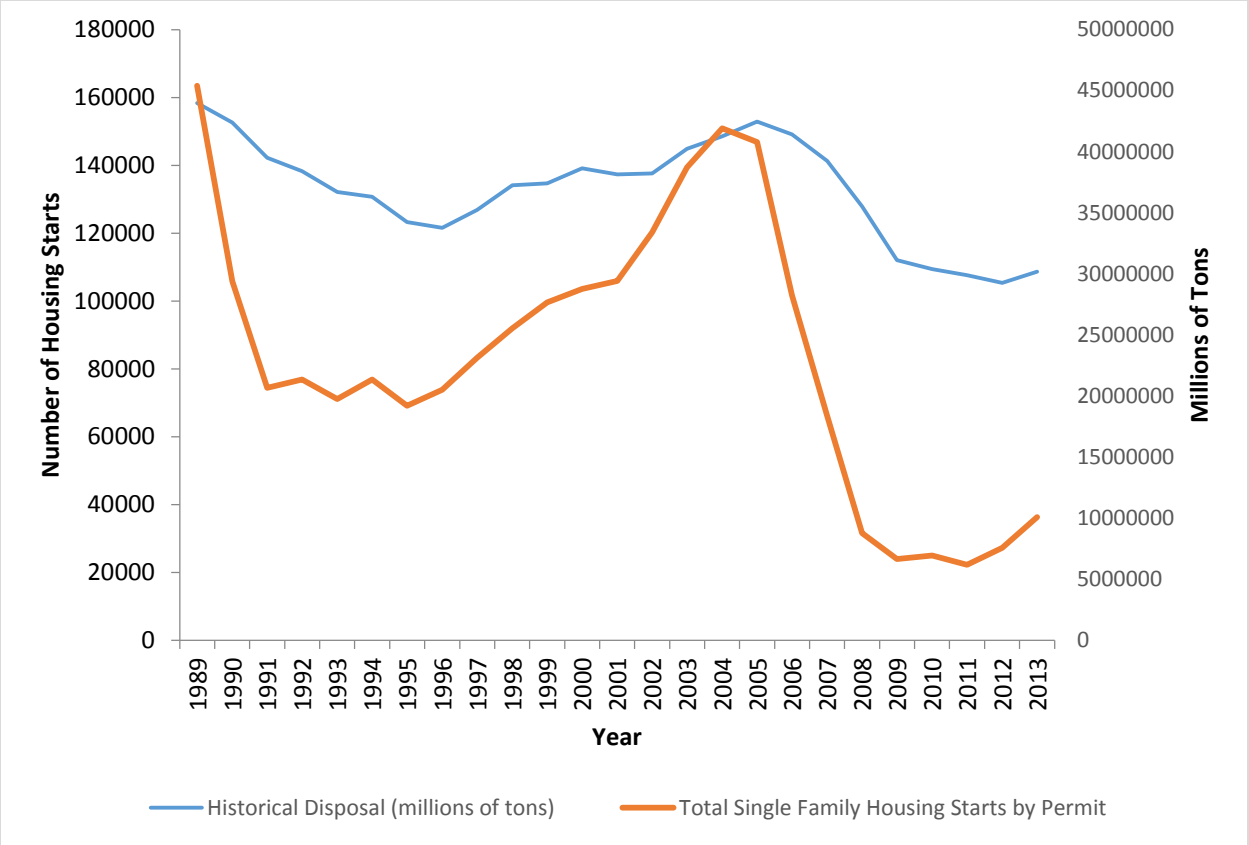

Figure 9. California's number of single-family housing starts per year compared to annual disposal tons, 1989 to 2014. Data from Federal Reserve Economic Data and DRS.

Unemployment appears to be inversely correlated to disposal. More people employed likely leads to more waste generation (Figure 10).

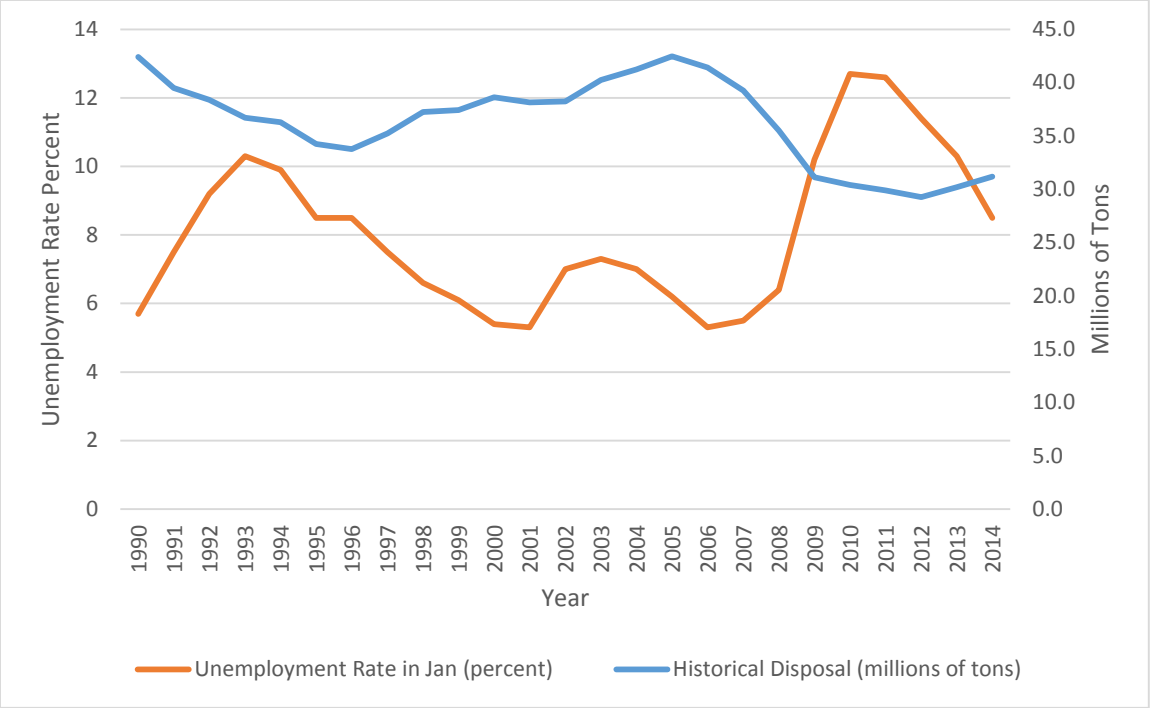

Figure 10. California's unemployment rate compared to historical disposal from 1990 to 2014. The blue line shows historical disposal since 1990 in millions of tons, and the orange bar shows the unemployment rate in January since 1990. Data from Employment Development Department and DRS.

What Does the Growing California Economy Mean for Future Disposal?

California's economy has continued to recover and expand in the last year with labor markets, real estate markets, and construction growing steadily in 2014 and the peak number of jobs surpassing the pre-recession peak.[5] Several economists predict that the California economy will continue to grow and recover from 2015 through 2017 with wages, job growth, and construction increasing. Real personal income is expected to increase by 3 to 4 percent a year, and wages are expected to rise an average of 4.2 percent a year from 2015 to 2017.[6] Unemployment is expected to decrease to 5 percent in 2017, according to the UCLA Anderson forecast quarterly report.[7] Construction is projected to grow 26 percent by 2020, making construction one of the fastest-growing industries in the state.[8]

With the economy expected to grow over the next three years, what does this mean for disposal change? As discussed, of all the economic indicators examined, California wages appear to correlate most closely with disposal change. The gray line in the following chart shows a predicted year-to-year increase in California wages of about 5 percent from 2015 to 2018 compared to the historical trends for wages and disposal (Figure 11).

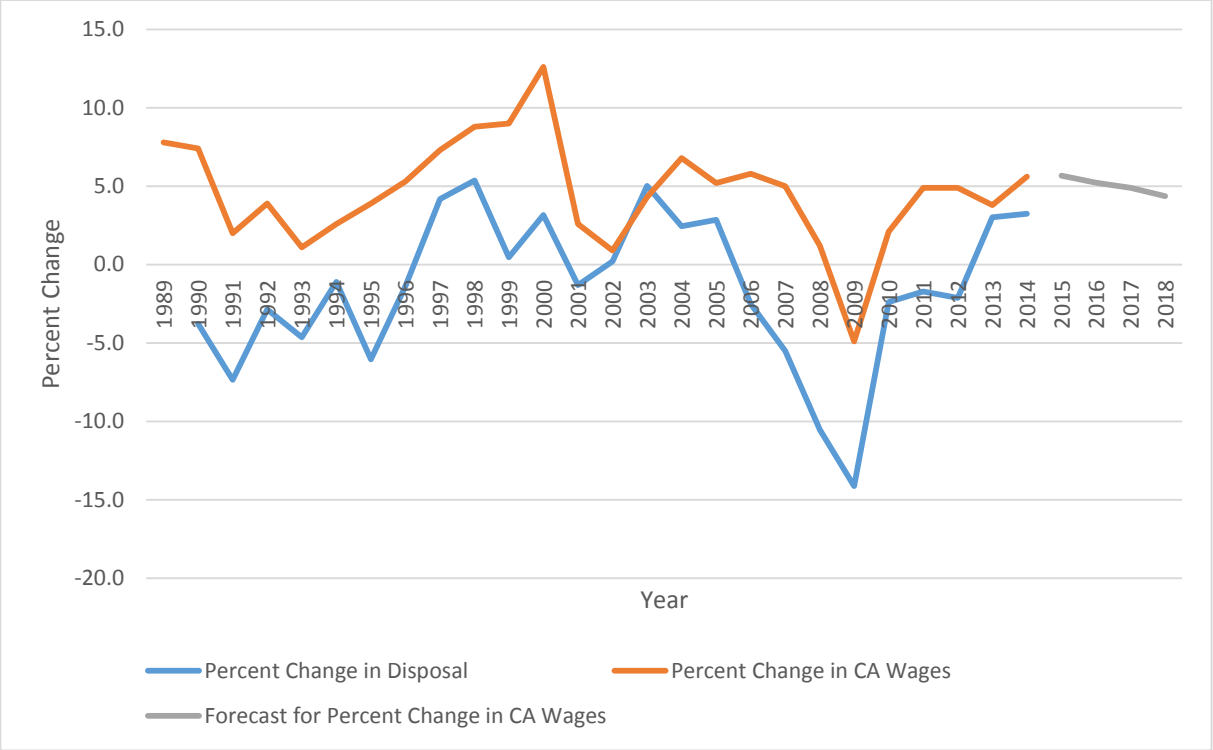

Figure 11: California's percent change in disposal from 1990 to 2014 (blue line) compared to the percent change in wages (orange line) and the projected percent change in wages (gray line) from 1989 to 2018. Projections for percent change in wages are from 2015 to 2018. Data from Bureau of Economic Analysis, California Department of Finance and DRS.

Based on this increase in California wages, annual disposal can be predicted to increase by about 5 percent per year from 2015 to 2017. Figure 12 shows California's historical and projected disposal, with red dots showing predicted disposal if there is a 5 percent increase in disposal each year from 2015 to 2017. If disposal were to follow this economic projection, it would reach nearly 40 million tons by 2017. This projection would match the medium-growth "business as usual" projection of disposal in which disposal gradually increases in 2016 and increases again in 2017.

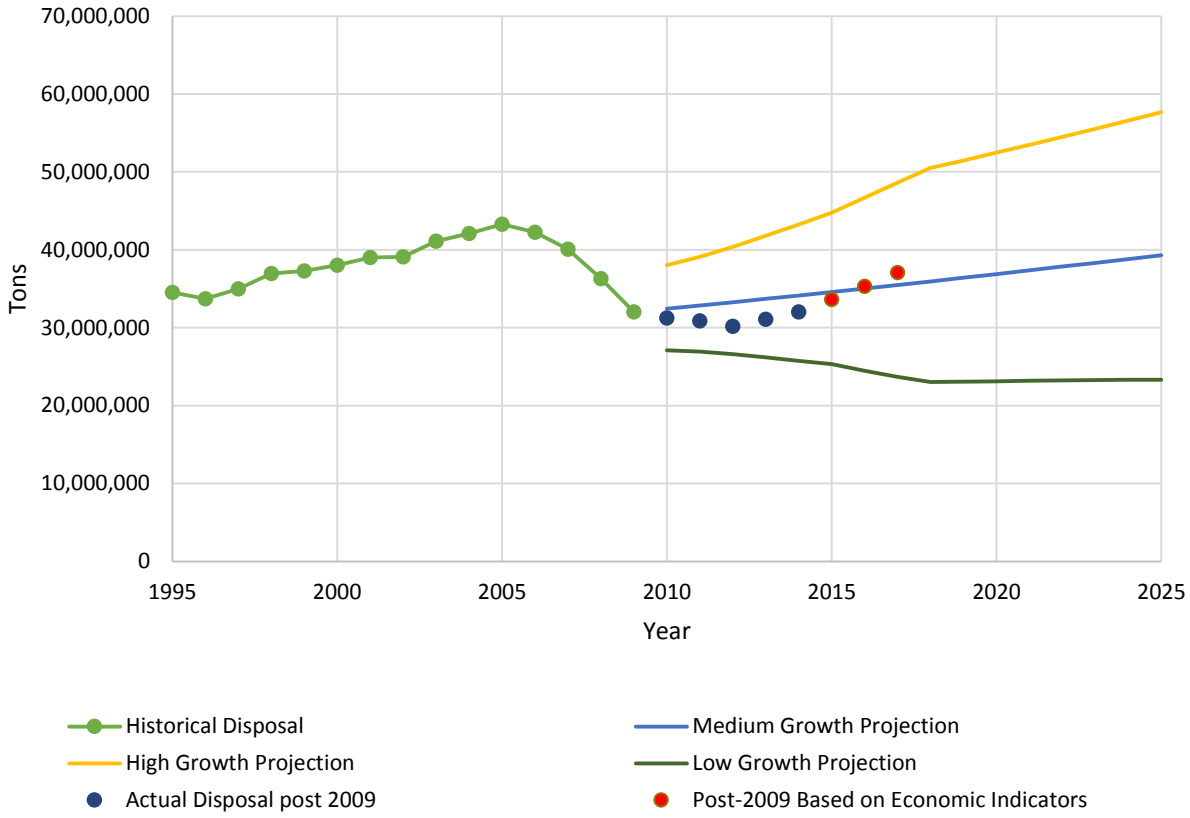

Figure 12: Historical and projected disposal and disposal projections based on economic indicators. 1. Historical 1995 to 2009 solid waste disposal (landfilled, transformed, or exported for disposal) originating in California as reported to CalRecycle's Disposal Reporting System (connected green dots); 2. Projected 2010 to 2025 solid waste disposal using Woods and Poole Inc. econometric data to generate high (yellow line), medium (blue line), and low (green line) growth factors; 3. Actual disposal (dark blue dots) for 2009 through 2014 for comparison purposes (material disposed after 2009 was not used in the projection calculations); and 4. Projected disposal from 2015 to 2017 based on economic indicators projecting a 5 percent increase in disposal each year. Data from FacIT and DRS.

It is important to note that analyzing economic factors and their relation to disposal does not take into account other factors such as the impacts of additional recycling efforts as California strives toward the 75 percent statewide recycling goal. It does not consider markets for recyclables, exports, collection infrastructure, or other changes that could affect disposal. The state does not collect comprehensive data related to recycling and composting, so it is difficult to assess the impact of recycling. Additionally, past performance is not always an indicator of future results, and correlations for economic indicators may become stronger or weaker during different periods (for example, during the recent recession, some of the correlations appear to falter).

As described, several economic indicators show that the economy influences disposal change. It is critical that the state decouple the disposal rate from economic growth. Statewide efforts to develop diversion programs and improve the recycling infrastructure should help divert materials generated due to an improving economy from landfills. This would help mitigate the effects of a growing economy so that it does not drive disposal change.

What Is the Role of the Disposal Reporting System?

CalRecycle's Disposal Reporting System (DRS) is the main source of disposal amount data in California. DRS started tracking the amount of material sent to landfills and the origin of waste by jurisdiction in 1995. While there have been some regulatory revisions and changes to reporting, the fundamental purposes and requirements of DRS have not changed substantially in the last 20 years.

CalRecycle primarily uses DRS data to determine disposal amounts for each jurisdiction. This allows the calculation of each jurisdiction's actual annual per capita disposal rate for comparison with its target rate under the requirements of AB 939 (note that this alone does not determine compliance). DRS similarly supports the calculations done to determine California's per capita disposal rate, statewide diversion rate, and statewide recycling rate.

The process for reporting disposal information involves many steps (Figure 13).

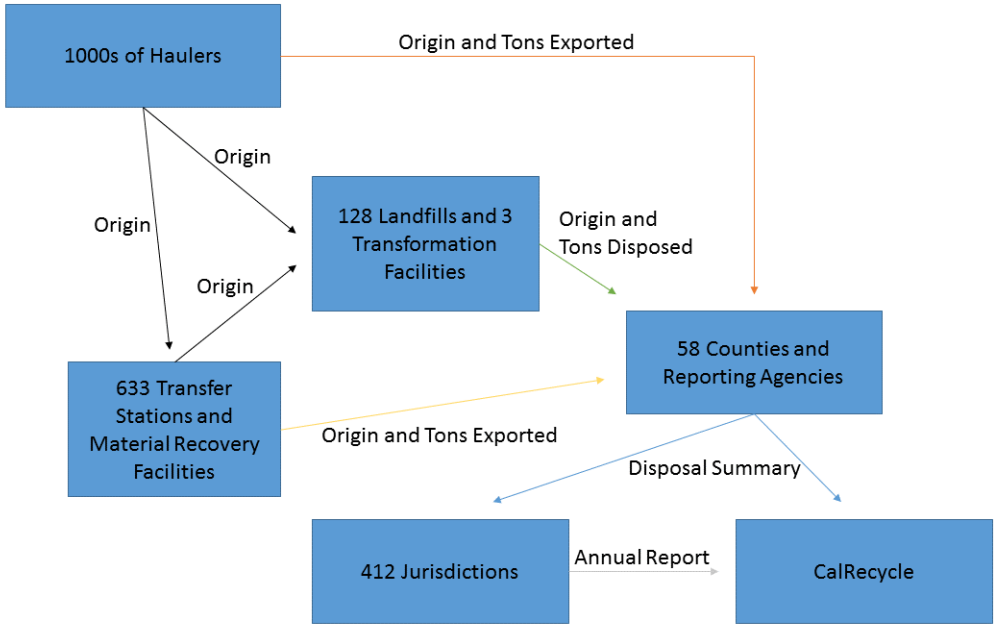

Figure 13. Who reports in DRS? Flow chart shows how disposal data is reported and tracked by jurisdictions, haulers, facilities, counties, and CalRecycle and the total number of entities for each group that has to report. The jurisdiction total is based on the number of jurisdictions required to report in the 2014 Electronic Annual Report. Transfer station, material recovery facility, landfill, and transformation facility counts are based on 2015 data in FacIT. County counts are based on the number of reporting counties in DRS for 2015. Hauler counts are estimated by research and surveys done by CalRecycle in 2015. Data from DRS, FacIT, the hauler database, and Solid Waste Information System (SWIS).

In addition to traditional disposal, disposal facilities must also report on other disposal-related activities in DRS reports, such as ADC, AIC, other beneficial reuse (such as road base or erosion control materials used at landfills), and materials sent from landfills for off-site recycling. DRS also tracks waste disposed at California facilities from other states, countries, or tribal lands; however, this waste does not count as disposal generated from within California.

CalRecycle staff reviews the data, compares landfill disposal amounts to those reported in relation to the IWMF, checks for anomalies, and compiles the four quarters of disposal information into a comprehensive disposal data set for the entire state and each county and jurisdiction. Jurisdiction disposal data is used by jurisdictions in their Electronic Annual Reports to determine their actual annual per capita disposal rate.

What Issues Affect Disposal Reporting Accuracy and Timeliness?

Accurate and timely disposal information is critical, both to ensure that jurisdictions meet their diversion mandates under AB 939 and to track total disposal statewide. Receiving disposal reports by their due dates allows CalRecycle staff and jurisdictions to review the information, contact the report filers to correct any errors, and finalize disposal data for jurisdictions' annual reports. Staff must expend resources asking for revisions on incomplete or inaccurate disposal reports. In 2015, CalRecycle continued to have issues with late, missing, inaccurate, or incomplete disposal reports.

Legislative Changes and Disposal Reporting Accuracy

In 2015 California enacted AB 901, which will require all disposal facilities, including transfer stations and MRFs, to report directly to CalRecycle rather than to counties, which in turn currently submit that information to CalRecycle. AB 901 added new requirements for the following aspects of disposal reporting:

- How disposal information is reported and who will report
- Consequences for not reporting on time or misreporting data
- How disposal information should be made available to jurisdictions and other entities

AB 901 went into effect on January 1, 2016, but the changes in disposal reporting requirements will take time to implement. CalRecycle will be working on developing regulations related to the law and updating DRS to reflect the new changes. CalRecycle anticipates it may take one to two years to complete the rulemaking process for AB 901 and transition from county to facility reporting for DRS.

Currently in DRS, counties gather disposal reports from facilities each quarter, compile the data, analyze it for completeness, and submit it to CalRecycle. In some instances, facilities did not submit reports to their county by the required deadlines, submitted incomplete reports requiring follow-up, or did not submit required reports to the county at all. This can cause issues with reports submitted by the county to CalRecycle, including late and/or incomplete reports and inaccurate data on the origin of disposal. The new procedures under AB 901 will improve the timeliness of reporting, allow facilities to immediately revise disposal data, and make disposal data available immediately for jurisdiction or landfills to review. CalRecycle plans to update the Electronic Disposal Reporting System (eDRS) so facilities can enter and update their data continually, which will simplify the disposal tracking process each quarter. A survey by CalRecycle of other states' reporting systems showed that most states—38 out of 50—already have direct reporting of disposal data to the state.

California facilities will now be required to submit disposal data electronically using eDRS. Mandatory electronic reporting will improve disposal reporting by standardizing data entry, simplifying the data submittal process, and making disposal data available to landfills and jurisdictions once it is submitted. Currently, more than half of all disposal reports are submitted to CalRecycle in various formats and not submitted using the

eDRS system. Staff resources are required to review these reports for completeness, convert them into an acceptable electronic format, and enter the data into the eDRS system. These issues cause delays in the submittal of disposal reports and the availability of disposal data. By requiring all facilities to report electronically using eDRS, all data will be standardized and validated before submittal, simplifying the submittal process and leading to more accurate and complete disposal reports.

An issue of increasing concern in recent years has been the lack of facility cooperation with jurisdictions on disposal accuracy. Disposal data is critical in determining a jurisdiction's disposal rate for meeting AB 939 compliance. However, in several cases, facilities have refused to allow jurisdictions to review disposal allocations to verify that they were made correctly for their city, citing proprietary reasons for restricting access to the data. AB 901 requires facilities to provide that data to jurisdictions, counties, and/or CalRecycle upon request.

AB 901 provides enforcement authority against facilities that do not follow DRS reporting requirements. CalRecycle can penalize facilities from $500 to $10,000 a day for not submitting disposal reports on time or submitting incomplete information. The new law also gives CalRecycle more authority to investigate disposal issues and penalize operators that purposely misreport or falsify disposal data. Any person who willfully files a false disposal report or purposefully falsifies or destroys disposal records will be liable for civil penalties up to $10,000 a day. Penalties may be carried out through the courts or administratively. AB 901 also gives CalRecycle the right to audit or investigate facility records at any time to ensure records are properly maintained.

In 2016, CalRecycle will conduct informal public workshops and stakeholder discussions to gather feedback on the requirements in the law. After the informal workshops are held, the rulemaking process will begin. This will include formal workshops and public comment periods for developing and adopting regulations for AB 901. The progress of implementing AB 901 and its impact on disposal reporting and disposal accuracy will be covered in the next State of Disposal report.

How Does Waste Flow in California?

California's Disposal Reporting System provides the data to track how waste flows each year at the city, county, and regional level to landfills. Waste flow data at the county and regional level can answer questions such as which counties generate the most waste in the state, which counties accept the most waste, and it can help determine the current status of imports and exports. In addition, waste flow data can show how changes in the disposal infrastructure such as landfill closures or openings affect the movement of waste materials in a region.

Waste Generation Sources

When discussing the generation of waste and how it flows, it is important to look at who generated the waste and whether it is generated by households or by businesses. CalRecycle classifies generated waste by commercial sector (businesses, industries, institutions, and government sites), and by residential sector (single-family and multi-family households). Sector data allows CalRecycle to determine the proportion of waste generated and disposed by each sector type, which is important for implementing Department policies. CalRecycle currently has difficulty quantifying which sector generates which waste due to several factors.

First, the Disposal Reporting System does not require that waste sent to landfills, transfer stations, or MRFs to be reported by sector, and there are no other sources for direct reporting of sector data.

Second, the only source for estimating the amount of waste generated by sector at the regional and state levels are periodic waste characterization studies. These studies determine sector breakdowns through surveys of vehicles bringing waste to a facility. Sector results from these studies can be heavily skewed based on several factors, such as the level of facility participation and whether the random selection of facilities surveyed represents the complete waste stream. The 2014 waste characterization study had an anomaly in the statewide data that makes it hard to determine whether the results accurately reflect disposal by sector. For more detailed information on sector data from the 2014 waste characterization study, see the disposal composition section later in this report and the 2014 waste characterization study.

Waste Generation by County

While it is difficult to determine the source of generated waste in the state, data reported in DRS can tell us which counties generate and receive the most waste in California. Overall, the largest counties by population landfilled, sent materials for disposal-related use, or sent to transformation the most waste in 2014 (Table 3). The list of the top 10 counties sending the most waste to disposal facilities did not change from 2013. In 2014, the top 10 counties by population in California landfilled, transformed, or sent for disposal-related use about 25.5 million tons (74 percent) of all waste materials disposed in the state. The Southern California region created the most waste, generating 60

percent of the state's total landfilled or transformed waste, with 20.7 million tons of materials going to landfills in 2014.

Table 3. Ten counties by percentage of total state population that landfilled, sent to disposal-related use, and transformed the most waste in 2014. The amount of materials disposed by a county includes tons landfilled, materials used for ADC and AIC, and waste sent to transformation (waste to energy). The table also shows the percentage of waste statewide that these counties sent to landfills or transformation facilities. From DRS and the Department of Finance.

County	Landfilled Tons and Disposal-Related Use (Disposal, ADC, AIC, and Transformation)	Percent of State Waste Landfilled, Sent for Disposal-Related use, or Sent to Transformation	Percent of State Population
Los Angeles	9,129,064	26.3	26.2
Orange	3,519,706	10.2	8.1
San Diego	3,438,171	9.9	8.3
Riverside	1,903,288	5.5	6.0
San Bernardino	1,679,694	4.8	5.4
Alameda	1,448,352	4.2	4.1
Santa Clara	1,444,558	4.2	4.9
Sacramento	1,259,847	3.6	3.8
Kern	888,362	2.6	2.3
Ventura	869,244	2.5	2.2

Landfill Disposal and Transformation by County

Waste tends to flow from county to county; some counties create more waste than they landfill, while other counties landfill more waste than they create. Overall, the top 10 counties by population received the most waste in the state in 2014. However, the relative rankings of population and disposed waste are not the same; this variation is likely caused by waste flow among counties. In 2014, the top three counties in population percentage differed in the percentage of materials they accepted for disposal and disposal-related use or sent to transformation statewide compared to their population. Los Angeles County houses 25 percent of the state's population but only landfilled or sent to transformation 16 percent of the state's waste in 2014. Conversely, Riverside County houses 6 percent of the state's population but landfilled or sent to transformation 14 percent of the state's waste in 2014 (Table 4).

Table 4. Top 10 counties by the amount of waste landfilled, transformed, or sent for disposal-related use at a county's disposal facilities in 2014. The amount of materials received by a county includes tons landfilled, materials used for ADC and AIC, and waste sent to transformation (waste to energy). The table also shows the percentage of state population each county represents and the percentage of waste statewide a county landfilled, sent for disposal-related use, or transformed at its facilities. From DRS and the Department of Finance.

County	Landfilled Tons and Disposal-Related Use at a County's facilities (Disposal, ADC, AIC, and Transformation)	Percent of State Waste Landfilled, sent for Disposal-Related use, or sent to Transformation in a County	Percent of State Population
Los Angeles	5,751,402	16.2	26.2
Orange	4,996,858	14.1	8.1
Riverside	3,719,649	10.5	6.0
San Diego	3,392,760	9.5	8.3
San Bernardino	1,806,153	5.1	5.4
Alameda	1,781,430	5.0	4.1
Ventura	1,389,042	3.9	2.2
San Joaquin	1,177,275	3.3	1.9
Solano	1,163,058	3.3	1.1
Santa Clara	1,150,227	3.2	4.9

California's disposal data shows that a considerable amount of waste flows between counties. In 2014, almost two-thirds of the counties in the state (42) sent 6 percent or more of their waste across their borders to other counties (Figure 14). Of these 42 counties, 12 counties sent all their waste outside their borders to other counties or as export to other states due to the fact they have no landfills for disposal. An example of this is San Francisco County, which has no in-county landfills and sends all of its waste to nearby counties such as Alameda, Contra Costa, San Mateo, and Solano.

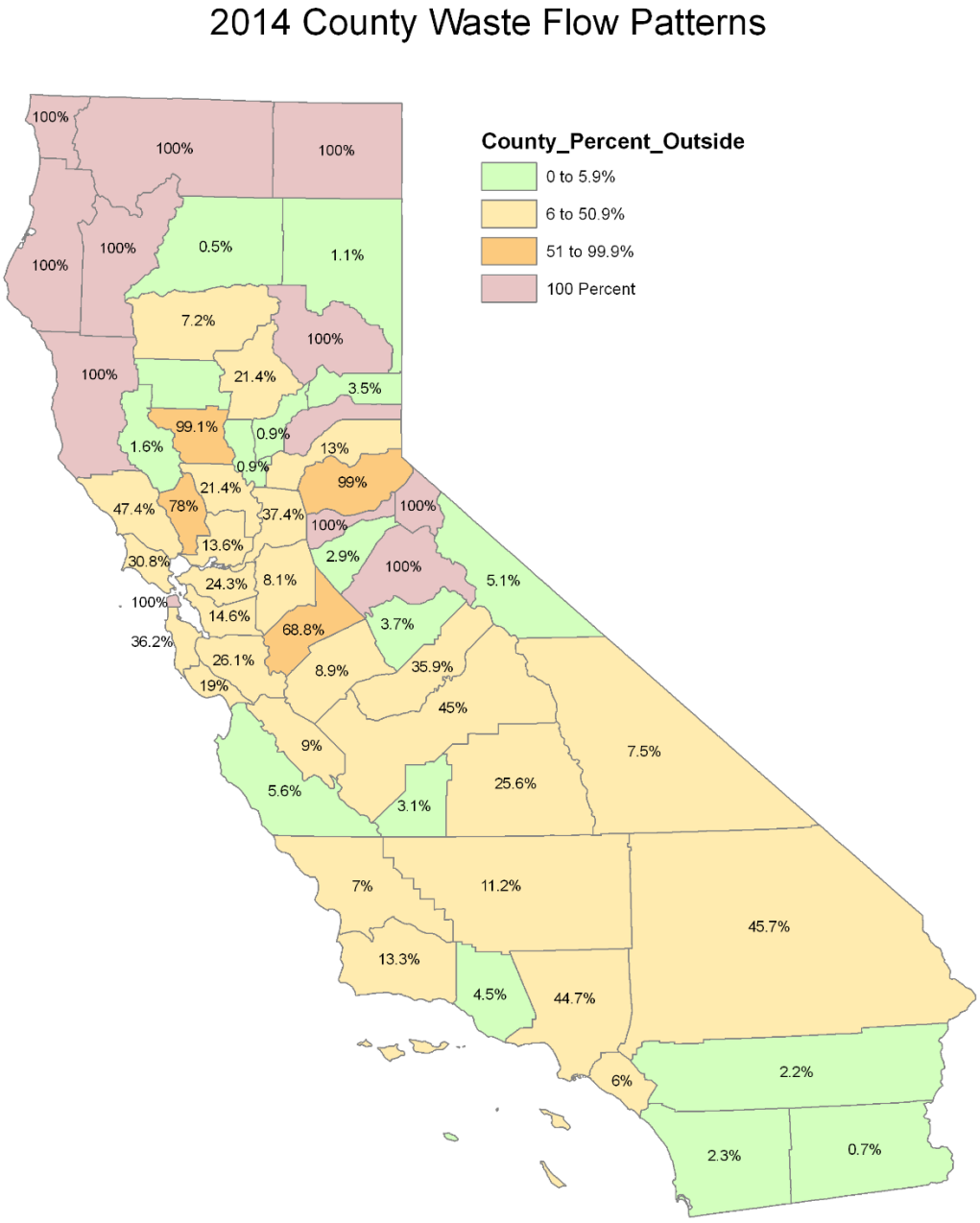

Figure 14. 2014 county waste flow patterns. Map shows counties and the percentage of waste they sent outside their county to other county landfills or as export to other states in 2014.

Purple counties sent all of their waste to other counties or out of the state because they do not have any facilities in their county. Orange counties sent 51 to 99.9 percent of their waste out of the county. Yellow counties sent 6 to 50.9 percent of their waste out of the county, while green counties sent 5.9 percent or less of their waste out of their county. Data from DRS.

One aspect of waste flow that is difficult to track is the flow of waste that is first sent to transfer stations and MRFs for processing before it is landfilled. Estimates show that possibly 60 percent of the waste processed in the state moves through transfer stations and MRFs; disposal data from these facilities could show the complete picture of how waste flows in the state. Disposal regulations require transfer stations and MRFs to track disposal and send this information to counties and landfills, but not directly to CalRecycle. CalRecycle began to request and compile this information in 2015. Initial data collected from transfer stations and MRFs for the 2014 report year was incomplete or reported incorrectly and could not be used for this analysis. Accuracy of transfer station and MRF data should improve as the systems and tools used for reporting are improved with the implementation of AB 901. For more information on transfer stations and MRFs, please see the section on the role of the disposal infrastructure.

Why Does Waste Flow Around California?

Reasons why waste flows between counties in the state include the location of facilities, daily limits on facility throughput, the role of transfer stations and MRFs, vertical integration of facilities and haulers, local ordinances, material types accepted, and costs. Limits on how much material disposal facilities can receive and the location of facilities are a factor in how waste flows. Facilities have daily disposal limits based on their particular design and operation, as well as specific environmental protection concerns. Facilities located in dense urban areas can reach waste capacity limits before the end of the operational day, causing material to be redirected to facilities farther away from where the waste was generated and collected. Conversely, landfills that receive waste from counties and cities up to 75 miles away may be the only disposal option for a broad area. Transfer stations play an important role in waste flow, temporarily collecting materials and moving them farther distances from where the waste was generated. Many transfer stations are located in dense urban areas such as Los Angeles and the Bay Area, where the waste is consolidated for transport to more distant landfills, often in less congested areas.

Vertical integration, agreements on where waste can flow, or local ordinances can influence waste flows. Companies that haul the waste and own landfills may preferentially send their waste to their facilities regardless of distance or county borders. On the other hand, some cities and counties have agreements with haulers that specify the destination of waste collected or ordinances that prohibit waste from flowing outside their county borders. Alameda and Orange counties both have local ordinances that direct county waste to local landfills in the county.

The cost of disposing waste, as reflected in the landfill tipping fees, also impacts waste flow. Landfill tipping fees are the amounts facilities charge per ton to accept solid waste

from franchised commercial haulers or self-haul waste from the public. Fees can vary by facility and customer type (franchised hauler vs. self-haul), affecting waste flow in the state. Tipping fees may have more of an effect on self-haul waste rather than on franchised haulers. Research of self-haul and franchised hauler fees in CalRecycle's 2015 report on state tip fees showed fees are higher, and vary more, for self-haulers. In addition, many commercial haulers already have negotiated agreements to send waste to specific facilities at set fees; as a result, fees would not play as great a factor in where commercial haulers take their waste. For more information on tipping fees please see the report titled "Landfill Tipping Fees in California."

How Do Changes to the Disposal Infrastructure Affect Waste Flow?

The effects of landfill closures, openings, and expansions on waste flow and disposal patterns in California are relatively unknown. The recent closing of the largest landfill in the state provides an opportunity to see how dynamic waste flows can be. The Puente Hills Landfill is located in Los Angeles County and was the largest landfill in the state from 1995 to 2009, accepting 3 million to 4 million tons of material a year. In the last four years of its operation, from 2010 to its closing in October 2013, the facility still accepted an average of 2.1 million tons of waste a year. During this time period, the landfill received almost 99 percent of its waste from Los Angeles County cities. Disposal data for Southern California for 2014 shows how the existing disposal infrastructure handled the material formerly sent by Los Angeles cities to Puente Hills Landfill.

Five large landfills in three nearby counties—Mid-Valley Landfill and San Timoteo Landfill in San Bernardino County; Badlands Sanitary Landfill in Riverside County; and Frank R. Bowerman Landfill and Olinda Alpha Landfill in Orange County—accepted most of the 2.1 million tons of waste in 2014 that formerly went to Puente Hills Landfill. Figure 15 shows the percent change from the prior year in waste accepted (including materials used for ADC and AIC) for all the facilities in Southern California counties for 2013 and 2014. After Puente Hills Landfill closed, waste sent to landfills in Los Angeles County in 2014 decreased by 22 percent (1.6 million tons) from the prior year. The amount of waste accepted in 2014 compared to 2013 in the three nearby counties increased by 49 percent, or around 593,000 tons, in San Bernardino County; 20.2 percent, or around 840,000 tons, for Orange County; and 15.4 percent, or around 496,000 tons, for Riverside County (Figure 15).

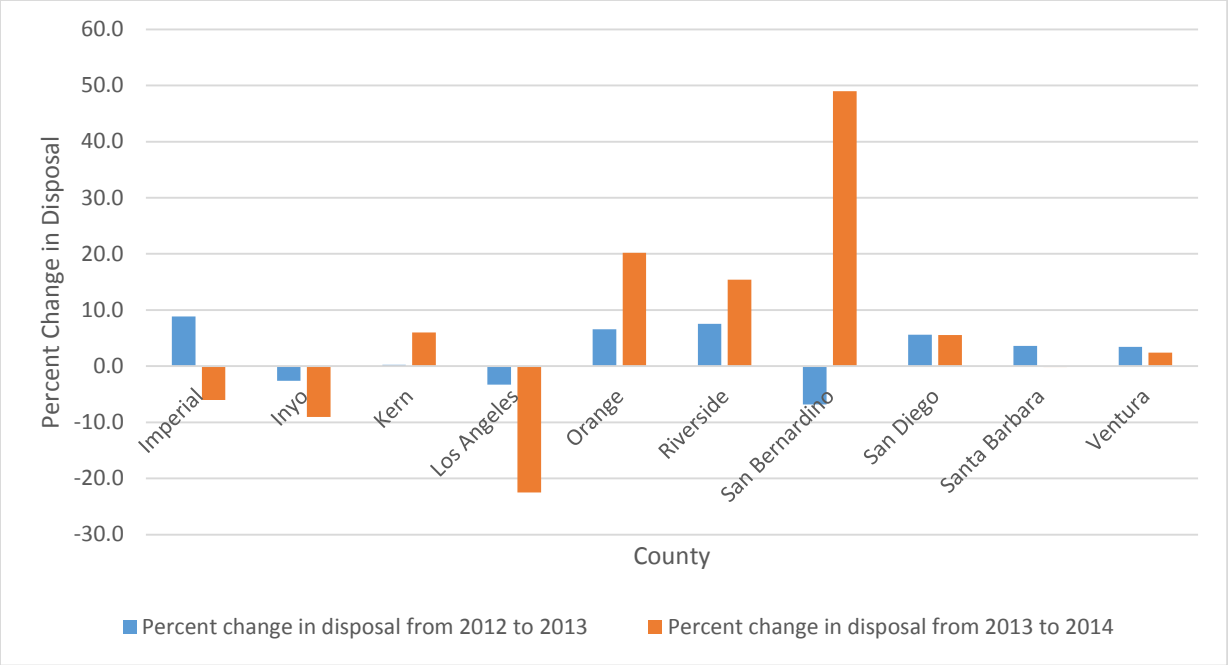

Figure 15. Percent change in material accepted (including disposal, ADC, and AIC) for Southern California county landfills from 2012 to 2013 and from 2013 to 2014. Data from DRS.

Analysis of where Los Angeles County sent its waste in 2014 compared to 2013 showed that the amount of waste sent to San Bernardino, Orange, and Riverside counties increased substantially after Puente Hills Landfill closed. Waste sent by Los Angeles County to San Bernardino County in 2014 increased by 437 percent, or around 709,000 tons compared to 2013; waste sent by Los Angeles County to Orange County increased by 99.8 percent, or 765,000 tons; and waste sent to Riverside County increased by 28 percent, or 253,000 tons (Figure 16). The total amount of waste sent by Los Angeles County jurisdictions to these three counties makes up about 1.6 million of the 2.1 million tons that used to go to Puente Hills Landfill. The remaining 500,000 tons may have gone to San Diego, Kern, and Ventura counties which saw smaller increases in disposal in 2014 compared to 2013. Conversely, the amount of waste sent by Los Angeles County to its own facilities decreased by 1.6 million tons in 2014.

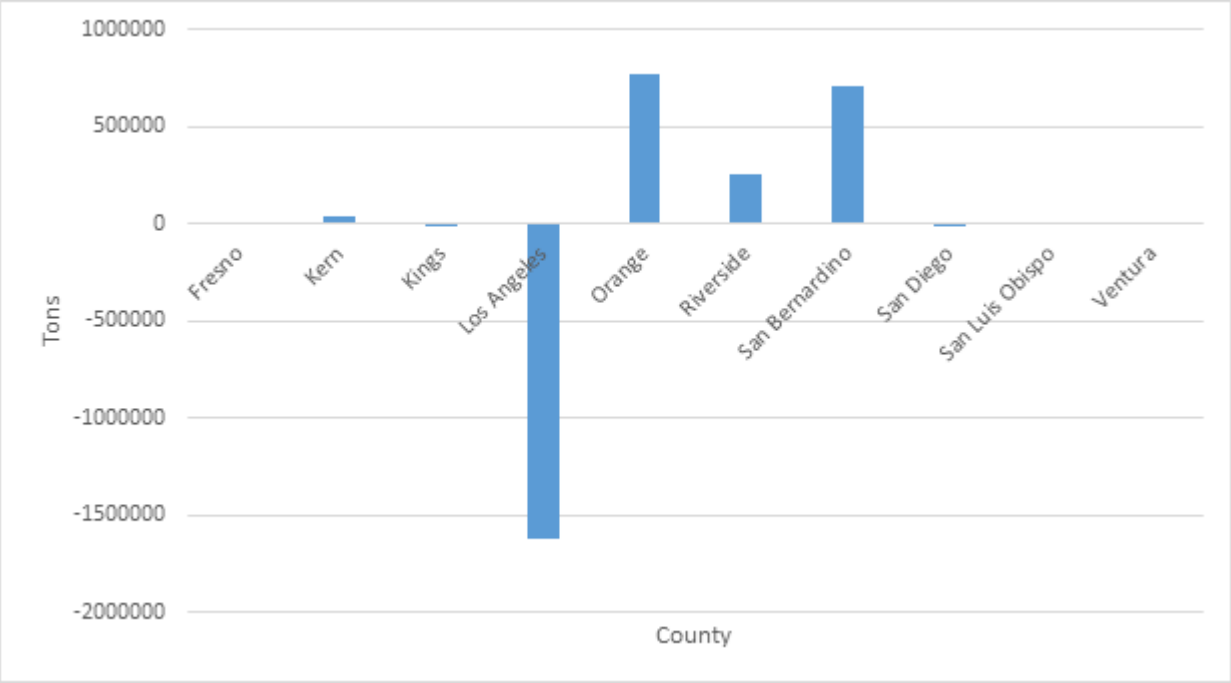

Figure 16. Change in the amount of waste (including disposal, ADC, and AIC) Los Angeles County sent to its own landfills and other Southern California county landfills in 2014 compared to 2013. Data from DRS.

Did waste flow change for the three counties accepting waste that formerly went to Puente Hills Landfill? In 2014, two of the three counties decreased the amount of waste they sent to their own landfills compared to 2013, while all three counties increased the amount of waste they sent to other counties. San Bernardino County increased the amount of waste sent to Riverside County by 49 percent, or 200,000 tons, in 2014, while decreasing the amount of waste sent to its own landfills by 11 percent, or around 111,000 tons. Orange County cities decreased the amount of waste sent to its own landfills by only 3.4 percent, or 13,000 tons, but increased the amount of waste sent to Riverside County facilities by 75 percent, or 10,000 tons, compared to 2013. Riverside County increased the amount of waste sent to its facilities by 3.5 percent, or 7,000 tons, while increasing the amount of waste sent to Orange County by 150 percent, or 8,000 tons. Other factors that affect waste flow may influence how much waste a county can send elsewhere, such as the disposal capacity of the facilities in a county, contracts already designating where a city's waste should flow, and agreements under which haulers only send waste to landfills owned by their parent company.

How did the closing of Puente Hills Landfill and the change in waste flow in the region affect the disposal infrastructure and disposal issues in Southern California? It is likely that for the waste generated by Los Angeles County that was formerly sent to Puente Hills Landfill, the average distance traveled increased and how the materials flowed changed. The five facilities in the three counties that accepted waste from Los Angeles

County in 2014 are 34 to 68 miles away as the crow flies from the center of Los Angeles County, while Puente Hills Landfill is 24 miles away from the center of Los Angeles County. This does not take into account transportation routes used to travel to facilities, the distance traveled to transport waste to these facilities is likely farther. After Puente Hills Landfill closed, more materials from Los Angeles cities may have flowed through transfer stations before being sent to landfills in counties farther away. CalRecycle does not have adequate transfer station data to determine how the closing of Puente Hills Landfill affected the flow of waste to transfer stations in the region.

It is unknown whether counties in the region other than Los Angeles were prepared for the change in waste flow in 2014. The increased waste flow may decrease the lifetime landfill capacity available for these counties. CalRecycle does not analyze capacity at the county level and cannot determine whether increased waste flow will change the remaining landfill capacity for these counties. Finally, some stakeholders have raised concerns about the increase in disposal at local landfills after the closure of Puente Hills Landfill. The landfill closure illustrates that increases in waste sent to landfills can be caused by changes in disposal flow and not solely by cities generating more waste.

It is important to note that this analysis included one year of disposal data for 2014 after Puente Hills Landfill closed in October 2013. CalRecycle will continue to evaluate disposal data in Southern California to track waste flow in the region.

Exports, Imports, and the Waste Stream

Exports are waste sent by California cities or counties to other states, other countries, or to tribal lands and are counted as disposal. In 2014, exports of waste to other states or countries increased slightly from 2013 by around 50,000 tons, with 323,630 tons of material exported to landfills in other states. Exported waste accounted for approximately 1 percent of California's landfilled waste in 2014. Nineteen counties generated waste that was exported out of state (Figure 17). Four counties—El Dorado, Nevada, Sacramento, and Siskiyou—created about 68 percent of the total exported waste for 2014. Most of the waste was sent to facilities in Nevada or Oregon.

Two primary reasons for the export of waste are physical proximity and convenience. Most of the counties that export waste are located near California's border. In some cases, facilities in other states are the closest disposal option. In addition, many jurisdictions send their waste across the border to other states because the landfill tipping fees are cheaper than California fees.

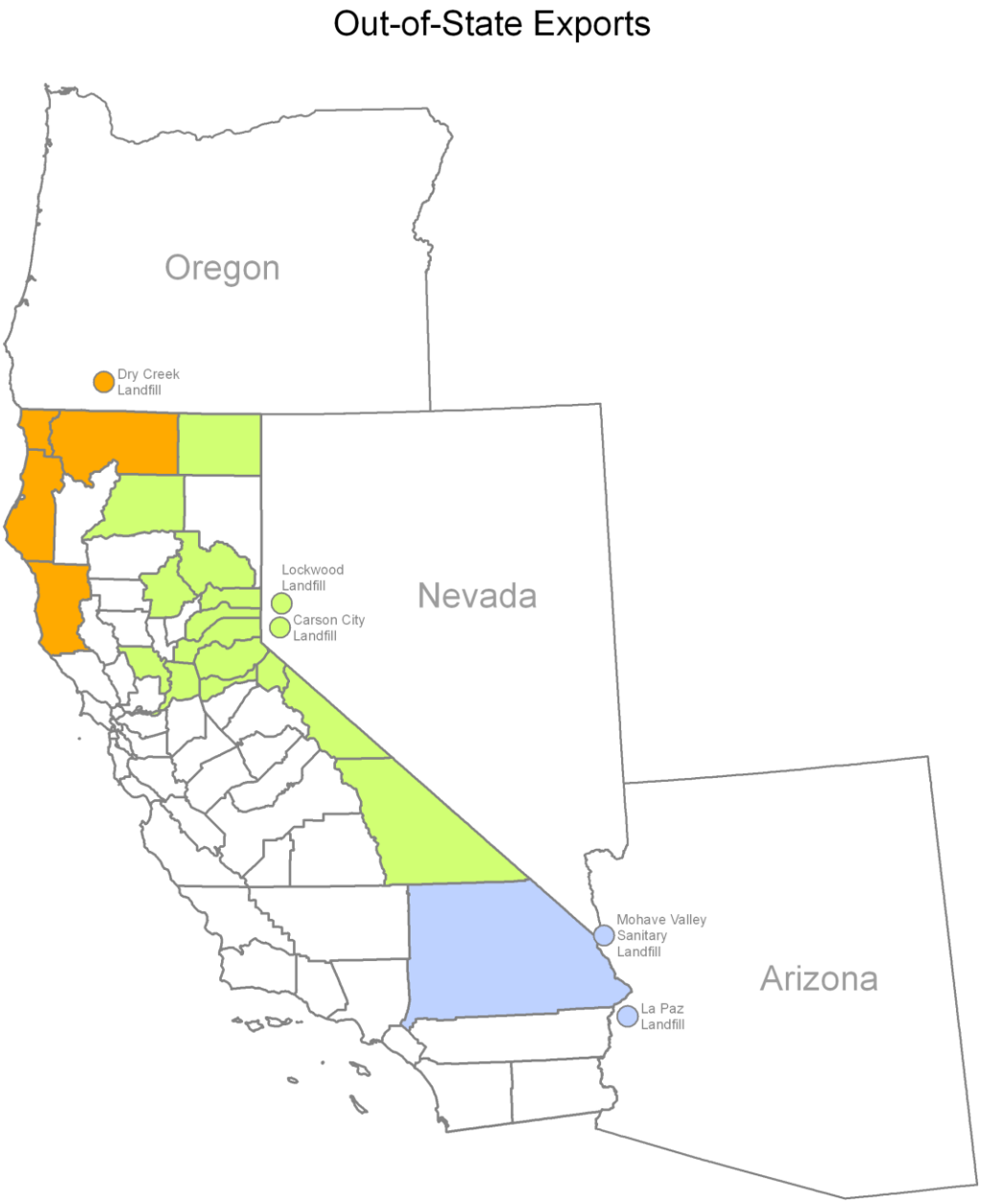

Figure 17. Out-of-state facility exports in 2014. Location and name of five facilities outside California that received solid waste from California in 2014, and the counties that shipped waste to those facilities. The color of the county indicates the state to which a county sent its waste. Data from DRS.

CalRecycle defines imported waste as waste from 116 federally recognized tribal lands in California or waste imported to state facilities from other states or countries. Imports are not considered disposal for goal measurement purposes. Total imports in 2014 were about the same as the prior year and accounted for less than 1 percent of California's landfilled materials for 2014 at 62,108 tons. In 2014, 22 counties reported some imports for the year. Seventy-four percent, or 46,151 tons, of the total imports for 2014 originated from tribal lands. The remaining imports consisted of small amounts of waste imported into California from other states or countries.

Special Occurrences Affecting Waste Flow

Special occurrences, including state and/or federally declared disasters such as forest fires, earthquakes, or floods, can affect the flow of materials in regions or counties. Disasters can temporarily create more waste material, including debris from destroyed or damaged structures or other materials that must be landfilled immediately for safety and health reasons. The cleanup for a disaster usually increases the amount of materials landfilled in a county and/or region for a year. In these cases, CalRecycle can grant special exemptions to jurisdictions so that materials are not counted as disposal. Recent examples of disasters that generated increased waste include the Napa earthquake in 2014 and the Valley and Butte forest fires in 2015. In 2014, disposal of waste increased by 20 percent in the unincorporated area of Napa County; a large proportion of this increase probably can be attributed to waste created by the earthquake.

Materials Exported for Recycling and Subsequently Disposed

In addition to the export of solid waste to landfills outside of California, an undetermined amount of solid waste is included in exports of recyclable materials. Recyclables that are exported through the port system are primarily distributed to China, Taiwan, and South Korea, where the ultimate fate of the material is unknown. Some clean recyclable materials sent overseas are recycled into new feedstocks or products. It is likely that others are not, instead going to pyrolysis or other thermal technologies. Once potentially recyclable materials leave California, end uses, greenhouse gas emissions, other environmental impacts, and health concerns are not tracked or quantifiable. Recyclable material from California is also exported to Mexico, Canada, and other states by rail and truck, but CalRecycle currently has no data detailing the quantity of those materials going to Canada and Mexico.

When exported, some bales of "recyclable" materials contain trash, other non-recyclable items, or incompatible recyclable items; according to some sources, bales shipped to China prior to 2013 may have contained up to 40 percent non-recyclable trash.[9] Bales contaminated with trash are difficult to process at recycling facilities and can result in entire bales of mostly recyclable materials being sent to disposal. In order to stem the tide of substandard recyclable bales, China launched "Operation Green Fence" in

February 2013 to prevent the importation of highly contaminated shipments. Although Operation Green Fence officially ended in November 2013, the initiative resulted in significant changes to the processing of bales, higher-quality bales of recyclables, and the expansion of domestic markets.

Sending carpet overseas does not count as recycling under CalRecycle's carpet extended producer responsibility program. However, for other recyclable material, exporting counts as recycling, even if the material is eventually disposed. This could serve as an incentive to export material rather than send it to facilities in California, potentially resulting in a loss of green jobs and green energy in California and a net increase in transportation-related greenhouse gas emissions and other impacts. If all recyclables that were exported were no longer counted as recycled, the statewide recycling rate would drop from 50 percent to about 33 percent. This estimate excludes recyclable materials sent to Mexico or Canada via truck and rail; if those materials were also not counted as recycled, it is likely that the statewide recycling rate would be even lower, although it is challenging to predict by how much. Please see the "2014 California Exports of Recyclable Materials" report for a more detailed discussion of exports in the state and related disposal issues.

What Is the Composition of the Waste Stream?

Different activities and behaviors by individuals and businesses result in the generation of different material types in the waste stream. Policy makers, local governments, and the public can use information on the types and amounts of individual materials in the waste stream for many purposes including policy development, solid waste planning, market development for recovered materials, and charting progress toward solid waste diversion goals. Through periodic waste composition studies, CalRecycle tracks California's ever-changing waste stream while gathering new information on materials of concern and new disposal trends. In 2014, CalRecycle completed its first waste characterization study in six years (the 2014 waste characterization study); the findings were published in 2015.

Data generated from the 2014 waste characterization study helped update the state's knowledge of the disposed waste stream, including the composition of materials in the waste stream, where waste comes from in terms of sectors, and the composition of disposed and recycled materials generated by commercial businesses.

Study results showed that there were significant changes in the composition of the waste stream compared to 2008, especially in the organics and inerts categories. The percentage disposed by the residential and commercial waste sectors also changed significantly compared to prior studies in 2008 and 2004. Finally, the study looked at total commercial generation (disposal and recycling) and found that many materials in the disposed waste stream can be recycled. This section summarizes the findings and results from the 2014 waste characterization study. For more detailed information, please refer to the complete 2014 waste characterization study.

2014 Study Limitations

The 2014 study followed the standards and protocols similar to those used in the 2008 and 2004 waste characterization studies. As with the two earlier studies, the 2014 study estimated the quantity and composition of the commercial, residential, and self-hauled waste stream in California and aggregated the data to estimate the overall composition. All efforts were made to develop a study that ensured that samples from facilities were representative of all materials disposed in the state and accurately represented the proportion of waste disposed by each sector, subsector, and activity. However, CalRecycle found a possible anomaly in the sector disposal tonnage data. Compared to previous studies, in the 2014 study there was a steep increase in the portion of the waste stream attributable to the residential sector, with a comparable steep decrease in both the commercial and self-haul sectors. An analysis of regional data showed that the Southern region was responsible for the large shift between residential and commercial waste. CalRecycle does not know if the shift in sector data in Southern California represents a change in the proportion of waste generated by each sector since the 2008

study or is an error caused by issues with the sampling methodology or results in the study. For the purposes of this summary, both the 2008 and 2014 study will be discussed when summarizing sector percentage results and findings. For more information on this issue, please refer to the 2014 waste characterization study.

What Materials Are Disposed in the Waste Stream?

Figure 18 shows the overall composition of disposed materials in the waste stream for material categories from the 2014 study. Organics account for more than a third of the waste stream. Food was the most prevalent individual material type in the "other organics" category. Recyclable material categories such as paper, plastic, metal, and glass made up 33 percent of the disposed waste stream. The "inerts and other" material class, which includes materials used for construction such as wood, concrete, and roofing materials, changed significantly in 2014 with a 10 percent decline compared to the 2008 study. Disposal of nearly every material type in the "inerts and other" class decreased between the two studies.

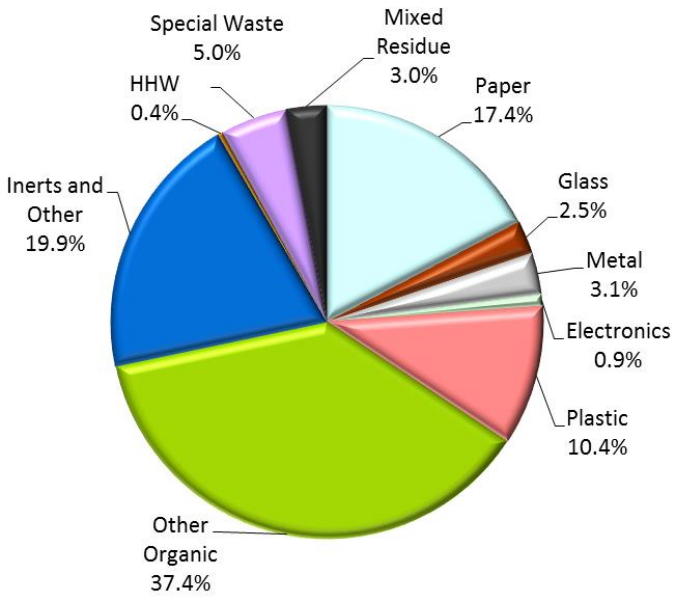

Figure 18. Overall composition of California's waste stream. Amounts may not add up to 100 percent due to rounding. Data from CalRecycle 2014 waste characterization study.

At the individual material type level, the 10 most prevalent materials in the waste stream reflect the top material classes disposed in the waste stream. Other organic material types (food and green waste), inerts and other materials (lumber), and common recyclables (paper, textiles, and cardboard) make up more than 60 percent of the disposed waste stream (Table 5).

Table 5. Ten most prevalent material types in California's overall disposed waste stream. Any differences in sums are due to rounding. Data from CalRecycle 2014 waste characterization study.

Material	Estimated Percent	Cumulative Percent	Estimated Tons
Food	18.1%	18.1%	5,591,179
Lumber	11.9%	30.0%	3,676,710
Remainder/Composite Paper	7.5%	37.6%	2,325,048
Bulky Items	4.4%	42.0%	1,365,340
Remainder/Composite Organic	4.3%	46.3%	1,323,465
Textiles	4.0%	50.3%	1,234,711
Other Miscellaneous Paper	3.9%	54.2%	1,215,919
Leaves and Grass	3.8%	58.0%	1,172,925
Uncoated Corrugated Cardboard	3.1%	61.1%	964,942
Prunings and Trimmings	3.1%	64.3%	962,262
Total	**64.3%**		**19,832,501**

General findings from both the 2008 and 2014 studies show that Californians continue to dispose of many materials that can be recycled or composted. Vegetative materials, compostable paper, and food that could be composted and/or sent to composting facilities account for 40 percent of the disposed waste stream. Paper accounts for 17 percent of materials sent to disposal in both the 2008 and 2014 studies. Both studies show that recyclable materials such as paper, metal, and glass make up a significant portion (more than 30 percent) of the disposed waste stream. Past studies on contamination of recyclables in the waste stream found that the majority of these recyclable materials are uncontaminated and could be readily recycled if removed from the waste stream. As mentioned earlier, inerts and other materials including lumber, concrete, and roofing materials showed a significant decline in the 2014 study compared to the 2008 study. It is unknown whether this is due to the significant decline and subsequent slow recovery in construction activity since 2008.

Who Disposes Material in the Waste Stream?

Human activity generates waste, whether it is created by a residential family or as the result of a business endeavor. Determining the source and amount of waste generated by residential or commercial sources for materials sent to landfills has many benefits. Determining sector breakdown and waste composition for the residential and commercial sector can help policymakers develop waste management and recycling policies, target materials for recycling, and promote programs to increase recycling of materials away from landfills.

Currently, CalRecycle only estimates waste sector data through periodic waste characterization studies. Studies estimate the source that generated waste by surveying franchised haulers and self-haulers that bring waste directly to a landfill or transfer station. In the disposal infrastructure, franchised haulers that collect waste from residential and/or commercial sources that generate the waste transport approximately 80 to 85 percent of the solid waste in California. The other 15 to 20 percent is self-hauled by the generator of the waste from commercial or residential sources. CalRecycle distinguishes three sectors for waste sources: the residential sector, in which haulers collect waste from residences and transport it to disposal facilities; the commercial sector, in which haulers collect and transport waste from businesses and institutions; and the self-hauled sector, in which residential and commercial generators bring waste directly to facilities. For more information on sector types, please refer to the 2014 waste characterization study.

Disposal Sector Findings

According to the 2014 study, residential sources generated nearly half of California's waste, and commercial sources generated the remaining 50 percent. This is a significant difference from the 2008 study, in which approximately two-thirds of the waste came from commercial sources and a third came from the residential sector. Combining the 2014 sector proportion data with the overall 2014 statewide disposal amount shows commercial sources responsible for more than 15 million tons of material sent to landfills and residential sources responsible for the remaining 15 million tons. Note that the sector tonnage results from the 2014 study may be in question; see the "2014 study limitations" section above.

In the 2014 study, the franchised (i.e., waste collected by haulers) residential sector is the largest disposal sector statewide at 47 percent, with 35 percent from single-family dwellings and 12 percent from multi-family. The franchised commercial sector makes up 39 percent, and the self-hauled sector makes up the remaining 14 percent. Commercial sources accounted for 11 percent of all self-hauled waste with 3 percent from residential sources. As noted earlier, the 2014 study results differed from those in the 2008 study due to an anomaly in the Southern region, which showed an apparent significant increase in residential disposal and a decrease in commercial franchised hauler and self-hauled disposal. In the 2008 study, the commercial sector was the predominant sector for disposal at 50 percent, with the residential sector at 30 percent and self-hauled at 20 percent.

The next four figures (Figure 19, Figure 20, Figure 21, and Figure 22) show the waste composition by material class for each sector and the overall recoverability of materials in California's waste stream. Looking at Figure 19, "other organics" such as food was the most prevalent disposed material class in the commercial sector at nearly 35 percent, with the paper class second at 20 percent. Overall, materials such as paper, glass, metal, and plastic that could potentially be recycled comprise a significant portion of the commercial waste stream. Analysis of the recoverability of materials from the

2014 study shows that more than 20 percent of the overall disposed waste stream is made up of materials that could be recycled, including curbside recyclables or other recyclables (Figure 20). The amount of easily recycled material still being disposed by the commercial sector shows further opportunities to recycle more. Mandatory commercial recycling was implemented statewide starting in July 2012, but the 2014 study shows that the proportions of recyclables in the commercial waste stream are similar to 2008. Organics are a significant proportion of the commercial waste stream. It is hoped the implementation of mandatory commercial organics recycling in 2016 will decrease the amount of organics in the commercial waste stream.

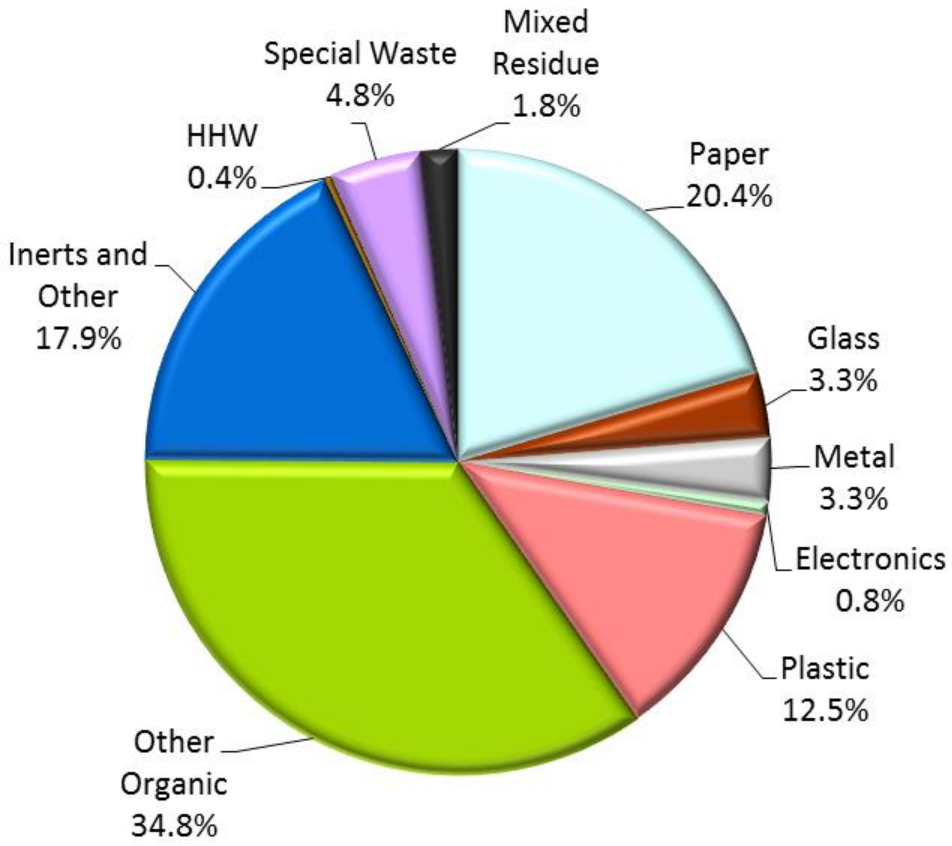

Figure 19. Overview of disposed waste from the commercial sector. Chart showing the overall waste composition by material class for the commercial sector. Amounts may not add up to 100 percent due to rounding. Data from CalRecycle 2014 waste characterization study.

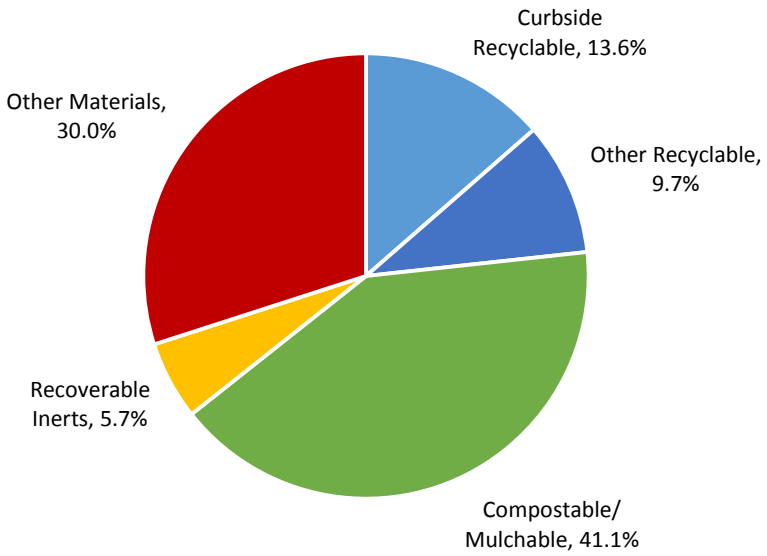

Figure 20. Recoverability of California's overall disposed waste stream. Data from CalRecycle 2014 waste characterization study.

Study results for the residential sector showed that organics and recyclable materials still make up a large portion of the residential waste stream. "Other organics" was the largest material class in the residential waste stream at 45 percent, with food the most prevalent organic material in the category at 22 percent and yard waste materials at 8 percent (Figure 21). Material classes such as paper, glass, metal, and plastic made up 35 percent of the waste stream, with paper the most prevalent individual material at 9 percent. Overall, two-thirds of the residential waste stream is composed of organics and material classes that can be recovered from the waste stream (Figure 20). There is significant potential for state and local diversion programs to divert these materials from the waste stream. Organics in the residential waste stream have increased since the 2008 study and will be an important area to focus on for statewide and local diversion programs.

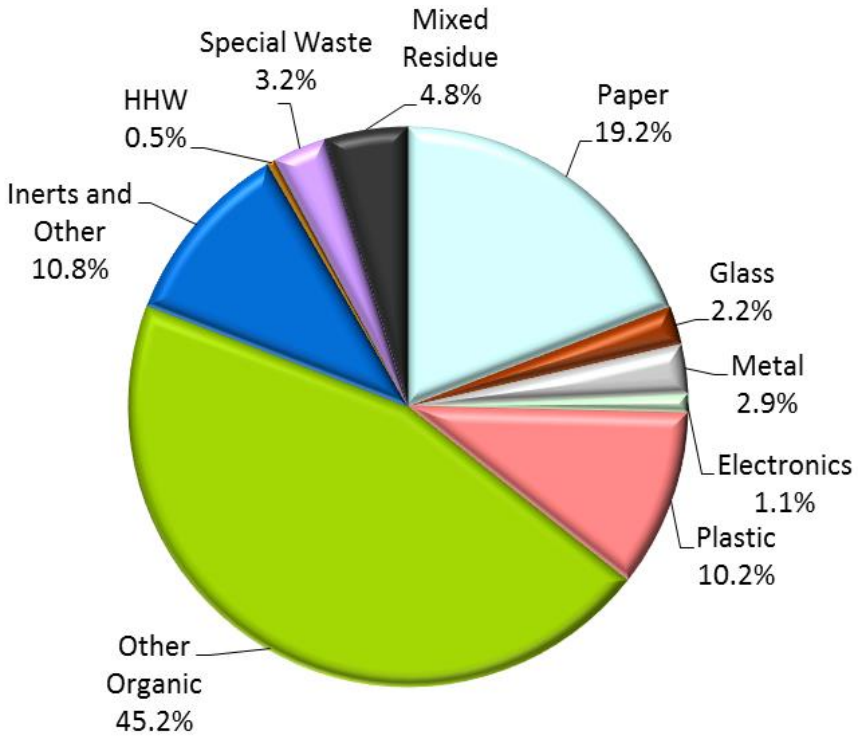

Figure 21. Overview of disposed waste from the residential sector. Chart showing the overall waste composition by material class for the residential sector. Amounts may not add up to 100 percent due to rounding. Data from CalRecycle 2014 waste characterization study.

In the 2014 study, waste from C&D activities dominated the self-hauled sector with an estimated 40 percent of self-hauled waste coming from C&D activities such as roofing, new construction, remodeling, and demolition. Similar to the 2008 study, the “inerts and other” category comprised more than 50 percent of all self-hauled waste (Figure 22). While many local governments have taken steps to reduce construction and demolition waste by encouraging the development of C&D recycling facilities or passing ordinances banning C&D material from landfills, self-hauled waste was still dominated by lumber at 28 percent and other C&D materials such as rock, soil, and fines (6 percent) and gypsum board (4 percent).

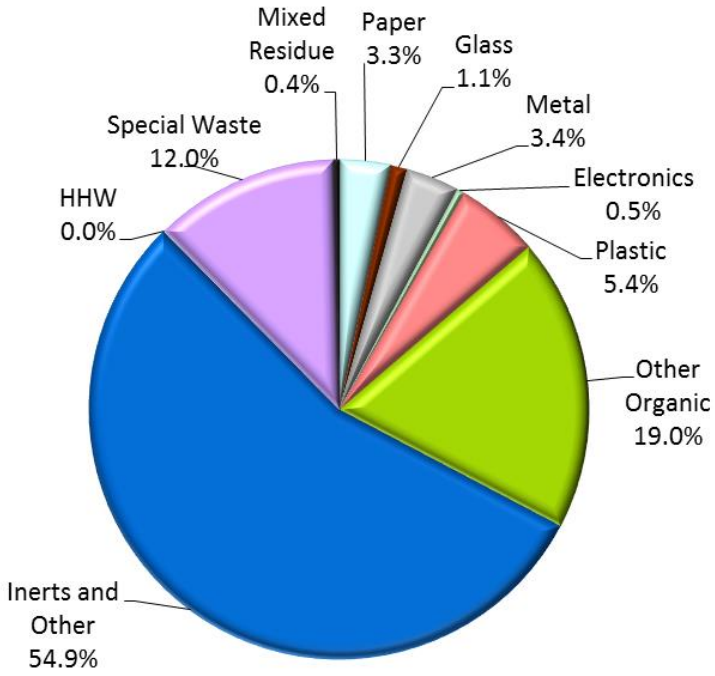

Figure 22. Overview of disposed waste from the self-haul sector. Chart showing the overall waste composition by material class for the self-haul sector. Amounts may not add up to 100 percent due to rounding. Data from CalRecycle 2014 waste characterization study.

Classifying the Waste Stream: What Does Disposal by Businesses Tell Us?
In addition to sampling waste received at landfills, the 2014 waste characterization study completed an in-depth study of waste generated by California businesses. A total of 837 unique commercial generator sites, distributed among 16 business types, and 52 unique multi-family generator sites were sampled in the state to determine the amounts of waste generated in the commercial disposed waste stream (disposal bins) and the recycled waste stream (curbside recycling bins, green-waste bins, and other diversion activities). The study characterized samples for the quantity of material generated for each waste stream, the composition of materials in each stream, and whether the materials were recoverable. The study on commercial generation will be available in 2016.

Almost two-thirds of the total generation of materials at businesses for disposal and recycling was attributed to the disposed stream, and the remaining one-third of materials was in the diversion streams (Figure 23). This means that nearly two-thirds of the materials a business creates goes to a landfill rather than toward recycling or reuse.

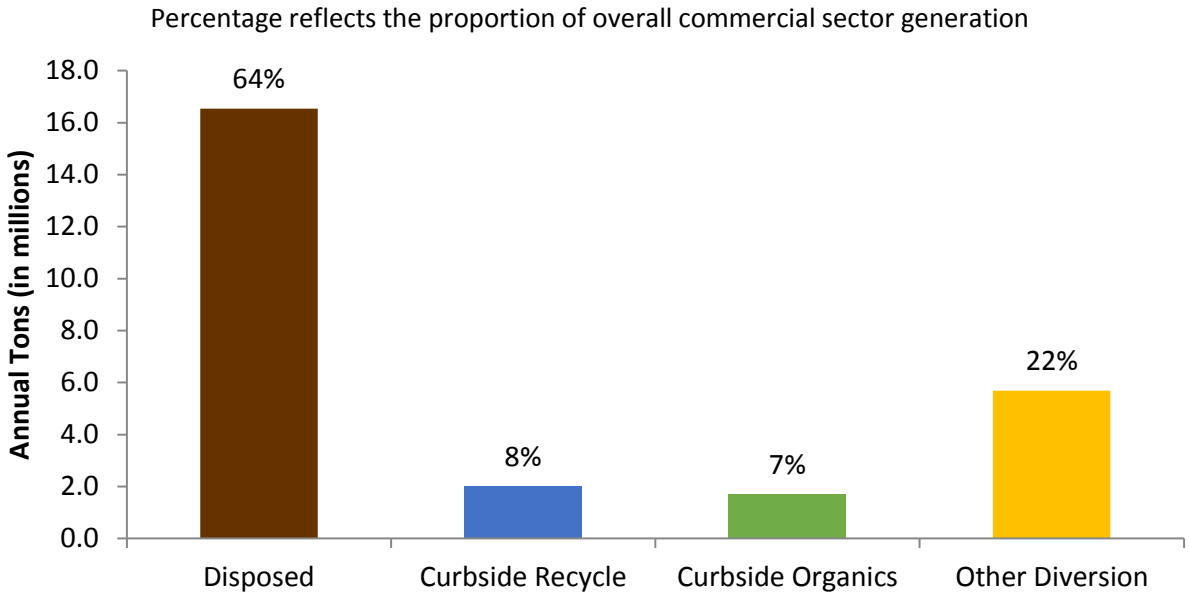

Figure 23. Annual tons by waste stream: overall commercial sector. This figure summarizes the quantity of materials placed in disposal bins, curbside recycling bins, and curbside organics bins, and materials diverted through other means such as businesses selling their own cardboard or scrap metal directly to recyclers. Data from CalRecycle 2014 waste characterization study.

With so much material sent for disposal by commercial businesses, how much is recoverable? Detailed analysis of the materials put in the disposal bins showed that many of the materials were recoverable. Figure 24 shows that materials that could be feedstock for compost or mulch facilities accounted for almost half of the disposed waste stream in the commercial sector, while other materials such as curbside recyclables and other recyclables accounted for another 25 percent. Looking at all materials generated by businesses for both disposal and diversion showed that divertible (recoverable) materials accounted for more than 80 percent of overall commercial sector generation.

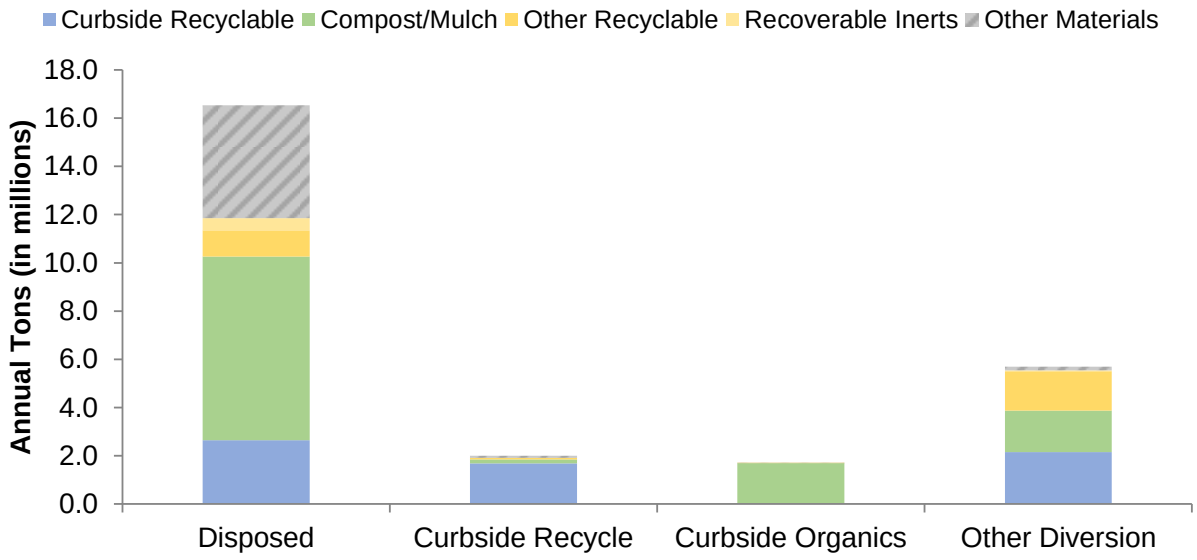

Figure 24. Recoverability by stream: overall commercial sector. Chart showing the total amount of material type category, in millions of tons for each disposal and recycling stream activity in the commercial sector. Data from the 2014 waste characterization study.

Overall, the study found that there is a significant potential for state diversion programs to recover a large part of the discards generated by businesses in the commercial sector and increase diversion of these materials from disposal. Increased efforts in commercial recycling will play an important role in reaching the statewide 75 percent recycling goal in 2020 and beyond. State regulations, including mandatory commercial recycling currently in place and mandatory commercial organics recycling, which will start in 2016, require increased efforts from businesses to recover recyclable materials and organics from the commercial waste stream. CalRecycle will continue to monitor the commercial disposed waste stream to see if more recoverable materials are being diverted from the waste stream.

What Is the Role of the Disposal Infrastructure?

Understanding the role of the disposal infrastructure is essential to understanding the flow of waste materials from collection through processing and ultimately to final disposal at a landfill. This section gives an overview and update of each component in the disposal infrastructure in California, including the haulers that transport waste from commercial and residential sources and the active facilities that process waste, including transfer stations, MRFs, landfills, and transformation facilities. Hauler and facility roles and ownership trends, and the amount of material handled by each, will also be discussed.

Transformation and other MSW thermal technologies are options for converting waste to energy. This section looks at the status of transformation in terms of use in the state and updates any new developments for thermal technologies such as engineered municipal solid waste facilities.

What Is the Disposal Infrastructure?

The primary function of the disposal infrastructure is the safe collection, handling, transport, and final disposal of waste materials at a landfill. Secondary goals of the infrastructure include the removal of materials from the waste stream for recycling through direct sorting or public collection of materials from self-haul customers. The infrastructure is a system of interconnected private and public facilities that perform different functions including transfer stations and material recovery facilities that collect and process waste and landfills that dispose of waste. The processing of waste in the infrastructure is dynamic, and waste flows are constantly changing based on the amount of waste generated in a region, the geographical region facilities are located in, facility capacities, costs, material markets, local service contracts, solid waste company dynamics (e.g. vertical integration), changes to facilities, and other factors.

Waste enters the disposal infrastructure from residential or commercial sources that generate waste. Solid waste haulers collect waste from the generator and take it to a wide array of facility types for processing and/or disposal (Figure 25). The generators of waste may also take waste directly to a facility themselves (self-haulers). If materials are not diverted from the waste stream for recycling or reuse, then landfills dispose of the waste or use it for disposal-related uses, or transformation facilities incinerate the waste to create energy. Often several types of facilities in the disposal infrastructure may be co-located and perform multiple functions: For example, a MRF and transfer station may be at the same site, and loads of waste may be directed to one or the other depending on the amount of recoverable material present in the load.

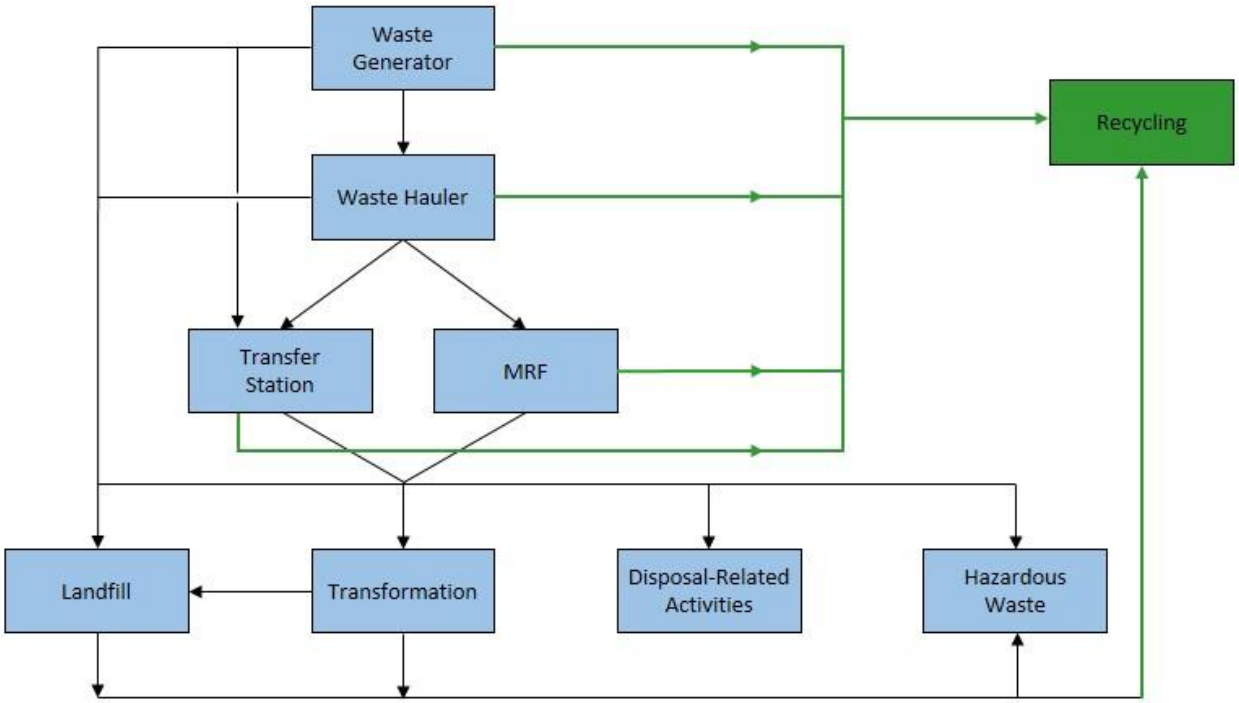

Figure 25. Solid waste infrastructure flow chart. Chart describing the many ways waste can flow from the waste generator. Waste can be directly hauled to the landfill from the waste generator. Waste can be transported by a waste hauler and sent directly to a landfill or to transfer stations or MRFs before being sent to a landfill. The final end uses for solid waste include landfilling, incineration at a transformation facility, disposal-related activities such as ADC, AIC, and beneficial reuse, and disposal at a hazardous waste facility. Generated waste may also be recycled at any point in the process.

Franchise Solid Waste Haulers

In California, franchised solid waste haulers are the primary movers of waste in the disposal infrastructure and are responsible for the transport of more than 80 percent of California's waste. Waste haulers collect material from the generator that created the waste and safely transport it to a landfill or facility for processing. Solid waste haulers can be either privately or publicly owned and operated.

Haulers typically set up agreements with cities to collect waste and recyclables from the residential and/or commercial sector for a jurisdiction. Jurisdictions can have multiple haulers serving them or exclusive franchise agreements in which one hauler serves the jurisdiction. The relationship between haulers and jurisdictions has also played a major role in reaching jurisdiction AB 939 diversion goals. Much of California's progress in relation to this mandate is the result of cooperative relationships between city local governments and their haulers in implementing recycling and composting programs.

Haulers that also own disposal facilities such as landfills, transfer stations, or MRFs can preferentially deliver waste to their own facilities (vertically integrate), influencing where

waste flows. SWIS and FacIT data show that three of the top 10 private hauling companies in terms of number of jurisdictions served (Recology, Republic Services, and Waste Management, Inc.) together own or operate more than 70 disposal, transfer, processing, and composting facilities throughout the state.

Solid Waste Hauler Distribution for Residential and Commercial Waste

CalRecycle's hauler database tracks which cities are served by public and private franchised haulers for residential and commercial waste collection. Hauler data is based on CalRecycle review of jurisdiction websites, hauler websites, jurisdiction annual reports, and jurisdiction site visits. In 2015, CalRecycle updated the hauler data and added the hauler database to FacIT to facilitate the updating of the data by jurisdictions and facilities. CalRecycle considers the hauler database to be as accurate as possible due to the many sources used to update the data. However, some data may be inaccurate due to incorrect or incomplete information on hauler and jurisdiction websites. CalRecycle encourages haulers and jurisdictions to contact the Department if they find data that is inaccurate.

Residential Sector Hauling

The types of haulers—public, private, large, or small—serving jurisdictions for the residential sector vary throughout the state. Figure 26 shows jurisdictions in the state and the hauling companies that have an exclusive residential hauling contract with the jurisdiction. Jurisdictions contracting with multiple haulers are shown separately in red. There are about 144 haulers serving the residential sector in California; this count includes governmental haulers and parent companies (multiple subsidiary haulers with the same parent company were counted as one hauler). Most of the jurisdictions have agreements with private haulers; government haulers serve only 10 percent of all jurisdictions (44). The top 10 haulers serving the most jurisdictions for the residential sector are listed in the legend, while smaller private haulers that have hauling agreements with six or fewer jurisdictions are included under "Other."

In the mountain region, most jurisdictions handle residential waste through agreements with smaller private haulers that only serve a few jurisdictions ("Other" on the map). A mix of larger haulers and smaller haulers serve jurisdictions in the Coastal region. In the Bay Area region, most jurisdictions handle residential waste through agreements with larger haulers. A variety of haulers serves the Los Angeles region, with most jurisdictions handling residential waste through agreements with large and/or small haulers.

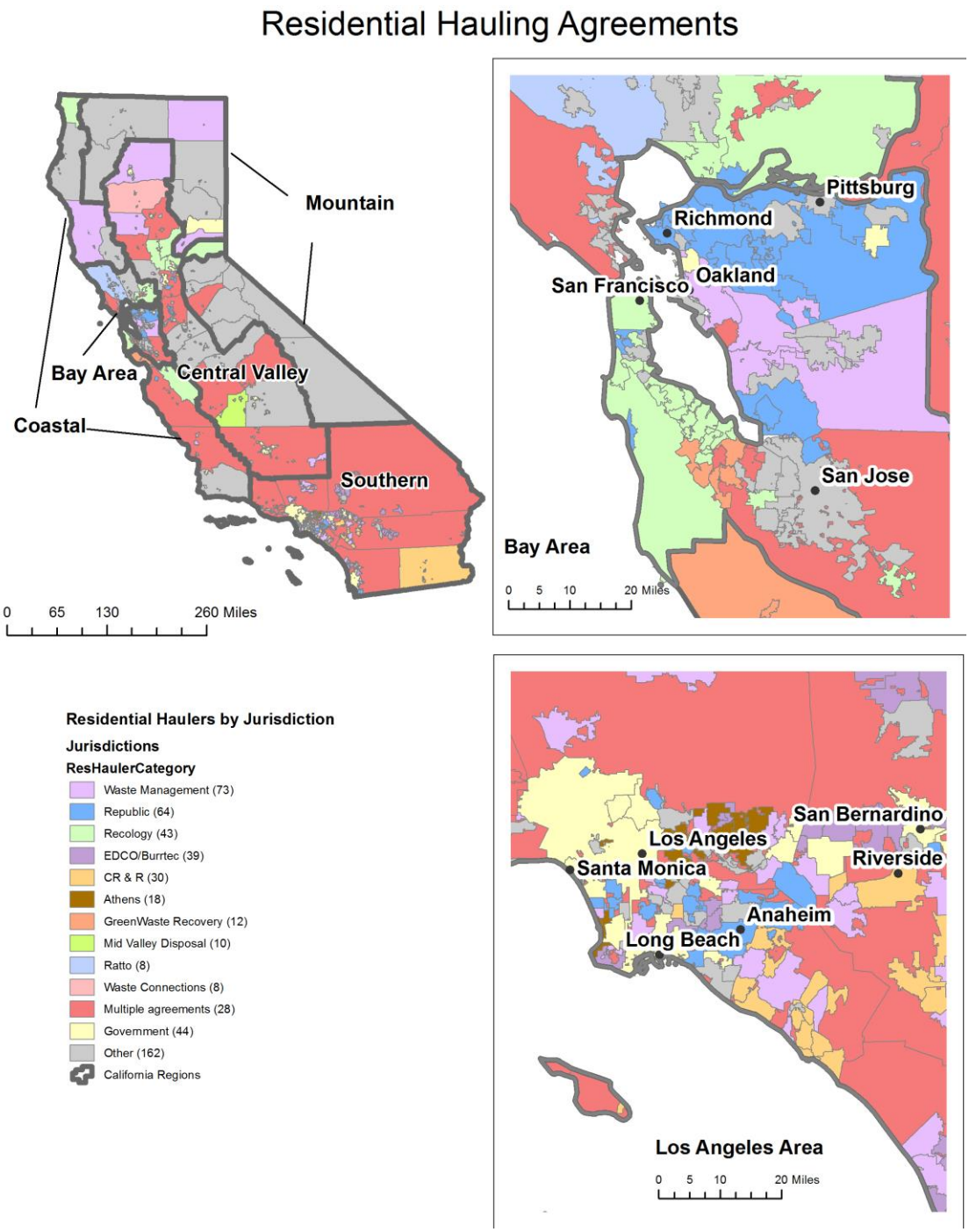

Figure 26. Residential hauling agreements by jurisdiction showing government haulers, large hauling companies, or other independent private haulers. The top 10 haulers in terms of exclusive agreements with jurisdictions are shown, while the "Other" category represents smaller hauling companies that have exclusive agreements with six or fewer jurisdictions. Jurisdictions served by multiple haulers are shown separately under "multiple agreements." Data from CalRecycle hauler database, 2015.

Commercial Sector Haulers

Figure 27 shows jurisdictions in the state and the hauling companies, both private and public, that have an exclusive contract to collect commercial waste from a jurisdiction. Jurisdictions contracting with multiple haulers are shown separately in red. There are about 152 haulers serving the commercial sector in California; this count includes governmental haulers and parent companies (multiple subsidiary haulers with the same parent company were counted as one hauler). The top 10 haulers serving the most jurisdictions are listed in the legend, while smaller private haulers that have hauling agreements with six or fewer jurisdictions are included under “Other.”

Commercial contracts tend to mirror residential contracts in terms of regional patterns. Small haulers serve the jurisdictions in the Mountain region. Similar to the residential sector, the Coastal region has a mix of large and small haulers serving their cities. A closer look at the Bay Area and the Los Angeles regions shows that the Bay Area is served by larger haulers while the Los Angeles region uses a mix of large and small haulers for its cities (Figure 27).

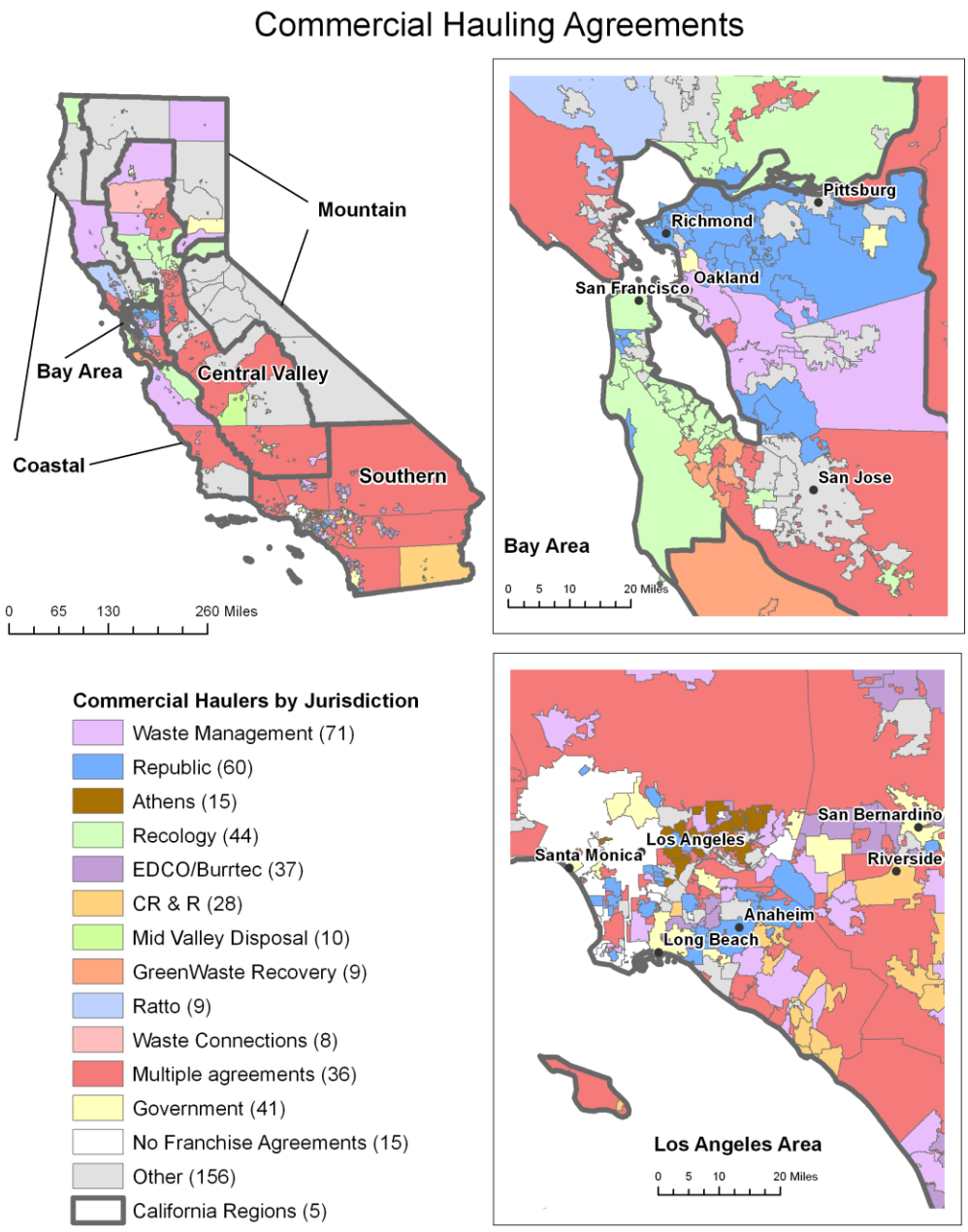

Figure 27. Commercial hauling agreements by jurisdiction showing government haulers, large hauling companies, or other independent private haulers. The top 10 haulers in terms of exclusive agreements with jurisdictions are shown, while the "Other" category represents smaller hauling companies that have exclusive agreements with six or fewer jurisdictions. Jurisdictions served by multiple haulers are shown separately under "multiple agreements." Data from CalRecycle hauler database, 2015.

Hauler Findings

The majority of jurisdictions use private haulers for both residential and commercial solid waste collection. Table 6 below shows the top 10 haulers in the number of jurisdictions served, listed by parent companies for residential and commercial hauling agreements, along with smaller haulers ("Other Private"), and government haulers. Most (95 percent) jurisdictions in California have exclusive franchise agreements with private haulers for the collection and transport of residential solid waste. Most (93 percent) jurisdictions in California have exclusive franchise agreements with private haulers for the collection and transport of commercial solid waste.

Table 6. Jurisdiction franchise agreements with hauling companies for residential and commercial hauling contracts. Since many jurisdictions have multiple franchise agreements, the total number of agreements is much higher than the total number of jurisdictions in California. Data from FacIT 2015.

Parent Company	Number of Jurisdictions with Residential Hauling Franchise Agreements	Number of Jurisdictions with Commercial Hauling Franchise Agreements
Waste Management	108	207
Republic	64	52
Recology	44	47
Burrtec/EDCO	41	37
CR & R	33	33
Athens	18	17
GreenWaste Recovery	13	16
Mid Valley Disposal	13	13
Waste Connections	8	8
Ratto (Unicycler)	8	8
Government	46	45
Other Private	208	310
No franchise agreement	0	15

How Does Waste get Processed Statewide?

As a result of California's diverse landscape and large population, there are many solid waste facilities located throughout the state and several ways waste can be processed. Waste that is disposed may be:

- First processed and aggregated at a transfer station before the waste is sent to a landfill. Waste may be processed to remove recyclables or not processed before it is sent to the landfill.
- First sorted and processed at a MRF to remove recyclables. This includes facilities that process clean loads of recyclables and send the leftover waste after processing to a landfill.
- First sorted and processed and sent to an EMSW facility.
- Sent directly to the landfill and used for disposal-related purposes such as ADC, AIC, or other beneficial reuse, or buried.
- Sent directly to a transformation facility.

The following section describes how different disposal facility types process waste for these methods.

Transfer Stations

Transfer stations are defined in FacIT as facilities that receive, temporarily store, and ship waste to landfills or transformation facilities for disposal or send waste to other transfer stations or MRFs before it is sent to landfills. Most transfer stations receive waste from commercial and residential haulers and accept self-haul waste from the public. While the main role of transfer stations is to process waste, they also divert materials for recycling. Increasingly, many transfer stations are employing methods to recover materials, including sort lines, pulling recyclable material directly from MSW loads, and allowing the public to drop off recyclables in separate areas or bins. Many transfer stations are clustered in the densely populated areas in Los Angeles and the Bay Area in order to move waste from urban areas to more remote regions (Figure 28). However, transfer stations operate in all regions of the state and play an important role of collecting and moving waste to landfills for virtually all counties in California.

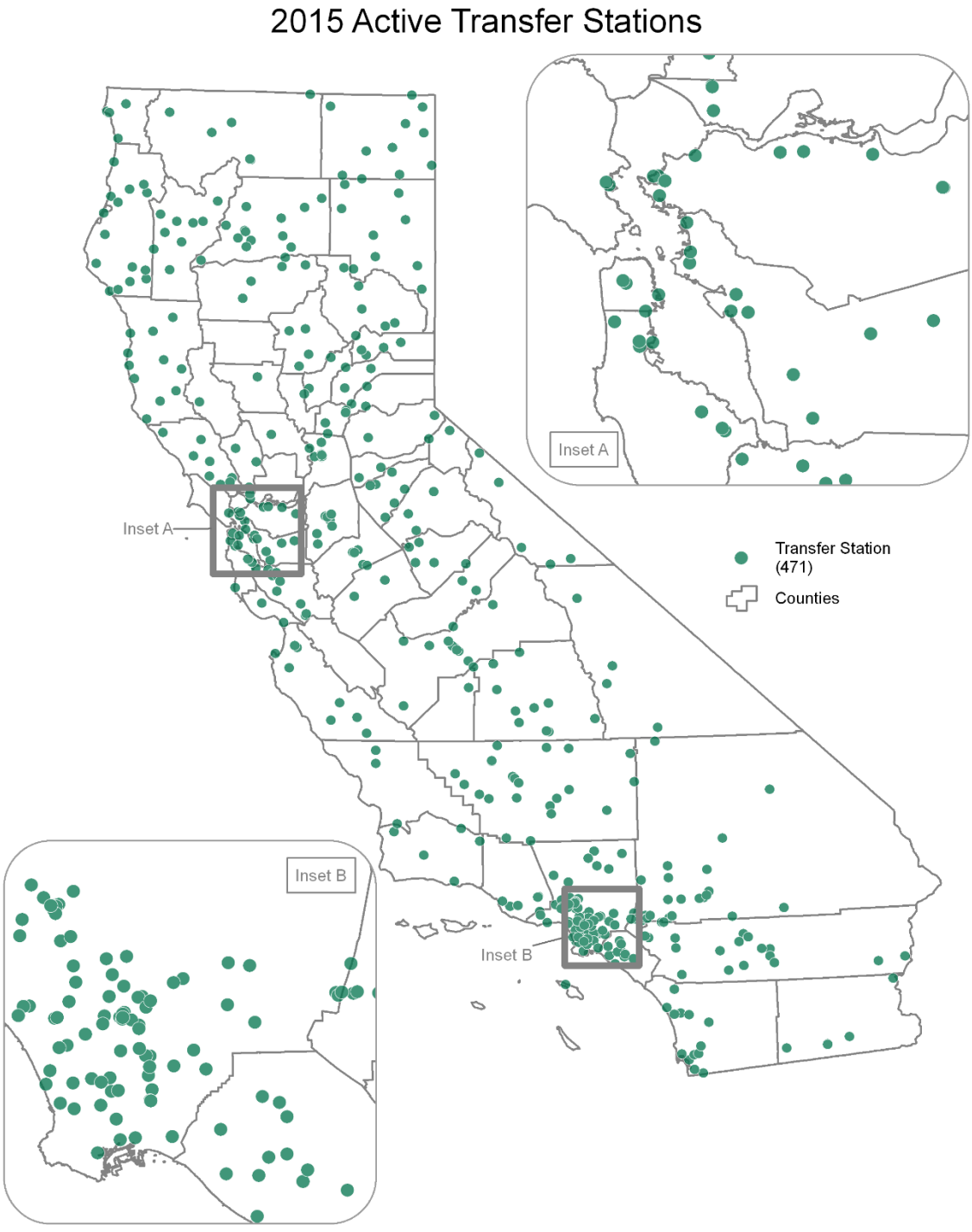

Figure 28. Active and permitted transfer stations in California. Map showing all permitted and active transfer stations in California in 2015. Data from FacIT.

In 2015, there were 471 active transfer stations in California, according to the FacIT database. Please note that the FacIT definition of transfer stations results in fewer facilities than the definition of transfer stations in SWIS for active facilities with a full permit or notification. Some types of SWIS transfer processing facilities, such as chip and grind operations, composting, construction and demolition, and some limited-volume transfer stations, are listed under individual categories in FacIT. This results in fewer transfer stations in FacIT as compared to SWIS.

Estimates show that transfer stations in California have the capacity to process a maximum of 60 million tons of material with an estimated annual throughput of 25.1 million tons a year. Facility capacity and annual throughput in FacIT are based on permit estimates from SWIS. These estimates are high compared to actual reported data by facilities, but they do provide a good picture of the total transfer station capacity in the state.

Material Recovery Facilities

MRFs are facilities that receive and process clean loads of recyclables or loads of mixed waste and recover and sort the materials by type using various methods such as sorting lines or other automated technologies. After removing recyclable materials, MRFs send any unrecovered materials, known as residual waste, to a landfill, transfer station, or another facility for further processing. MRFs can be permitted or unpermitted dependent on the amount and type of waste materials they have after processing materials. Recycling facilities that separate materials for reuse from MSW loads or have more than 10 percent residual waste or more than 1 percent putrescible waste from the loads they process are required to be permitted as a transfer facility. Permitted MRFs fall under the same requirements governing waste materials as transfer stations. Permitted and unpermitted MRFs primarily accept mixed or clean waste loads from commercial and residential haulers, and some facilities accept waste from the public. MRFs serve an important role in the recycling infrastructure in separating recyclables from the waste stream. For more information on the recycling role of MRFs, please refer to the "State of Recycling in California Updated 2016" report.

While there are permit requirements for larger MRFs that generate a certain amount and type of waste materials/residuals, there is no single definitive definition of "material recovery facility" in state statute or regulation. As a result, discussions of MRFs in the state can be somewhat unclear since there is no single definition of what a MRF constitutes. For example, there are many facilities in the state that do not require a full permit but process clean recyclables, create small amounts of residuals sent to landfills, and perform the same functions as a permitted material recovery facility. This analysis is based on MRFs tracked in FacIT and includes both active MRFs that process only clean recyclables and MRFs that process either clean recyclable or mixed waste to recover recyclable material. FacIT includes both permitted and unpermitted MRFs.

In 2015, the total number of MRFs did not change from 2014, with 161 active MRFs in the state (Figure 29). There are 32 MRFs known as mixed-waste processing facilities,

which segregate and salvage materials in mixed-waste loads by employing sorting lines with manual or automated sorting technologies. There are 129 MRFs that only process clean recyclables that have already been separated from the waste stream. The statewide handling capacity for processing materials for the 161 MRFs in FacIT is estimated to be about 36.1 million tons, with an estimated annual throughput of 15.3 million tons.

Figure 29. Active MRFs in California. Map showing all active MRFs in 2015 as listed in FacIT. Includes both permitted and unpermitted facilities. Data from FacIT and SWIS.

Landfills

Landfills are the key component in the disposal infrastructure for the management and disposal of municipal solid waste. Although California has adopted several statewide policies aimed at reducing the amount of disposed waste, landfills continue to play an important role in accepting waste that cannot otherwise be reduced, reused, or recycled. Landfills accept materials that enter the waste stream, report the amount and origin of the waste material for disposal reporting, and dispose of the materials. Materials can be transported to a landfill by commercial franchised haulers, taken directly to a landfill by self-haulers, or transported to a landfill after the material is processed at a transfer station or MRF. A secondary function at some landfills is to separate designated materials they receive such as wood, tires, electronic waste, metals, or other materials for recycling or reuse. Landfills may also use certain types of materials received as alternative daily or alternative intermediate cover of the landfill face or for other beneficial reuse purposes at the facility, such as road base and erosion control. See the disposal-related materials section for a more detailed discussion of these materials. As with other facilities in the disposal infrastructure, landfills may be co-located with transfer stations and/or MRFs.

California's landfills are regulated by strict state and federal standards to protect the environment and public health and safety. Federal regulations set forth by 40 CFR Part 258 (Subtitle D of the Resource Conservation and Recovery Act) strictly regulate landfills to better project groundwater and air quality. California has its own operation, design, permitting requirements, and minimum operating standards for landfills to protect the environment and public health. Due to the cost of building and maintaining landfills that meet these requirements, many smaller, publicly owned landfills have closed, and larger, privately owned landfills have become more common in the state.

In 2015, there were 128 permitted solid waste landfills and 126 landfills accepting solid waste (Figure 30).

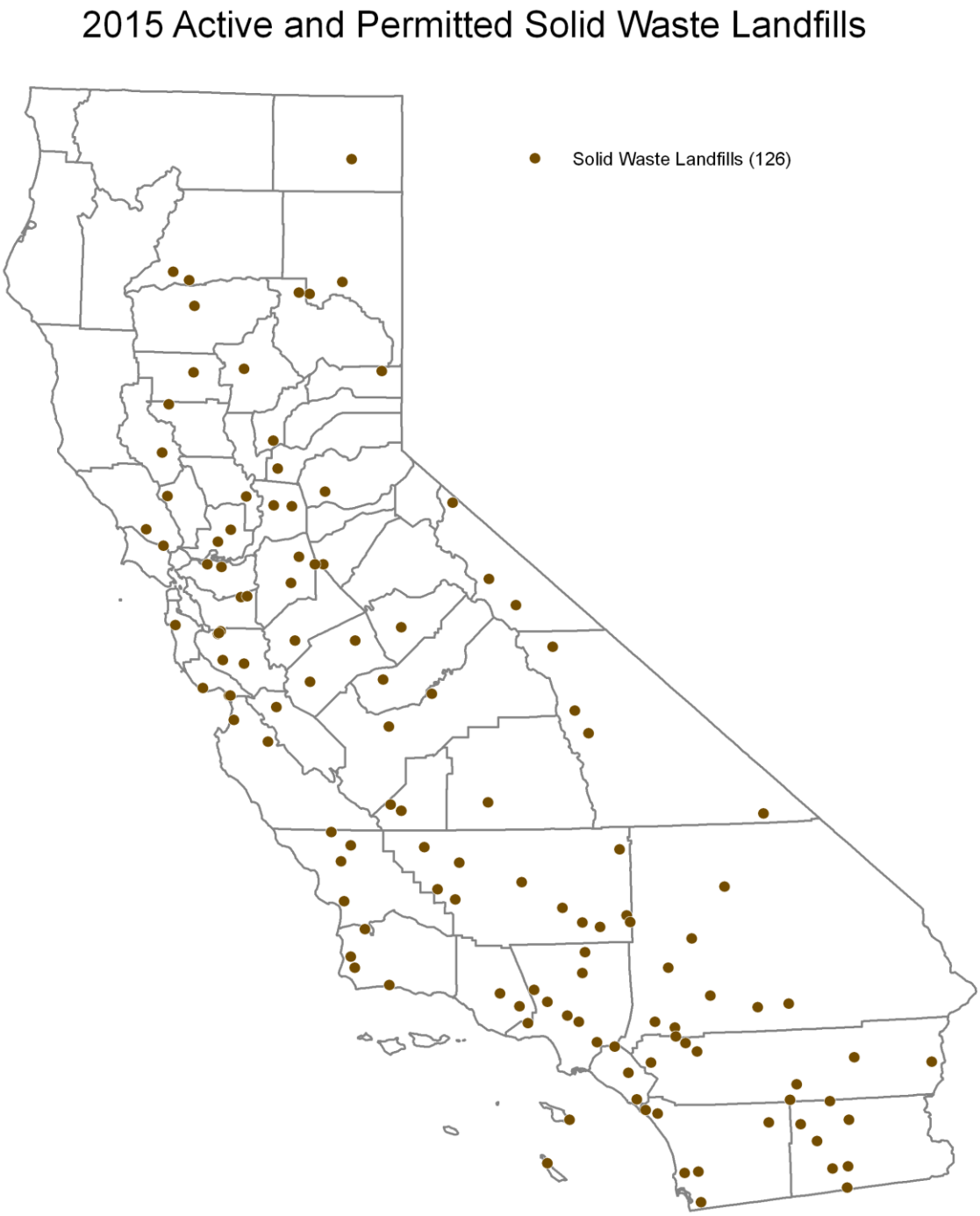

Figure 30. California active and permitted landfills. Map of permitted and active solid waste landfills accepting waste in California in 2015. Data from FacIT and SWIS.

Who Owns Landfills?

Ownership statistics for landfills in FacIT track whether the owner is public or private and the type of entity that owns the landfill (county, city, federal, regional agency, or company). Figure 31 shows the breakdown of landfill ownership in the state. In 2015, there were 88 publicly owned landfills and 38 privately owned landfills. Of the publicly owned landfills, 56 were owned by counties, 16 by cities, 10 by the federal government at military bases, and 6 by regional agencies. Private landfills were predominantly owned by four parent companies: Waste Management (13), Republic (9), Waste Connections (5), and Recology (2).

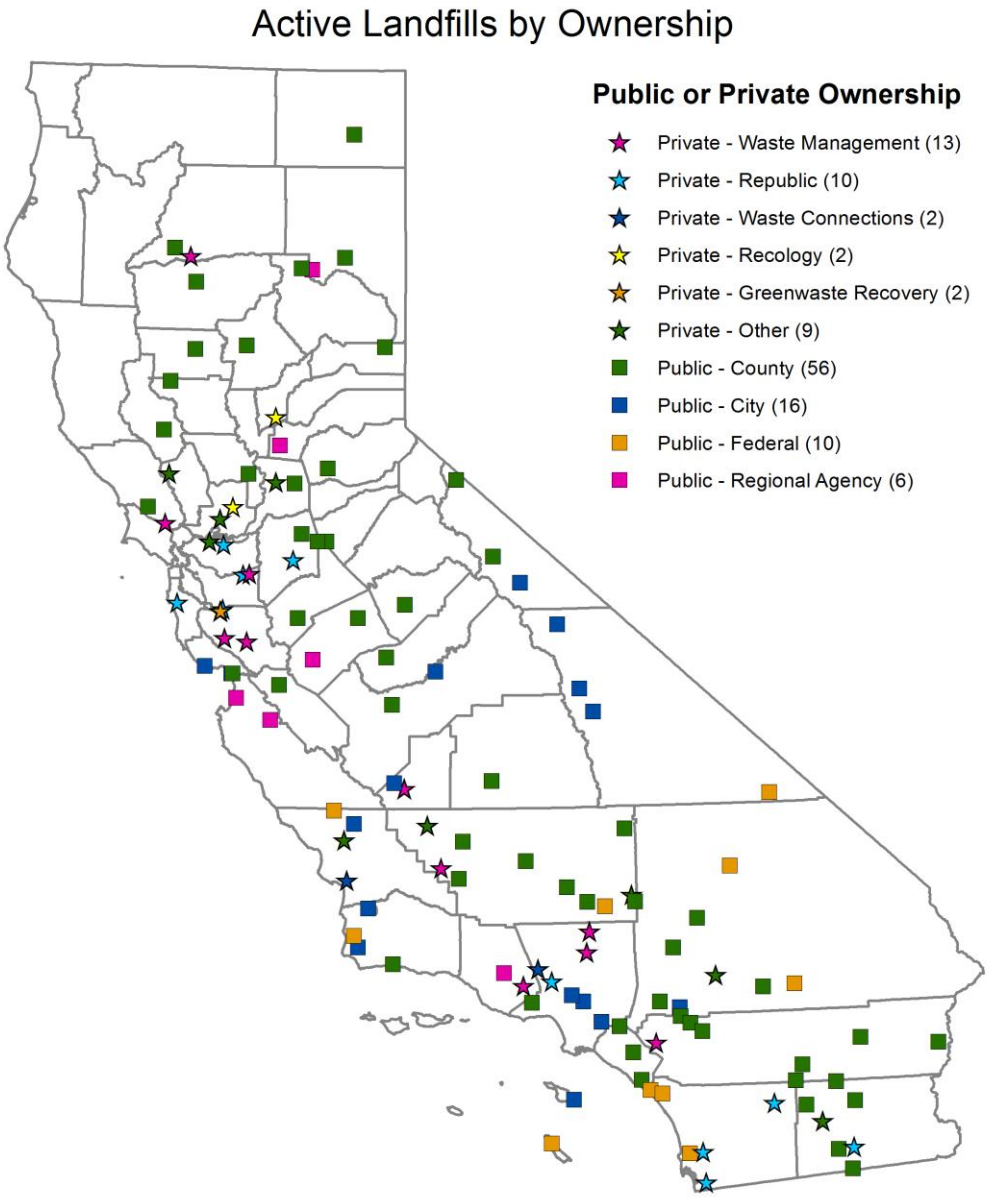

Figure 31. Active California landfills by ownership type. Map of permitted and active landfills accepting waste in California by ownership type for 2015. Stars represent privately owned landfills, and different colors represent the company that owns the landfill. Squares represent publicly owned landfills and different colors represent the type of public entity that owns the landfill (county, city, federal, or regional agency). Data from FacIT and SWIS, 2015.

How Much Waste Flows Through Landfills, MRFs, and Transfer Stations?

Using data from waste characterization studies, FacIT, and DRS, CalRecycle estimates that in 2014, 60 percent of statewide disposal resulted from waste materials that were processed through transfer stations or materials sent for processing at MRFs, and the remaining 40 percent flowed directly to landfills without any processing or removal of recyclable materials (Figure 32). This means in 2014, roughly 19 million tons of disposed materials flowed through MRFs and transfer stations, and 12 million tons flowed directly to landfills. The most recent MRF study in 2006 showed that it is likely that between 6 million and 7 million tons of solid waste residuals flow annually from MRFs to landfills. Using these MRF estimates, we can roughly estimate that around 6 million to 7 million tons flowed through MRFs and 11 million to 12 million tons of waste flowed through transfer stations in 2014.

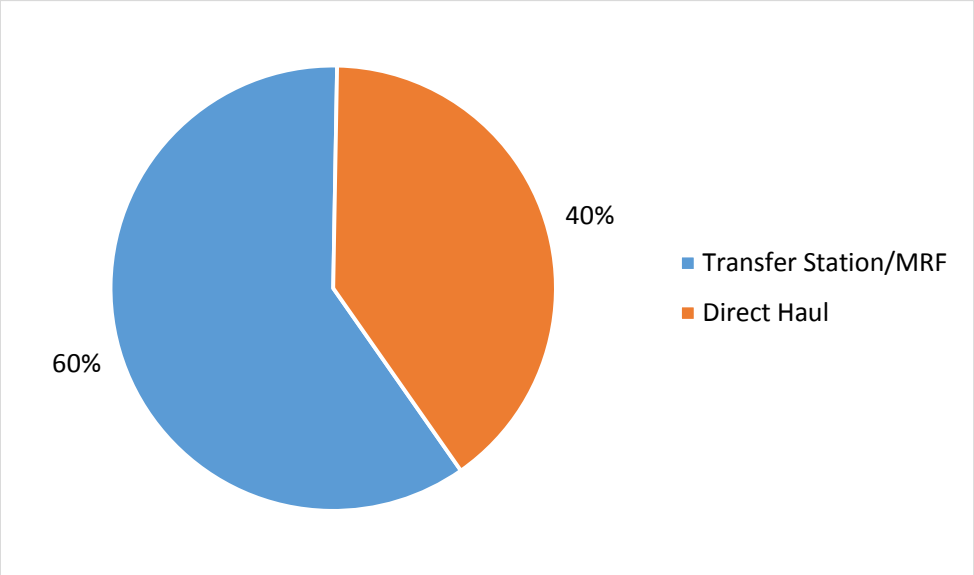

Figure 32. Estimated percentage of waste sent to landfill by source. The chart represents 31 million tons of solid waste delivered to disposal in 2014, and the sources represent waste sent directly to the landfill (Direct Haul); and waste sent to transfer stations and material recovery facilities (Transfer Station/MRF), which includes waste sent to transfer stations and then the landfill and waste from materials that were processed at a material recovery facility that could not be recycled. Data from DRS, CalRecycle's 2014 waste characterization study, and the 2006 MRF study.

As mentioned earlier in this report, disposal reporting from transfer stations and MRFs is incomplete and inaccurate, and it needs to improve. CalRecycle continues to rely on estimates of the disposed waste stream from transfer stations and MRFs using SWIS permit data, waste characterization studies, and a 2006 MRF study to predict the annual amount of waste flowing to landfills. These rough estimates are based on projections of facility annual capacity and throughput in permits or surveys of facilities from studies

and may not accurately reflect the amount of material flowing through stations. AB 901 created new requirements for disposal facilities, including transfer stations and MRFs, to report disposal data directly to CalRecycle in an electronic format. Improved reporting by disposal facilities under AB 901 should help CalRecycle track waste flow through MRFs and transfer stations.

Transformation Facilities

Transformation is a thermal technology in which conventional combustion systems burn mixed (unprocessed or minimally processed) solid waste in an incinerator to create energy. In California, three permitted transformation facilities accept waste materials from commercial and residential haulers and from the public. Transformation facilities play a small but consistent role in processing waste materials in California: Roughly 1 percent of the total waste generated in the state is sent to transformation facilities. In addition to processing waste, transformation facilities recover metals for recycling and use leftover ash as a road base. Many cities and counties send some waste materials to transformation facilities (Figure 33).

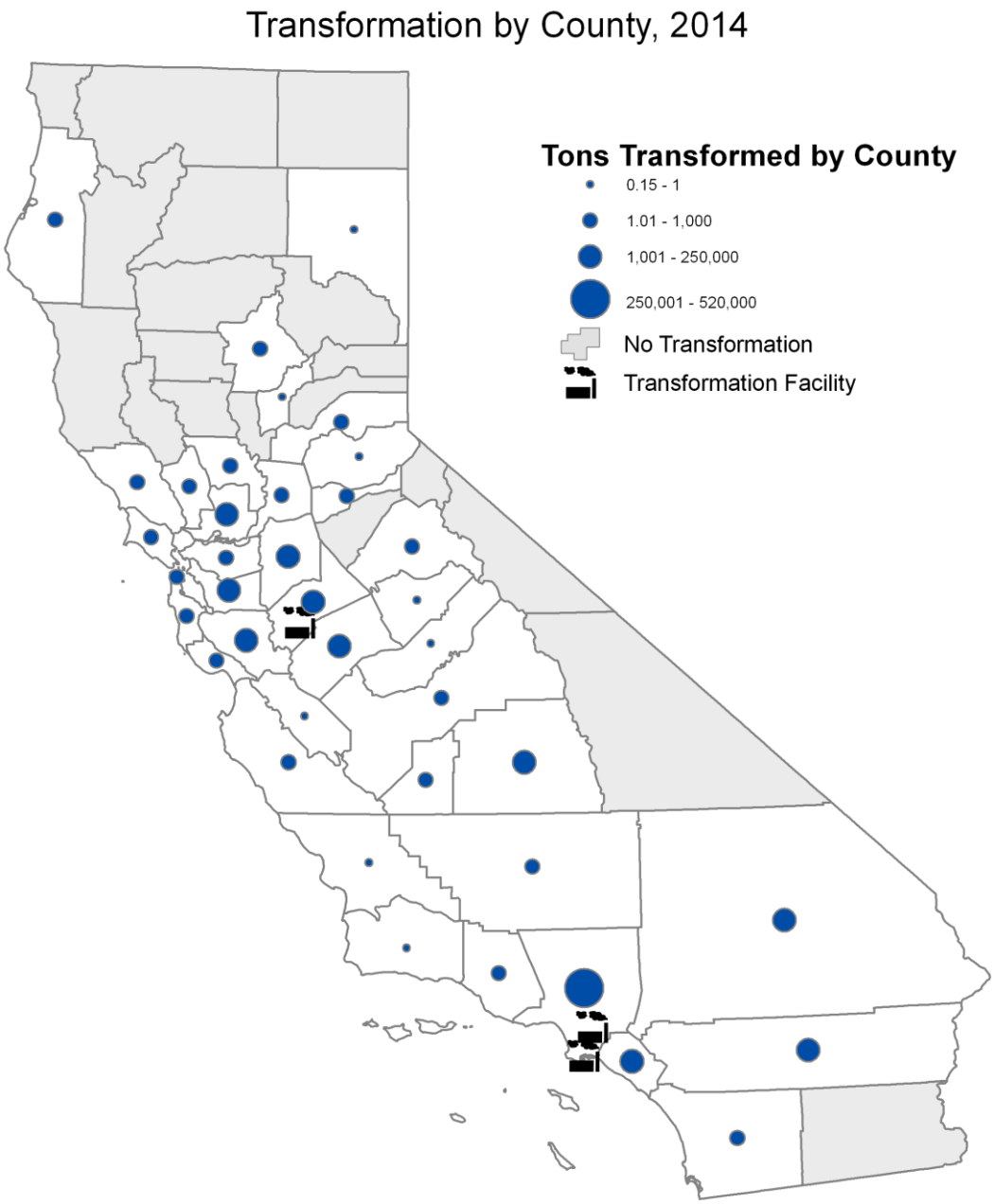

Figure 33. Transformation tonnages by county, 2014. Map showing the amount of waste sent by counties to transformation facilities in 2014 and the location of the three transformation facilities in the state. Larger circles represent more waste sent to transformation facilities. Data from DRS.

The three transformation facilities in California are Commerce Waste to Energy in Los Angeles County, Covanta Stanislaus Inc. in Stanislaus County, and Southeast Resource Recovery Facility (SERRF) in Los Angeles County. Table 7 shows general statistics for the three transformation facilities in California including waste accepted, ash output, and energy output. Southeast Resource Recovery Facility is the largest transformation facility in the state, both by tons accepted and by energy output.

Table 7. Statistics for California transformation facilities. The posted self-haul tipping fee represents the average posted gate fee for the public at the facility. Waste accepted does not include waste imported from other states or countries. Data from DRS and transformation facility websites.

Facility	2014 Waste Accepted (Tons)	2012 Ash Output (Tons)	Estimated Annual Energy Output (megawatt (MW))	Posted Tipping Fee	Average Landfill Fee	Average Distance Hauled (Miles)
Covanta	255,449	71,414	22.5	$51/Ton	$38/Ton	105
Commerce Waste to Energy	103,995	29,226	11	$61/Ton	$44/Ton	25
Southeast Resource Recovery Facility (SERRF)	458,169	146,285	36	$57/Ton	$44/Ton	24

Transformation in California did not change significantly in 2014 compared to prior years, with 817,613 tons of waste materials sent to transformation facilities. The amount of waste transformed has generally stayed the same over the last two decades, while the landfill disposal rate has fluctuated over the same time period (Figure 34). Several factors limit fluctuations in the amount of waste material sent to transformation facilities in California. Transformation facilities need a consistent amount of waste to operate, so cities and counties have guaranteed minimum waste deliveries to transformation facilities under “put or pay” contracts. Facilities generally operate in the range between the minimum amounts specified in their contracts and their maximum permit capacity.

As a result of the high cost of building a new transformation facility ($100 to $200 million) and the difficulty in getting approvals to operate a facility, no new facilities are planned in California in the near future. With no new facilities planned, the amount of transformation in California is not likely to increase significantly. Similarly, the amount of materials sent to transformation will not decrease significantly unless any of the three facilities permanently close and/or temporarily shut down for maintenance. Due to these factors, waste continues to flow to transformation facilities with little change despite

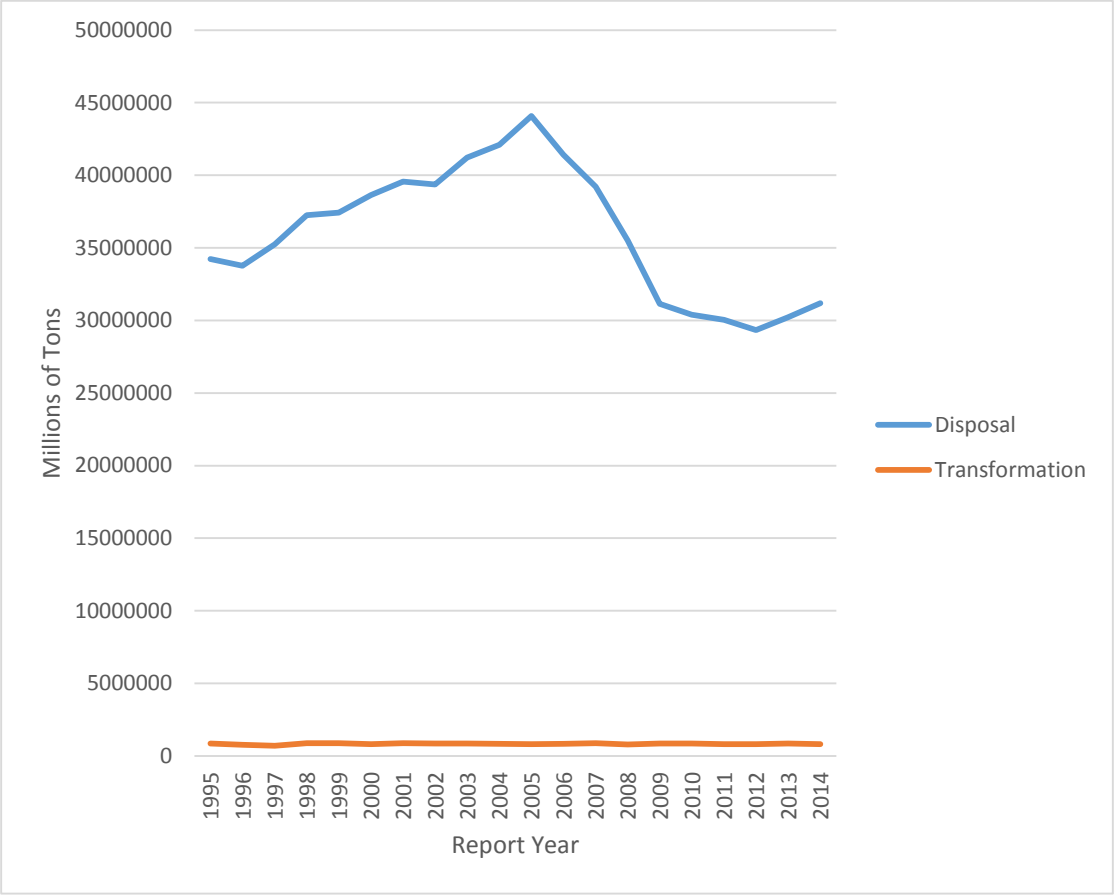

Figure 34. Tons of material transformed and landfilled 1995-2014. The graph shows the tons of waste materials sent to landfills and sent to transformation facilities in California from 1995 to 2014. Data from DRS.

economic booms or the recent recession causing changes in the amount of waste landfilled each year.

Waste sent by jurisdictions to the three transformation facilities did not change significantly in 2014, with cities located closest to a facility sending the most waste. The following maps (Figure 35, Figure 36, and Figure 37) show the jurisdictions that sent waste to each transformation facility.

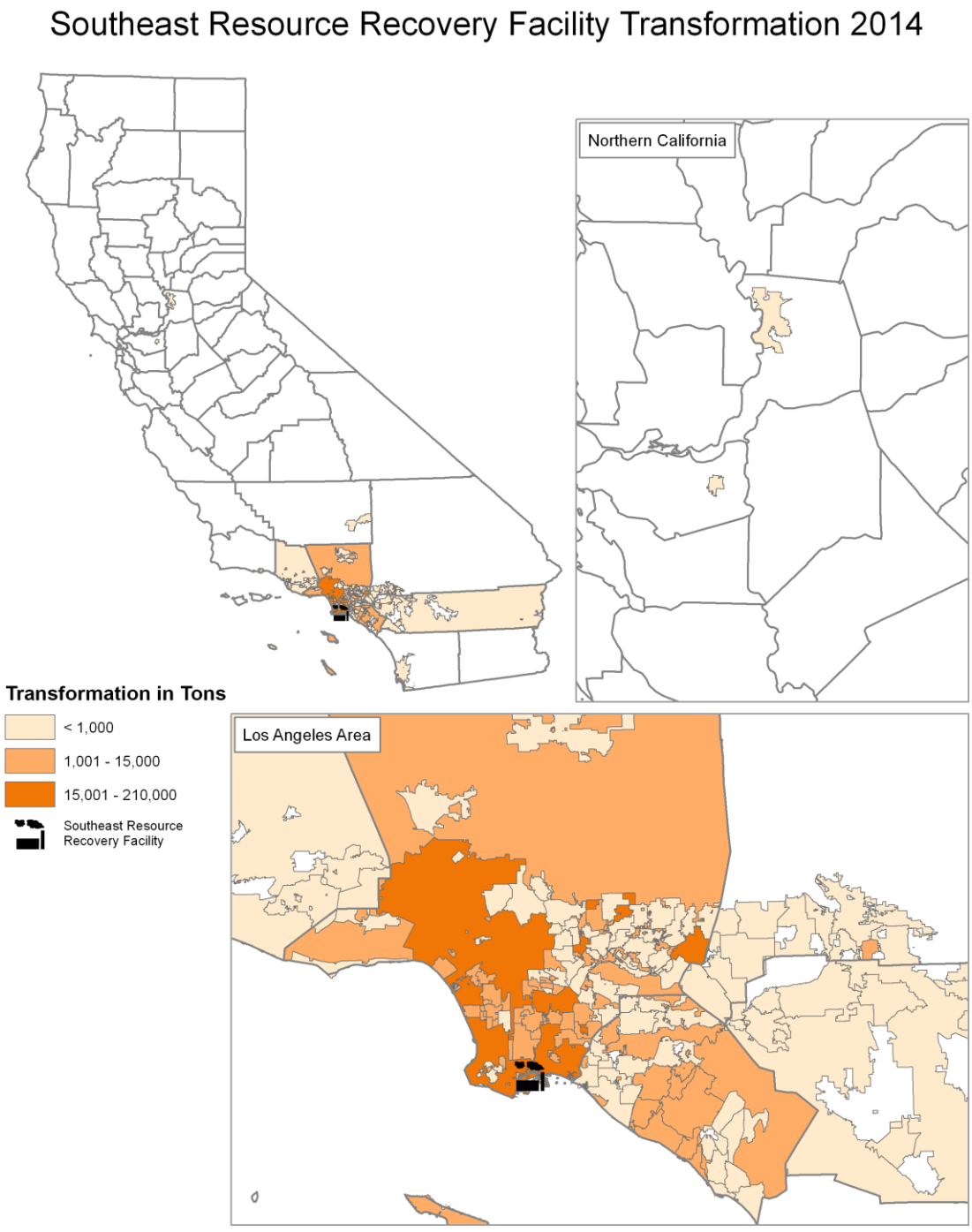

Figure 35. Southeast Resource Recovery facility transformation 2014. Map showing total tons of solid waste sent by jurisdictions to the SERRF transformation facility in Long Beach in 2014. Data from DRS.

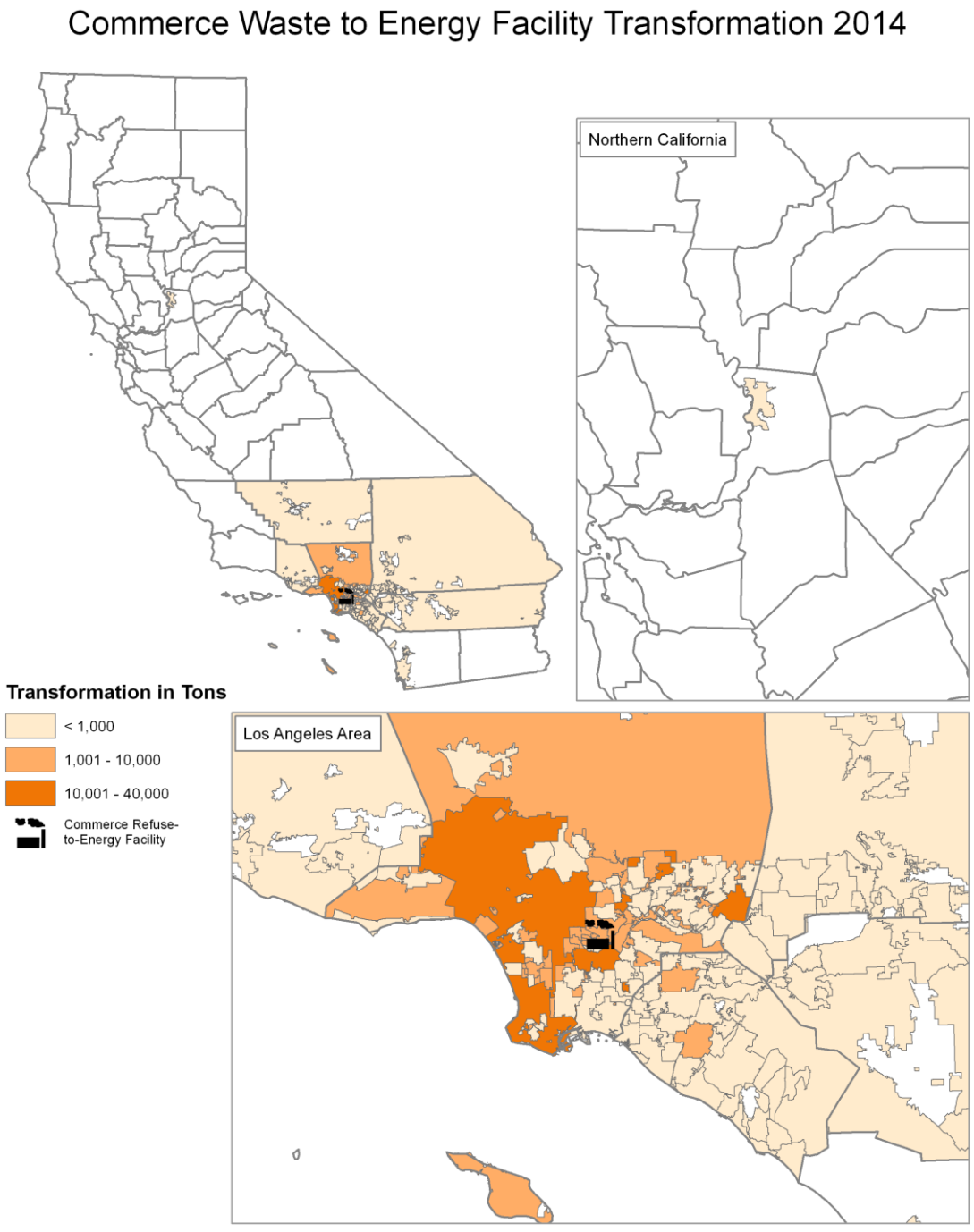

Figure 36. Commerce Waste to Energy facility transformation 2014. Map showing total tons of solid waste sent by jurisdictions to the Commerce Waste to Energy transformation facility in Los Angeles in 2014. Data from DRS.

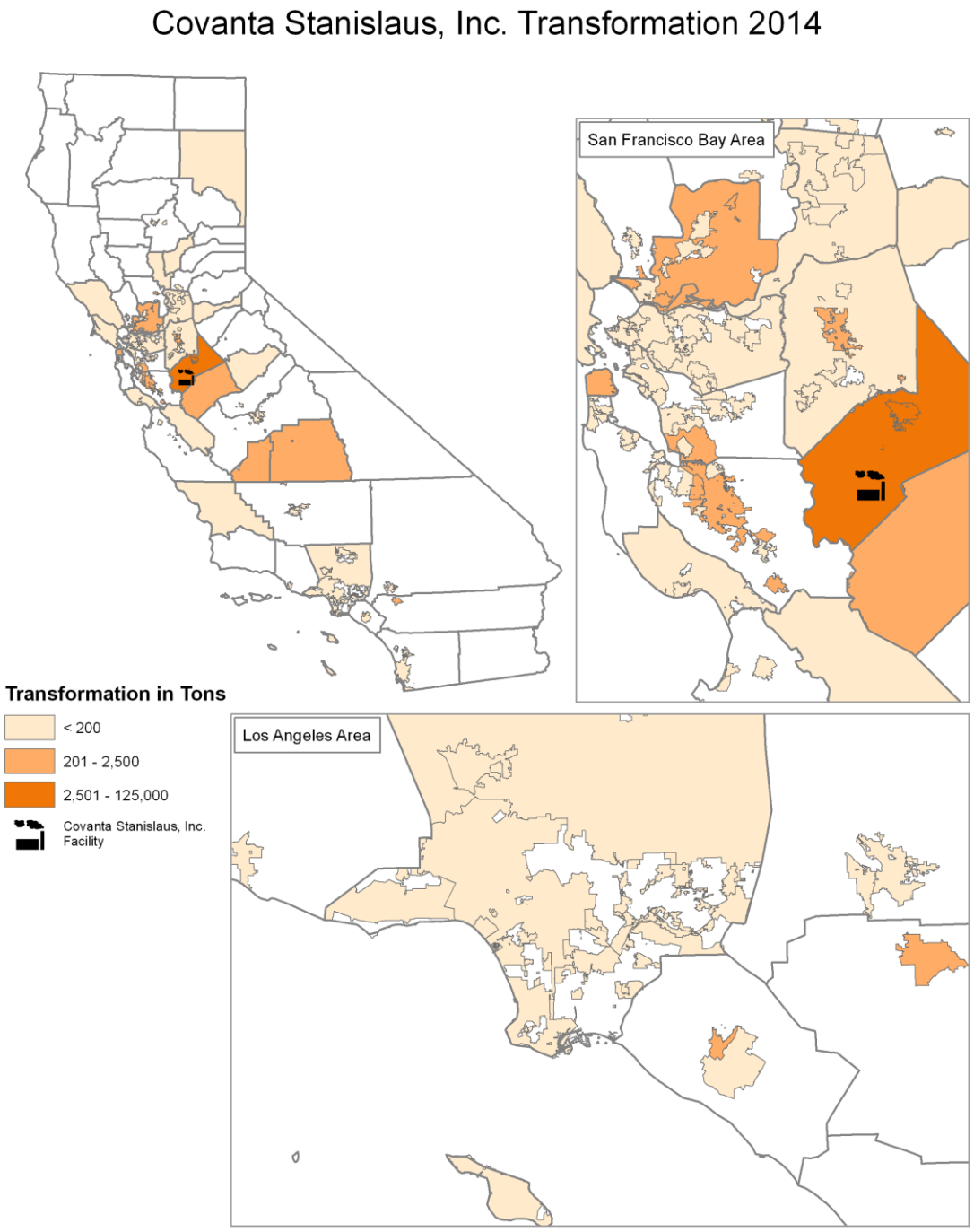

Figure 37. Covanta Stanislaus, Inc. facility transformation 2014. Map showing total tons of solid waste sent by jurisdictions to the Covanta Stanislaus, Inc. transformation facility in the San Joaquin Valley in 2014. Data from DRS.

In 2014, the majority of jurisdictions sending waste to transformation sent less than 1 percent of their waste to these facilities: 241 jurisdictions sent less than 10 percent of their waste to transformation, and 21 jurisdictions sending greater than 10 percent (Figure 38).

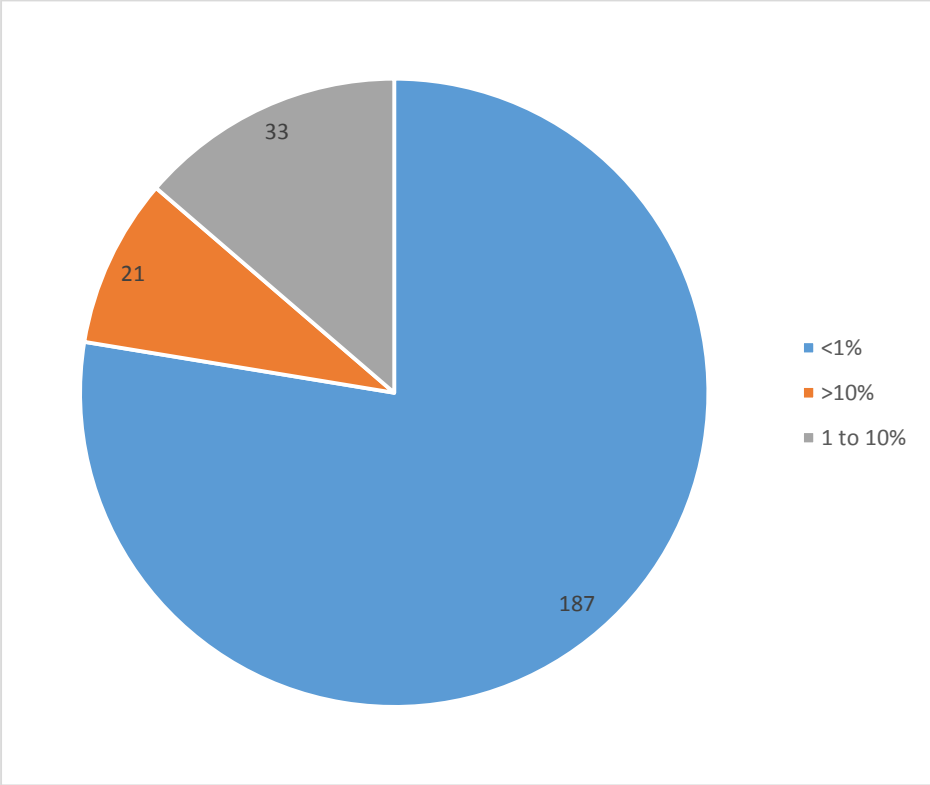

Figure 38. Jurisdictions sending solid waste to transformation facilities in 2014. Chart shows the number of jurisdictions that sent more than 10 percent of their waste to transformation (21), 1 to 10 percent of their waste to transformation (33) and less than 1 percent of their waste to transformation (187). Data from DRS.

In 2014, the majority of jurisdictions using transformation did not need a diversion credit for transformation to meet their 50 percent diversion mandate. Of the 241 jurisdictions that sent some waste to transformation in 2014, 57 jurisdictions earned a transformation credit of 1 percent or more, and only two jurisdictions needed the credit to reach 50 percent diversion (Figure 39). Most of the jurisdictions that received a credit greater than 1 percent were jurisdictions in Southern California that sent a significant amount of material to nearby transformation facilities.

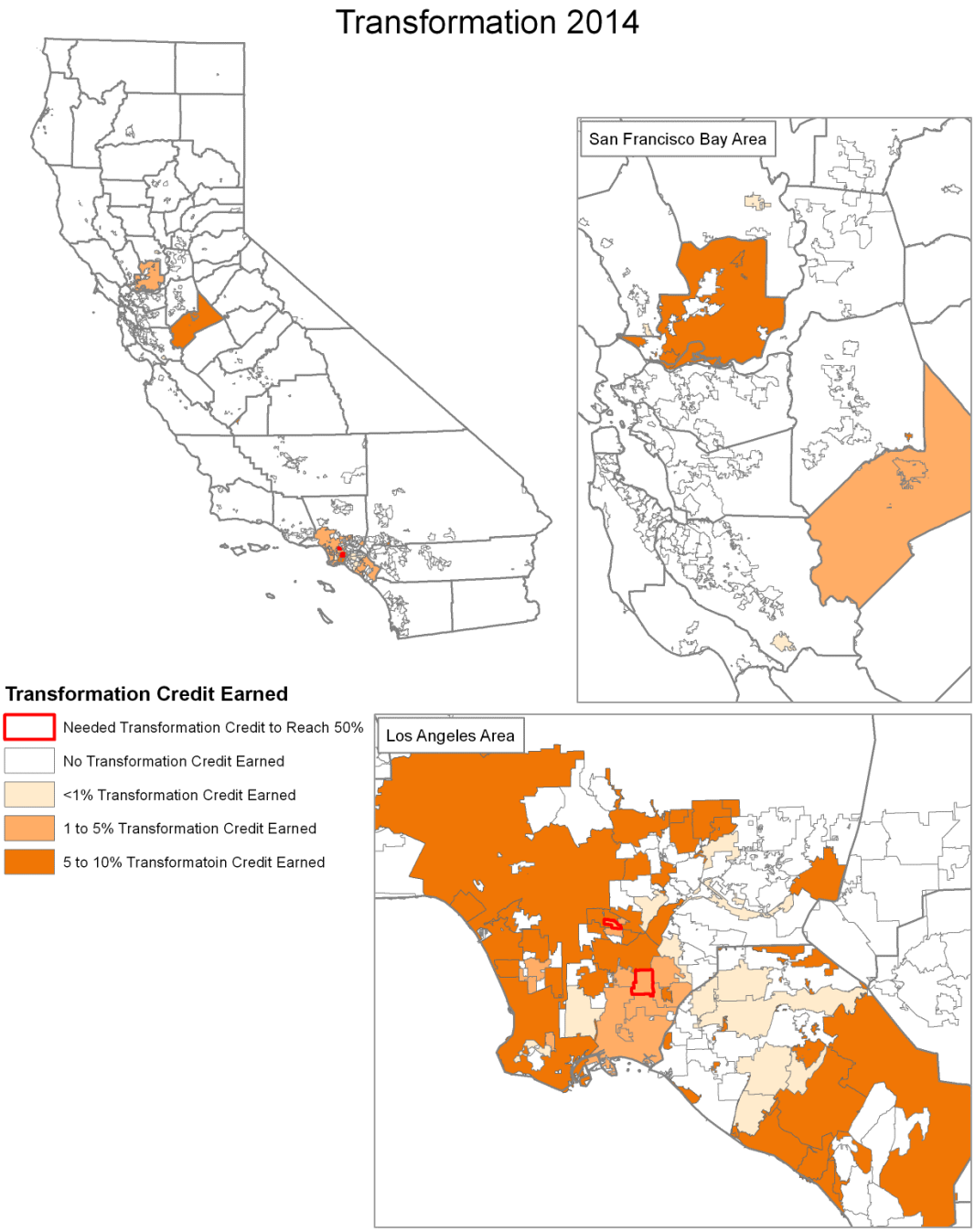

Figure 39. Jurisdiction use of transformation credits in 2014. Map showing the number of jurisdictions that earned 1 to 5 percent diversion credit from transformation toward their 50 percent goal, 5 to 10 percent credit, less than 1 percent credit, and no credit due to little or no transformation use. Jurisdictions with a red border (2) reached 50 percent diversion due to the transformation credit. Data from DRS.

Transformation Findings

Transformation provides another option in the disposal infrastructure for the safe and efficient handling of solid waste in the state. Long-term disposal trends show that the amount of transformation stays relatively constant each year regardless of external forces, and several jurisdictions close to these facilities consistently rely on transformation as an alternative to landfilling. But several factors may change transformation use in the next decade. The three existing facilities were built in the 1980s and will likely close in the next 10 to 20 years. No new transformation facilities are planned in the state; therefore, as plants close, there will be fewer options for transformation. Transformation facilities may also face the challenge of rising operational costs. Currently both SERRF in Long Beach and Commerce Waste to Energy in Los Angeles have expiring energy contracts with price "floors" that pay higher prices for the energy the plants produce.[10] If new rates paid for energy from these facilities fall significantly, these plants will be more expensive to operate and even less competitive with landfills.[11]

If the amount of material sent to transformation declines due to plant closures or other reasons, where would the existing waste going to transformation be sent? Currently, almost 1 million tons of waste material is sent to transformation facilities annually. Barring major changes in recycling programs, it is likely that landfills near the transformation facilities would take most of that waste.

EMSW Facilities

In 2014, engineered municipal solid waste conversion was defined in AB 1126. AB 1126 also defined a new type of solid waste facility that uses waste materials to create energy under specific conditions as outlined in the law. Materials that can be burned at a permitted EMSW facility include municipal solid waste that meets the definition of engineered municipal solid waste and other materials such as tires and biomass. The approval of EMSW mirrored its growth as a process nationwide, where 0.7 million tons of "engineered fuel" was being used as fuel for cement production in 2011.[12]

EMSW is a new process in the state, and only one facility has been permitted to operate as an EMSW facility. The operating facility is the Lehigh Cement Plant in Kern County, which is permitted to use 350 tons per day of engineered municipal solid waste. The facility also uses biomass and tire-derived fuels. It is anticipated that additional facility types, primarily cement kilns, will apply for permits to operate as EMSW facilities. While more EMSW facilities will become active in the next few years, it will likely be several years before a significant amount of material flows through these facilities at the statewide level.

Some other facilities in the state use waste as fuel but do not fall under the EMSW requirements. Cement manufacturing plants in California have been using scrap tires as

a supplemental fuel. According to data reported in response to the Air Resources Board's Energy Efficiency and Co-Benefits Assessment of Large Industrial Facilities Regulation (EEA Regulation), reporting cement plants derived about 7 percent of the total energy they consumed in 2009 from scrap tires.[13]

Other MSW Thermal Technologies

Pyrolysis and thermal gasification are related conversation technologies not yet in use on a commercial scale in California. These processes perform the thermal decomposition of organic materials at elevated temperatures in the absence of gases or with a limited amount of gases.

How Much Landfill Capacity Does the State Have Left?

Landfilling is the primary method for disposing of waste in California. While the state makes every effort to divert materials from landfills, factors such as the growing economy, the large population of the state, and the complexity of materials in the waste stream means the state will need landfills and available landfill capacity for the near future. Historically, the main questions concerning landfill capacity have been how much capacity is left and whether a shortage in capacity exists. While currently there is not a landfill capacity shortage, the dynamic nature of the waste stream makes monitoring landfill capacity an important task. Important questions to consider annually include the amount of remaining total lifetime landfill capacity statewide, the amount of landfill capacity available by region, and projections of future disposal and their affect on available lifetime landfill capacity. It is also important to monitor changes to landfill capacity due to increases in disposal and diversion, changes in the disposal infrastructure such as landfill closings, openings, and expansions, and changes in disposal flow.

What Is the History of California's Landfill Capacity?

In the early 1990s, California faced a landfill crisis: About half of California counties had 15 years or less of landfill capacity remaining.[14] In response to these capacity issues, AB 939 created a county-level goal of always maintaining at least 15 years of ongoing landfill capacity. In the last 25 years, diversion programs at the state and jurisdiction level and expansion of landfill space have improved the long-term landfill capacity for California's solid waste infrastructure.

In the last 25 years, the trend toward fewer, larger landfills has altered the amount of available landfill capacity in California. Since 1989, 134 landfills have closed or are no longer accepting municipal solid waste, and 21 new landfills have become active. There are currently 128 landfills permitted in California, with an average annual landfill capacity of about 690,000 tons; however, only 126 landfills accepted MSW in 2014. (This analysis is based on the 126 active landfills accepting MSW in 2014.)

In this section, CalRecycle evaluates landfill capacity at a statewide and regional level in order to identify broad trends. As statewide diversion and recycling efforts are expected to impact disposal rates, it is critical to consider how predicted landfill capacity and landfill life will vary based on how well California meets its recycling goals.

What Is California's Annual Landfill Capacity?

Overall, most regions in the state have enough permitted landfill capacity to handle the amount of waste that is currently being disposed each year. Table 8 summarizes the 126 active and permitted landfills by region, as well as the maximum amount of waste that landfills in a region can accept in a year (annual landfill capacity) and the amount of

materials each person in a region could theoretically dispose of in a year (per capita landfill capacity). Yearly per capita landfill capacity is based on facility permits in SWIS, in which a facility reports the maximum amount of material it can take in a year. To help compare landfill capacity and the rate of disposal for a region, Table 8 shows the per capita disposal for 2014 in each region. All regions have a greater yearly per capita landfill capacity than their per capita disposal and currently have sufficient annual landfill capacity to meet current disposal rates.

Table 8. Regional per capita annual facility landfill capacity for active, permitted California landfills and per capita annual disposal in tons for 2014. Per Capita Disposal in Tons per Year shows the amount of tons a person in a region disposes in a year based on 2014 disposal rates. Per Capita Landfill Capacity in Tons per Year shows the amount of tons that a region could accept from each person in the region in a year based on the maximum annual facility throughput for each facility in the region. Annual Landfill Capacity in tons shows the maximum amount of waste landfills in a region can accept in a year based on annual facility capacity estimates. Data from DRS, FacIT, and the Department of Finance.

Region	Number of Landfills	Annual Landfill Capacity (tons)	2014 Population	Per Capita Landfill Capacity in Tons per Year	Per Capita Disposal in Tons per Year
Bay Area	15	14,400,000	7,500,000	1.9	0.8
Central Valley	37	24,400,000	6,900,000	3.5	0.9
Coastal	15	4,700,000	1,800,000	2.6	0.9
Mountain	15	800,000	600,000	1.3	0.8
Southern	44	38,800,000	22,000,000	1.8	1
Statewide	**126**	**83,200,000**	**38,700,000**	**2.1**	**0.9**

Based on the per capita annual landfill capacity, the Central Valley has the most permitted landfill space for its population, about 3.5 tons per person per year. In contrast, the Mountain region has only 1.3 tons per person per year of permitted landfill space. Although this is the lowest regional per capita annual landfill capacity, it is higher than the 0.8 tons of per capita disposal for the Mountain region. The 126 active landfills in California have sufficient annual capacity to accommodate currently disposed waste.

What Is California's Lifetime Landfill Capacity?

Annual landfill capacity by region provides an important picture for California's current disposal needs; however, it is also important to track the available lifetime capacity of landfills in a region. This allows CalRecycle and its stakeholders to evaluate and predict needs for future landfill space.

Lifetime Landfill Capacity – Regional Business as Usual

The collective capacity of California landfills to accept municipal solid waste as of January 2015 was nearly 1.68 billion tons. This is the equivalent of 2.2 billion cubic yards of available landfill space statewide, using a conversion factor of 0.75 tons per cubic yard. Compared to state landfill capacity projections from January 2014, the state had 45 million tons less capacity available in January 2015. The change in lifetime landfill capacity is primarily due to the 37.8 million tons of disposal and disposal-related materials sent to landfills in 2014 and minor changes in capacity projections due to operating changes in three landfills.

Table 9. Population, disposal, and remaining lifetime landfill capacity in California in 2014, by region. Years of landfill space is calculated assuming that the population and amount of disposal remains constant. These assumptions are made for simplicity; the real situation is likely to be more complex. Data from DRS, FacIT, and the Department of Finance.

Region	Population	Disposal + Export (million tons)	Total Remaining Capacity (million tons)	Years of Remaining Landfill Space
Bay Area	7,500,000	4.8	210	44
Central Valley	6,900,000	5.6	589	105
Coastal	1,800,000	1.6	104	65
Mountain	600,000	0.2	11	55
Southern	22,000,000	18.9	769	41

Table 9 shows the remaining lifetime landfill capacity for each region and the years of remaining landfill space. At the current rate of disposal, if all waste generated in the region remained in the region, the landfill space in most regions would last at least 40 years (Table 9). Overall, this is similar to CalRecycle's 2013 regional lifetime landfill capacity projections, which predicted at least 40 years of remaining lifetime landfill capacity in most regions.

It is important to remember that regional landfill capacity projections do not take into account changes in annual disposal and population and how those changes affect capacity. A future decrease in statewide disposal due to increased diversion and recycling and/or a decrease in population could significantly increase the number of years of landfill space left in a region. In addition, since waste generated in a region is not generally landfilled only in that region, the aggregate facility lifetimes for landfill capacity in practice may be longer.

Available landfill capacity is not spread evenly over the state. Figure 40 shows the regions of the state with relatively more or less available landfill capacity for the facilities in each region. There is more landfill capacity near the higher-population areas that generate the most waste. The Central Valley, Bay Area, and Southern regions all currently have substantial available landfill capacity, and portions of the Coastal region have ready access to landfills with high landfill capacity. The northern portion of the state and the Mountain region have much more limited total landfill capacity, though these regions send a large portion of their waste to other regions or export waste to other states.

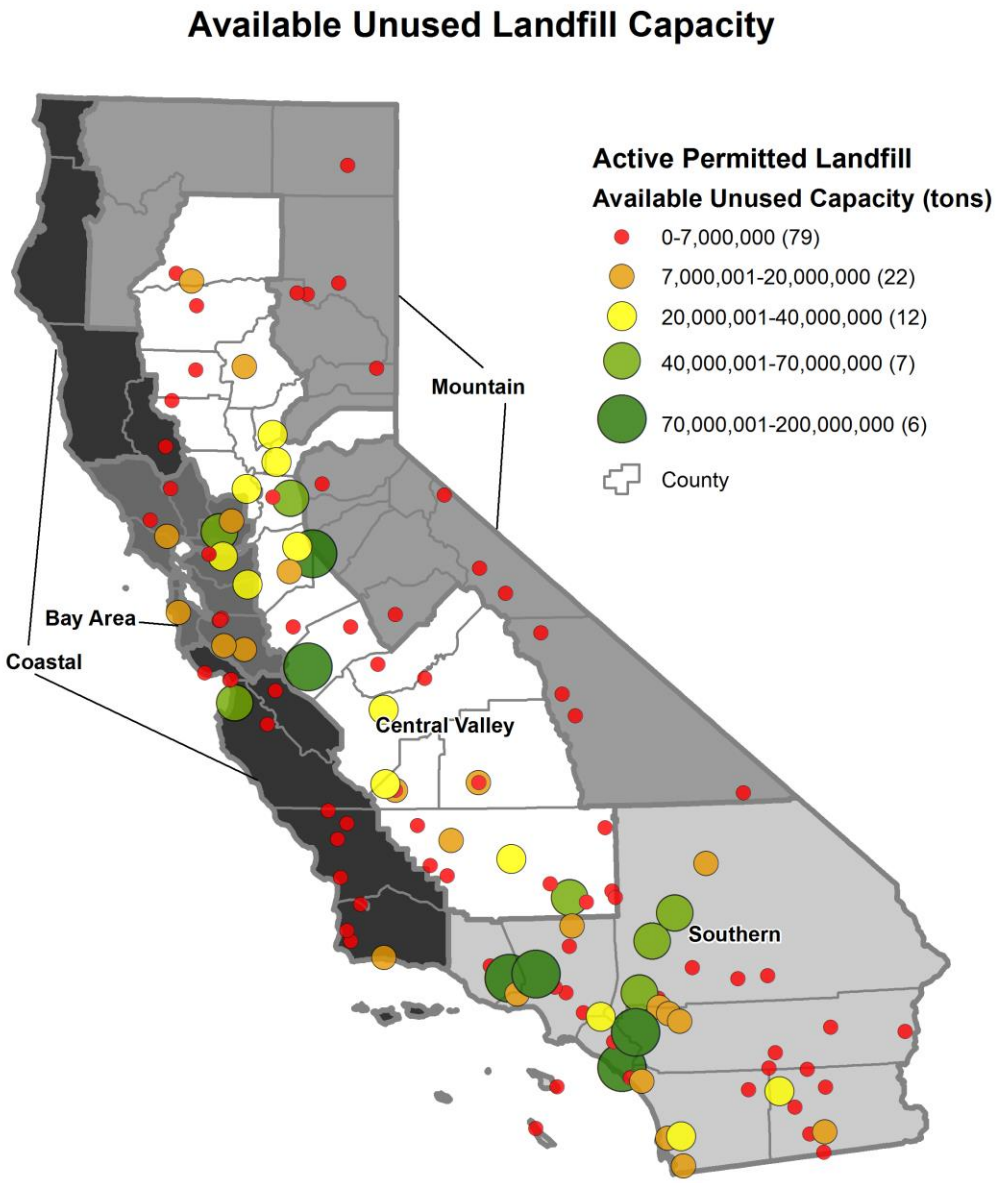

Figure 40. Available lifetime landfill capacity in California. Map showing available unused lifetime landfill capacity for each landfill in a region and the number of landfills that represent that capacity amount in California's five regions for 2014. The size and color of the circles represent the amount of available lifetime capacity for a landfill, with green representing the most available landfill capacity and red the least. Data from FacIT.

Figure 41 shows that the amount of unused landfill capacity is greater for public landfills than private landfills, with 1.1 billion tons available for public landfills and 635 million tons available for private landfills. Private lifetime landfill capacity tends to be located in the Bay Area and Los Angeles regions most likely to serve regions of the state with higher populations.

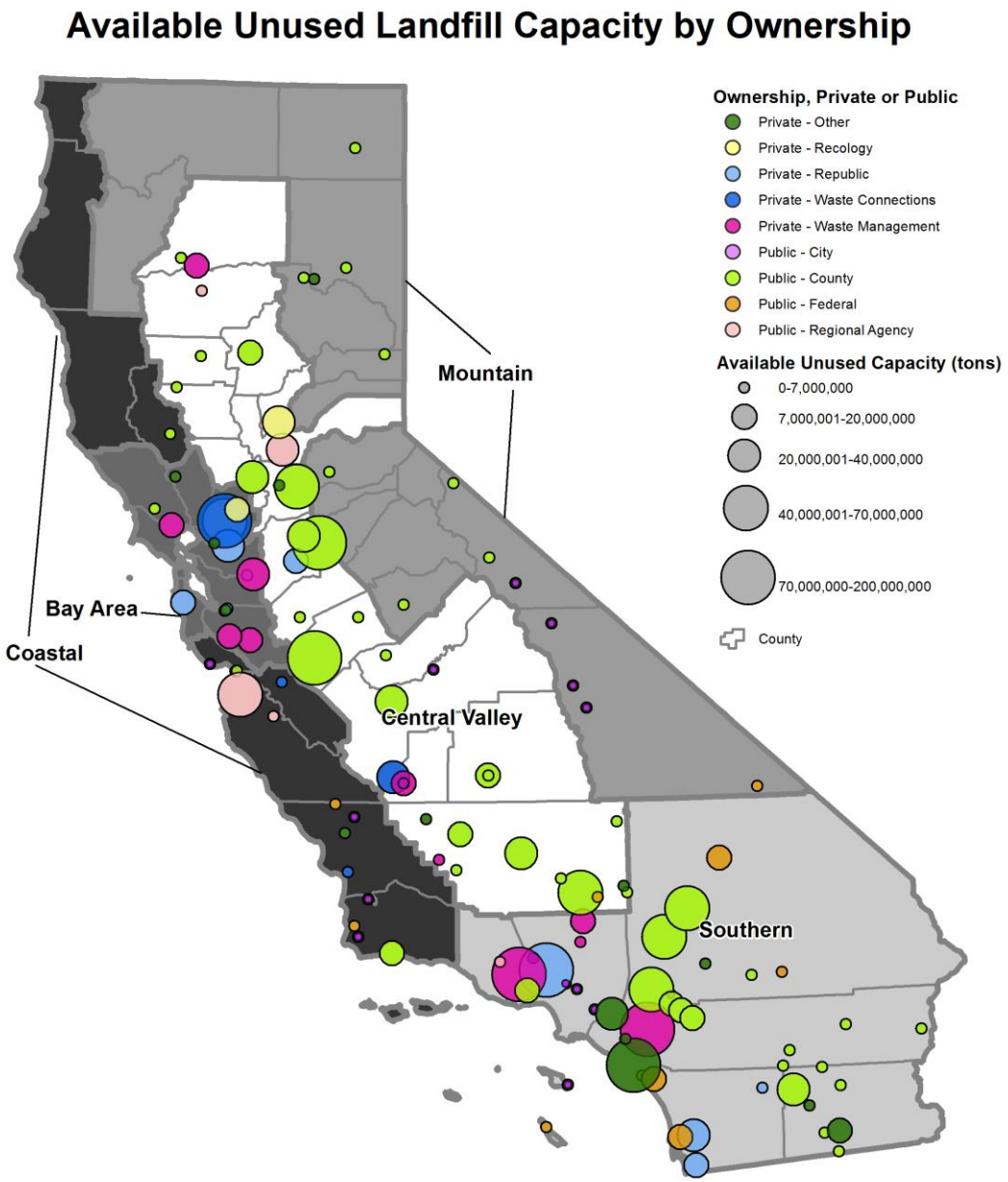

Figure 41. Unused lifetime landfill capacity by ownership type. Larger circles represent more available lifetime landfill capacity. The color of the circle designates the type of owner (public or private) and company name if it is owned by a private facility. Data from FacIT, 2014.

In order to more accurately project the unused lifetime capacity of landfills in California by region, it would be necessary to consider changes in population and disposal rates over time. However, this limited analysis does suggest that there is extensive unused lifetime landfill capacity in most regions that far exceeds the county-level goal of 15 years of minimum landfill capacity required by the state. Any changes made in state policies or current policies that decrease disposal should prolong the usable lifetime landfill capacity for facilities in a region beyond landfill capacity projections created using "business as usual" disposal projections.

Lifetime Landfill Capacity: Three Statewide Scenarios

One alternative to the regional-level approach of evaluating total lifetime landfill capacity is a statewide analysis. Although this method does not allow for regional variations, a statewide approach does provide two key benefits. First, population changes over the lifetime of the landfill can be considered; for the purposes of this section, Department of Finance statewide population projections were used. Second, factors that influence the total amount of disposed waste in California can be evaluated more easily. These include changing rates in material recovery and recycling over time, as well as economic factors such as changes in wages, the rate of construction, and the employment rate.

For this section, three scenarios were projected for disposal:

1. **"Low Disposal Scenario" or "Meets 75 Percent Goal Scenario."** In this scenario, disposal was predicted to meet the 75 percent statewide recycling goal by 2020. This scenario approximates a linear reduction in disposed waste until 2020, followed by a mild increase in disposal that is tied to increases in California's population. Beginning in 2020, a disposal rate of 2.7 pounds per person per day was used.
2. **"Medium Disposal Scenario" or "Current Disposal Rates Scenario."** This scenario uses a business-as-usual approach in which disposal remains roughly the same into the future. For this scenario, an average of the last seven years' per capita disposal rates was used to define a medium disposal rate. This takes into account the economic downturn and initial recovery. In this scenario, a disposal rate of 4.7 pounds per person per day was used.
3. **"High Disposal Scenario" or "Economic Boom Scenario."** For this scenario, a high disposal rate was predicted. This scenario is reflective of substantial economic growth, which is generally linked to higher levels of disposal. The total tons of disposed waste is calculated using the Woods and Poole Inc. data and corresponds to an average disposal rate of roughly 7.0 pounds per person per day.

The three disposal scenarios were used to model statewide disposal and lifetime landfill capacity in California.

What Projections of Future Disposal and Landfill Capacity Can We Make?

The projected amount of disposal in 2025 ranges between 20.9 million tons under the Low Disposal Scenario and 57.7 million tons under the High Disposal Scenario (Figure 42). Overall, a second year in a row in which actual disposal increased (blue line) shows that disposal may be trending toward the medium disposal projection. While disposal appears to be increasing, the policies established under the 75 percent recycling goal could gradually move disposal toward the Low Disposal Scenario.

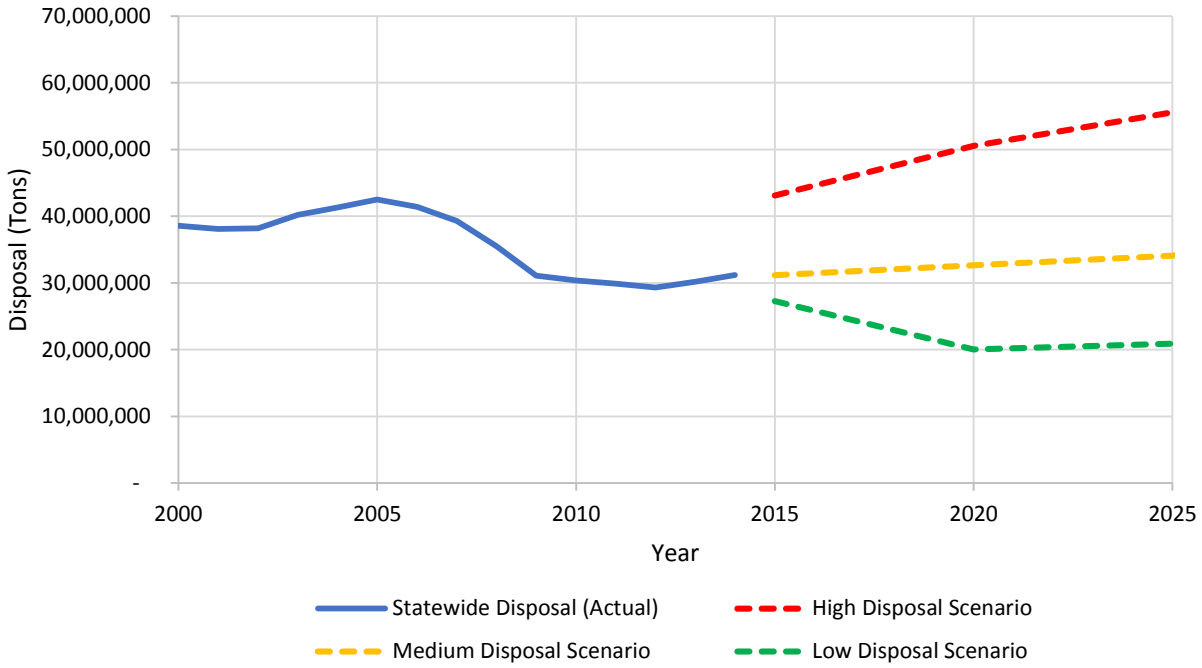

Figure 42. Statewide disposal projected through 2025. The blue line represents actual annual statewide disposal from 2000 to 2014. Dotted lines represent projections of future annual disposal from 2015 through 2025 based on three scenarios: High Disposal Scenario (~7.0 ppd, Woods and Poole Inc.), Medium Disposal Scenario (4.7 ppd), and Low Disposal Scenario (2.7 ppd in 2020, 75 percent recycling goal). Data from FacIT and DRS.

Three disposal scenarios—Meets 75 Percent Recycling Goal, Current Disposal Rates, and Economic Boom—were used to determine California's remaining statewide lifetime landfill capacity and the years of available landfill capacity statewide (Figure 43). In all three disposal projections, the future available lifetime capacity at landfills statewide decreases steadily but at different rates.

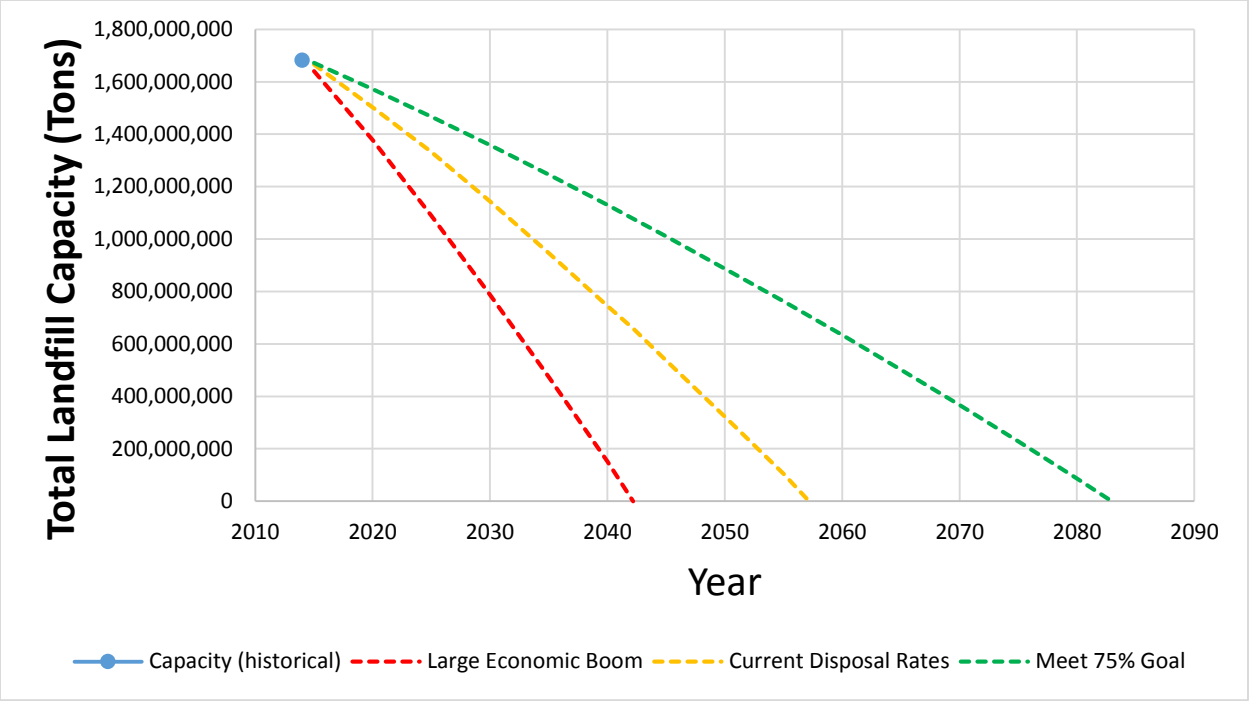

Figure 43. Statewide lifetime landfill capacity projected through 2090. Chart showing current and future lifetime landfill capacity for California. Blue dot represents current lifetime landfill capacity for the state in 2014. Dotted lines represent projections of future lifetime landfill capacity based on an Economic Boom Scenario (~7.0 ppd, Woods and Poole Inc.), Current Disposal Rates Scenario (4.7 ppd), and Meets 75 Percent Goal Scenario (2.7 ppd in 2020, 75 percent recycling goal). Data from FacIT and DRS.

Landfill Capacity: How Many Years of Capacity Does California Have?

A comparison of the expected years of California's available lifetime landfill capacity in 1992 to today's situation shows a marked increase in years of available lifetime landfill capacity statewide. In the 1992 report, landfill capacity was projected to run out by the early 2000s unless changes in disposal or landfill capacity occurred.[15] Today, with the trend toward larger landfills and lower per capita disposal, the projected years of available lifetime landfill capacity statewide would be between 26 years in the Large Economic Boom Scenario and 67 years in the Meets 75 Percent Goal Scenario. If disposal remains at the current per capita average of 4.7 pounds per person per day, as reflected in the Current Disposal Rates Scenario, there are currently 41 years of lifetime landfill capacity remaining in California. This Current Disposal Rates Scenario is lower than the 47 years of lifetime landfill capacity projected in the regional business-as-usual scenario in Table 9 because the analysis for Figure 43 takes into account population growth projections for California that are not available for individual regions.

How Do Closures, Openings, and Facility Expansions Impact Landfill Capacity?

Landfill closures or openings can impact the capacity of landfills in a region and overall lifetime landfill capacity. When a facility closes, landfill capacity for a region and statewide will decrease and the capacity at nearby landfills may change as jurisdictions that had sent waste to the closed landfill begin to send their waste to other landfills. Conversely, when a new landfill opens, regional and statewide landfill capacity increases, and waste flow for a region changes. The recent closure of the Puente Hills Landfill in Los Angeles County, the pending opening of the Santa Maria Integrated Waste Management Landfill in Santa Barbara County, and the planned opening of Gregory Canyon Landfill in San Diego County are the most recent examples of a landfill closure and two planned landfill openings that may have impacts on statewide and regional landfill capacity.

How Did the Puente Hills Landfill Closure Affect Landfill Capacity?

As discussed earlier in the report, the closing of Puente Hills Landfill in October 2013 changed the flow of waste in the Southern region in 2014: Three counties bordering Los Angeles County had increases in the amount of materials sent to their landfills in 2014 compared to 2013. It is difficult to project the effect this change in countywide disposal had on landfill capacity in each county since CalRecycle does not have accurate landfill capacity projections at the county level. But it is likely that remaining landfill capacity for facilities in these counties will decrease at a faster rate if they continue to accept waste from Los Angeles County that formerly went to Puente Hills Landfill.

How Does the Opening of a New Landfill Affect Landfill Capacity?

Two future landfill openings will likely affect landfill capacity in California. The Santa Maria Integrated Waste Management Facility Class III Landfill in Santa Barbara County, permitted in 2012, will likely be the next new landfill in the state to become operational. When the facility starts accepting waste, it will add 10 million tons of landfill capacity to the region. Although it is difficult to predict how nearby landfills will be affected by the opening of this landfill until it opens and starts accepting waste, it is likely that opening a new landfill will change the amounts of waste disposed at other landfills, particularly in the Southern region. The new landfill will replace the Santa Maria Regional Landfill, set to close in 2017.

Another landfill in the planning stages is the Gregory Canyon Landfill in eastern San Diego County. While this facility has a solid waste facilities permit, other approvals are not in place, so it is not clear when it will start accepting waste. CalRecycle will monitor the changes in disposal flow and capacity when both new facilities become operational.

How Do Landfill Expansions Affect Landfill Capacity?

Expansions of landfill capacity at existing landfills can increase the amount of waste material a county or region can take while helping counties avoid the costly process of

siting and building a new landfill. In addition, the flow of waste in a region may change since a landfill with an expanded capacity may take more materials from other counties and/or regions. Two recently approved landfill expansions did not significantly change overall state landfill capacity but may have an effect on regional landfill capacity. The approved expansion of Newby Island Landfill will add more than 11 million tons of lifetime landfill capacity to the Bay Area region. The proposed expansion of Forward Landfill in San Joaquin County would potentially add 6 million tons of landfill capacity to the Central Valley region. CalRecycle updates capacity projections as expansions are approved. Proposals for future expansions are not final, so they are not included in this analysis.

Landfill Capacity Findings

California's disposal infrastructure has enough landfill capacity to store the waste materials generated by Californians each year and for the near future. The 126 active MSW landfills in California provide about 86 million tons of annual landfill capacity. This annual landfill capacity is enough to provide disposal for all the materials generated each year in California. While changes in available landfill capacity may occur regionally due to landfill closures, expansions, or openings, overall landfill capacity for the state does not change significantly each year.

California has more than sufficient landfill space to accommodate waste at the regional and statewide level for at least 20 years. If California reaches its 75 percent statewide recycling goal in 2020, the state would not run out of landfill space until the 2080s, based on current projections of landfill capacity. The recent increase in disposal in the last two years shows that future disposal may be moving toward a "Medium Disposal Scenario" in which disposal gradually increases each year. Even under this projected disposal scenario, the state has more than 40 years of projected lifetime landfill capacity.

What Is the Impact of Disposal-Related Materials?

For jurisdiction-related purposes, disposal-related activities count as diversion, while AB 341 recognizes disposal-related activities as disposal. These activities are not source reduction, recycling, or composting, so they do not count toward the 75 percent statewide recycling goal. The following disposal-related activities are closely tied to disposal and/or disposal facilities:

- Alternative daily cover or alternative intermediate cover
- Other beneficial reuse
- Municipal solid waste thermal processes and waste-derived fuels.

Currently there are more than 5 million tons of disposal-related materials—not including materials sent to thermal processes such as transformation—used each year in the state. It is likely some of this material will have to be diverted to meet the statewide 75 percent recycling goal in 2020. This section highlights the use of disposal-related materials at landfills in the state for 2014, evaluates any trends that are emerging, and discusses future issues that may affect their use.

What Are the Types of Disposal-Related Activities?

Disposal-related activities include:

- Alternative daily cover (ADC)
- Alternative intermediate cover (AIC)
- Other beneficial reuse at landfills
- Transformation
- Generating fuel from waste tires (Tire-derived fuels)

ADC is the use of materials specifically approved by local enforcement agencies to cover solid waste at landfills on a daily basis. AIC is the use of approved materials to cover solid waste at landfills in areas that will not receive additional waste for 180 days. Other beneficial reuse is the application of waste-derived materials at landfills such as for road base, construction fill, and erosion control. Materials approved for ADC, AIC, and other beneficial reuse include processed green material such as yard trimmings and untreated wood waste, construction and demolition waste, auto shredder waste, sludge, contaminated sediment, ash, compost, tires, and mixed waste. Non-waste-derived materials used for ADC, AIC, or other beneficial reuse, such as foams and tarps/blankets, are not tracked in DRS as disposal-related materials and facilities are not required to report on their use.

What Are the Past and Current Uses of Disposal-Related Materials Statewide?

For the five types of disposal-related activities in the state, ADC is the most common, with 3.4 million tons used in 2014. More than 2.2 million tons were used for other beneficial reuse at landfills, and 60,000 tons were used for AIC. Figure 44 shows the annual trends of disposal-related activity, excluding transformation and tire-derived fuel, from 1995 to 2014.

Total ADC use reached its peak in 2005 with 4.5 million tons used and declined to 3.4 million tons used in 2014. While total ADC use has declined since its peak in 2005, the ratio of ADC use to disposal has remained consistent over the years despite changes in disposal due to the economy or other factors (Table 10). For example, the ratios of ADC to disposal since ADC was near its peak total use in 2006 compared to 2014 are similar (10.2 percent to 11 percent), yet total ADC use has dropped 0.8 million tons since 2006.

The decline in ADC use since 2004 may be due to several factors. The decrease in ADC use may correspond to a decrease in the need for ADC due to the decline in disposal. Changes in facility practices, jurisdiction preferences for sending material for ADC use, or change in material availability for ADC use all may be factors in the decline in ADC use since 2004.

In 2006, CalRecycle began tracking materials used for AIC and other beneficial reuse at landfills. AIC has remained a small portion of disposal-related material use, with AIC at less than 1 percent of total disposal over the last decade and total AIC use around 60,000 tons in 2014. Other beneficial reuse initially increased in use from 2006 to 2012 but has decreased in the last two years. From 2006 to 2012 the ratio of other beneficial reuse to disposal jumped from 3.7 percent to 8.9 percent, with overall use at 2.5 million tons in 2012. Since 2012, the ratio of other beneficial reuse to disposal has declined to 7.1 percent in 2014 and a total use of 2.2 million tons.

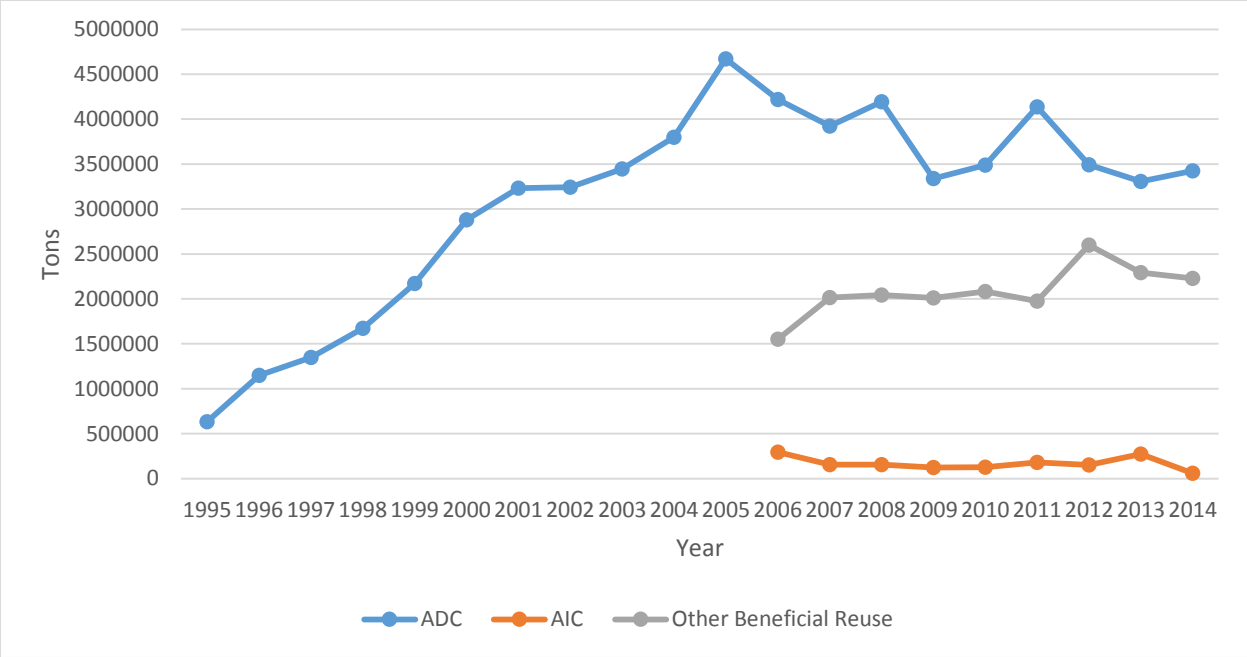

Figure 44. Disposal-related material use 1995 to 2014. Graph showing the annual tons of use in California for disposal-related materials including ADC, AIC, and other beneficial reuse from 1995 to 2014. Tracking of ADC started in 1995, and tracking of AIC and other beneficial reuse started in 2006. Data from DRS.

Table 10. ADC, AIC, and other beneficial reuse tons used at facilities in California from 2006 to 2014 and percentage of disposal for each disposal-related activity. Data from DRS.

Year	Disposal Tons	ADC	ADC % of Disposal	AIC	AIC % of Disposal	Other Beneficial Reuse	Other Beneficial Reuse % of Disposal
2006	41,419,208	4,219,992	10.2	295,665	0.7	1,550,909	3.7
2007	39,219,392	3,922,060	10.0	156,770	0.4	2,015,163	5.1
2008	35,517,378	4,192,731	11.8	154,097	0.4	2,044,435	5.8
2009	31,142,113	3,339,609	10.7	124,633	0.4	2,009,931	6.5
2010	30,398,619	3,487,779	11.5	125,331	0.4	2,082,567	6.9
2011	30,047,841	4,137,698	13.8	178,424	0.6	1,976,573	6.6
2012	29,347,588	3,492,741	11.9	151,440	0.5	2,598,696	8.9
2013	30,220,454	3,308,011	10.9	273,349	0.9	2,292,608	7.6
2014	31,195,544	3,423,840	11.0	60,776	0.2	2,228,942	7.1

Where Is ADC Used?

Approximately 62 percent (78 facilities) of California landfills used ADC in 2014, while 38 percent (48 facilities) did not. Facilities primarily use ADC in regions of the state with the highest population, the highest waste generation, and the most waste landfilled, though all regions have some ADC use. In 2014, Southern California and the Bay Area remained the regions with the most ADC use in the state (Figure 45). Southern California had six facilities with more than 100,000 tons of ADC use in 2014 and three facilities with 50,000 to 100,000 tons. The Bay Area had four facilities with more than 100,000 tons of ADC use in 2014 and four facilities with 50,000 to 100,000 tons. Overall, the Southern California and the Bay Area regions accounted for more than 80 percent of total ADC use in 2014, with Southern California at 50.5 percent and the Bay Area at 31.6 percent.

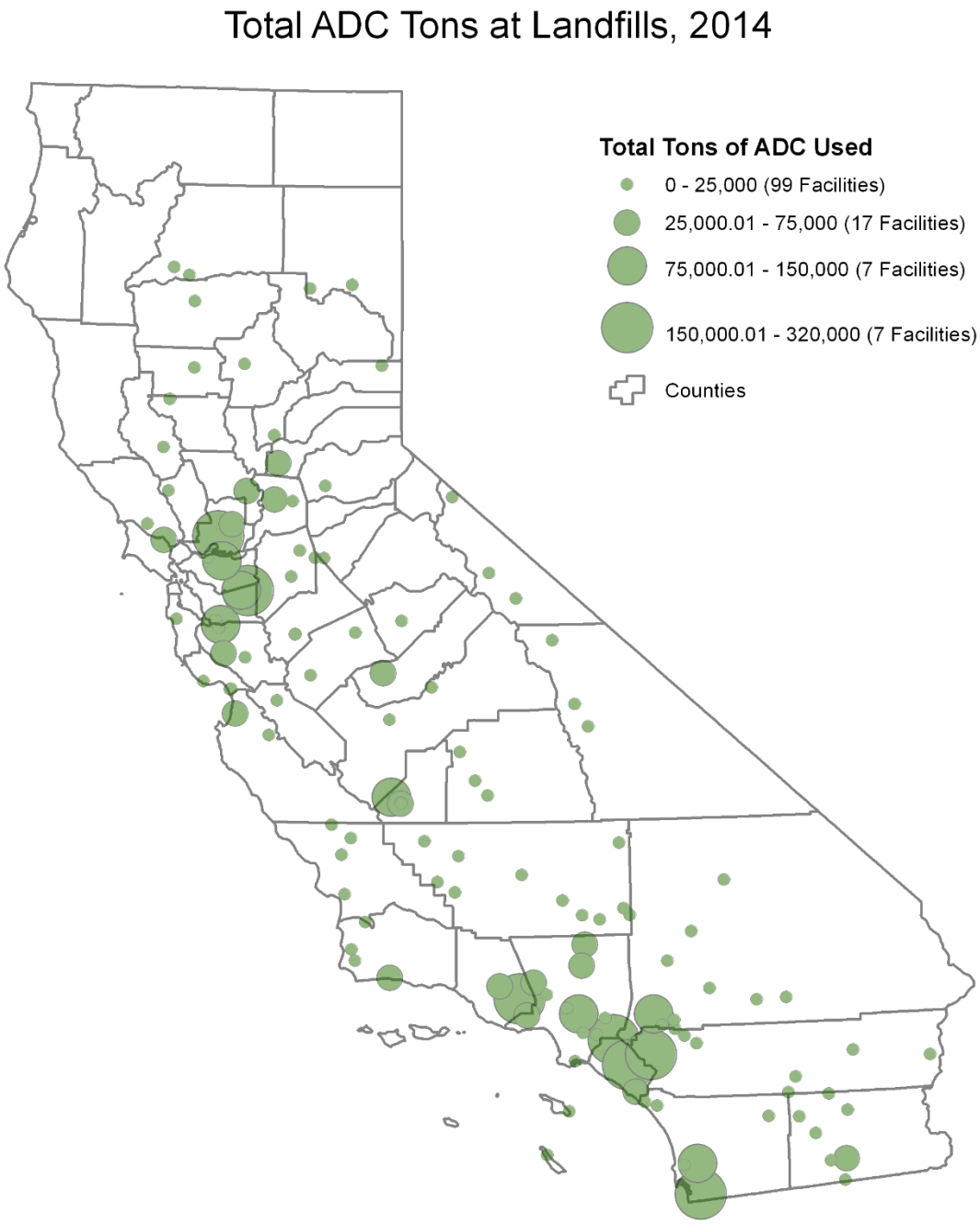

Figure 45. Total ADC use at landfills in 2014 in tons. Green circles represent landfills in California that used ADC in 2014, with the size of the circle representing the amount of ADC used by a facility (larger circles represent landfills that used more than 100,000 tons of ADC). Data from DRS.

Which Materials Are Used the Most for ADC and Other Beneficial Reuse?

Green material remained the most used ADC type in 2014 at 38 percent, followed by construction and demolition and auto shredder waste, at 19 and 16 percent respectively. (Figure 46).

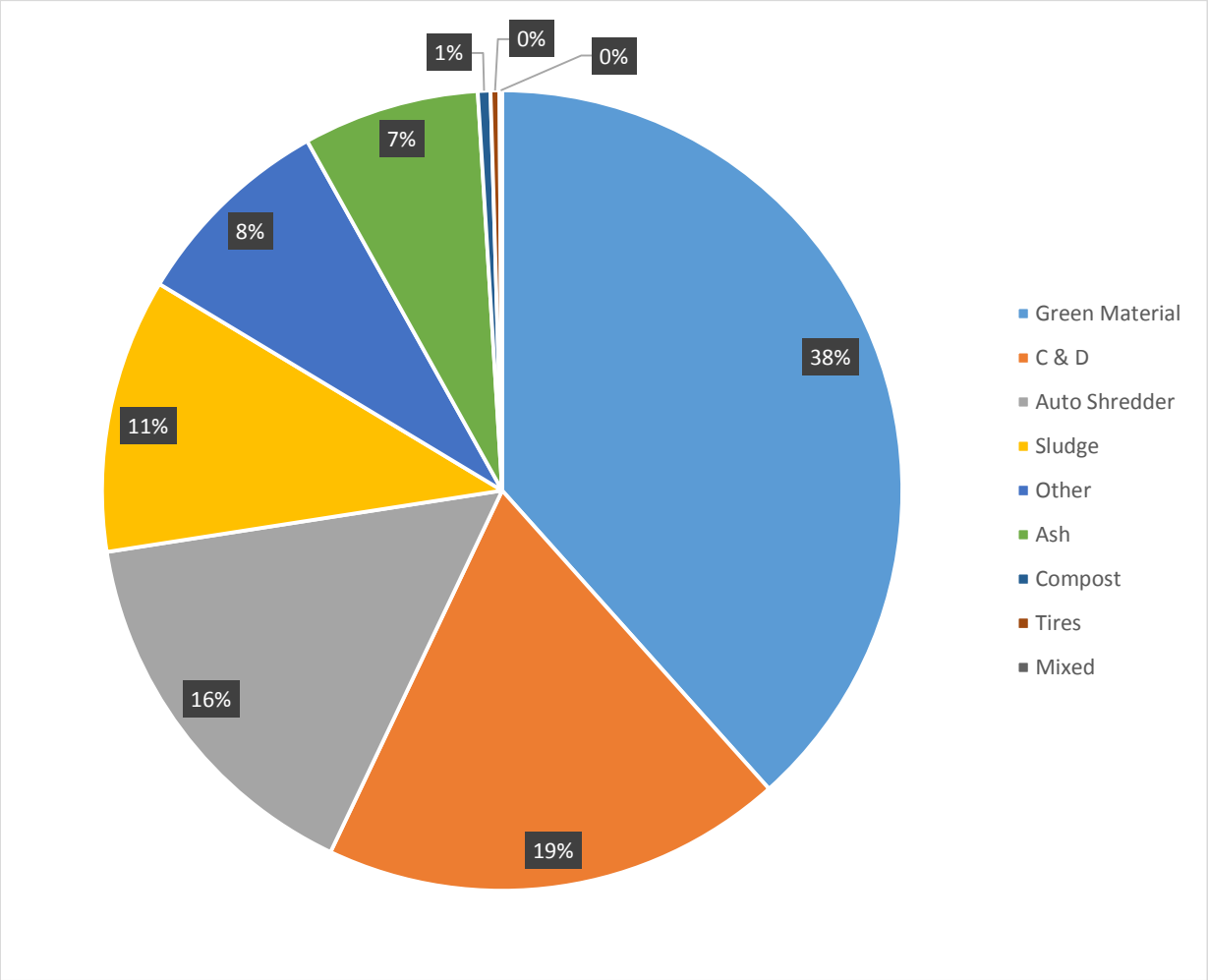

Figure 46. ADC material types used in 2014. Chart showing the percent of each ADC material type used for total 2014 ADC use. Data from DRS.

Green material declined from 44 percent of total ADC use in 2013 to 38 percent in 2014. Since its peak use in 2005 of 3 million tons, green material ADC use has declined by nearly 1.7 million tons to 1.3 million tons in 2014 (Figure 47).

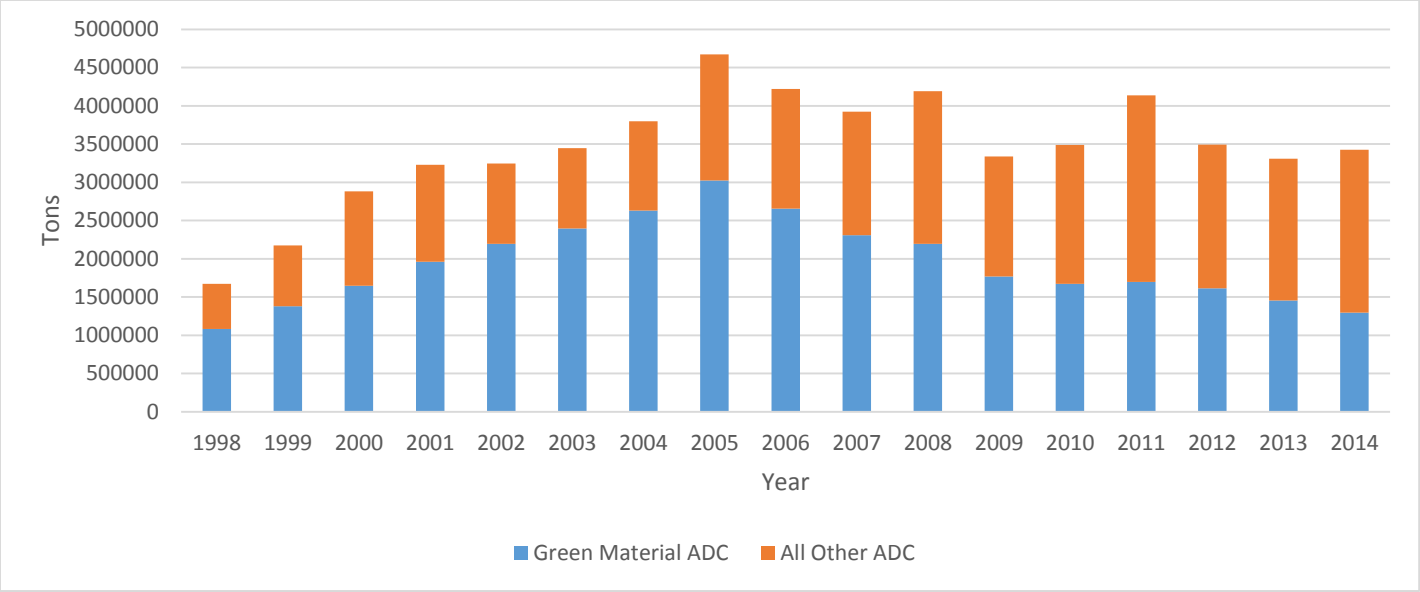

Figure 47. Green material ADC use compared to other ADC material types. Chart showing the total green material ADC use in tons (blue) compared to all other ADC material types (orange) used from 1998 to 2014. Tracking for specific ADC material types did not begin until 1998. Data from DRS.

Regionally, most green material ADC use occurs in Southern California (Figure 48). In 2014, 80 percent of green material ADC use occurred at landfills in the Southern California region. Four Southern California counties—Orange, San Diego, Los Angeles, and San Bernardino—accounted for more than three-quarters of green material ADC use in the state, or around one million tons of the total 1.3 million tons of green material ADC used in 2014.

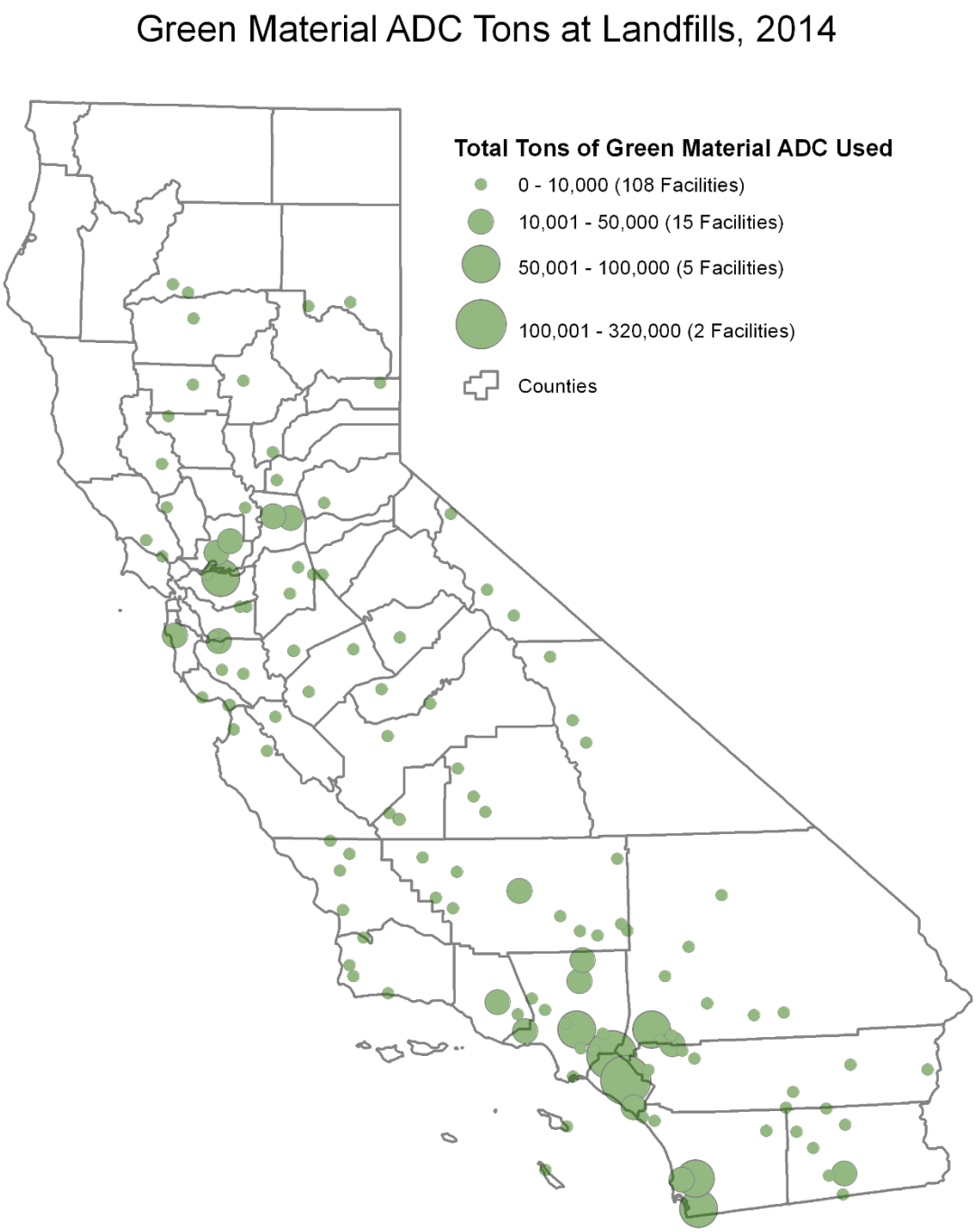

Figure 48. Green material ADC use at landfills, 2014. Circles represent landfills with green material ADC use in 2014. Larger circles represent a larger amount of material used. (Data from DRS)

The decline in green material ADC use over the last decade may be due to many factors, including:

- Landfills changing their green material ADC practices and use for economic reasons or operational needs
- The severe drought conditions reducing the availability of green material for ADC
- Local jurisdiction or county ordinances banning green material from landfills including use as ADC
- Jurisdictions directing more green material to composting
- The overall decline in disposal since 2005, which may have reduced the need for green material ADC
- Shift away from green material ADC use since in 2020 it will count as disposal

The top materials used by facilities for other beneficial reuse differed from ADC, with "Other" materials the most-used category at 49 percent and contaminated sediment and C&D the second and third most-used materials at 20 percent and 19 percent respectively (Figure 49).

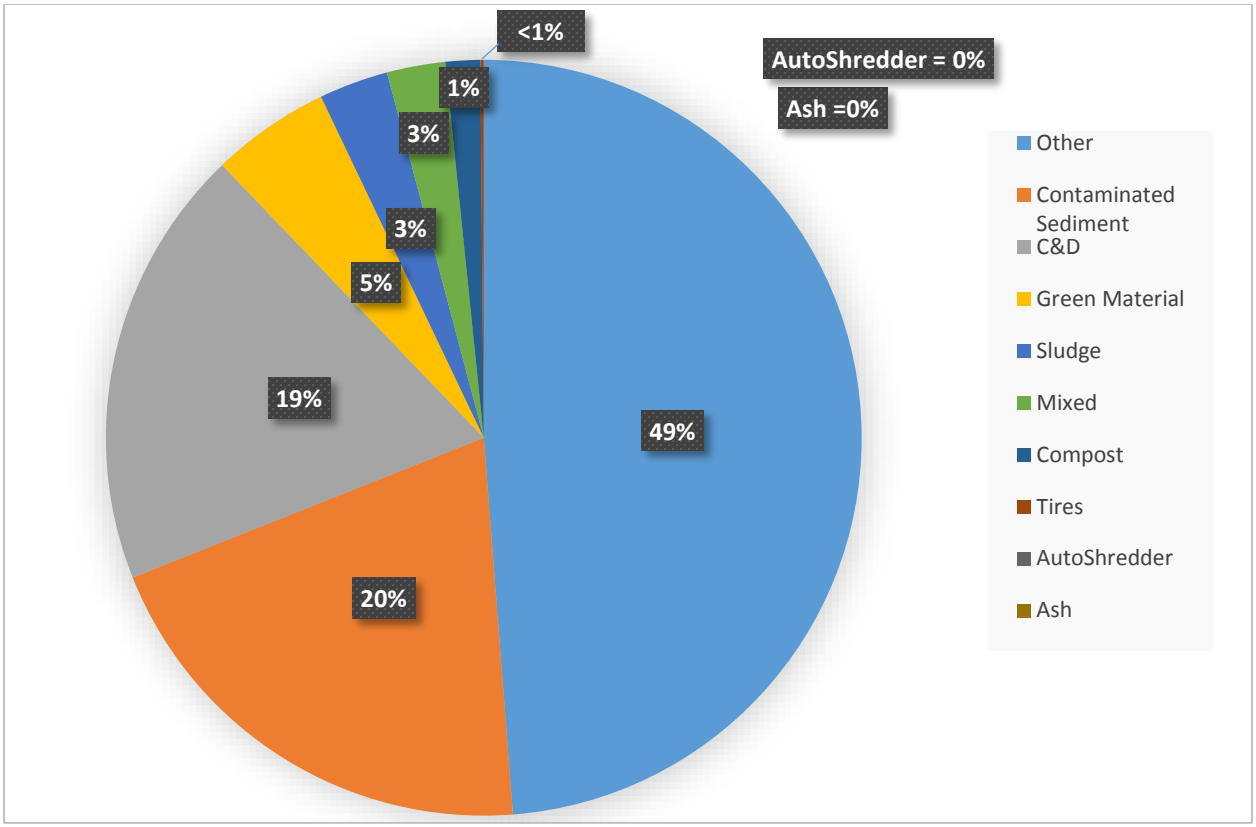

Figure 49. Other beneficial reuse material types used in 2014. Chart showing the percent of each other beneficial reuse material type used for total 2014 other beneficial reuse material use. Data from DRS.

How Much ADC Use Is Attributed to Jurisdictions?

ADC use is widespread throughout California and is attributed to many jurisdictions. While most jurisdictions have part of their waste sent to landfills used as ADC, the amount of use attributed to jurisdictions varies statewide. In 2014, more than 60 percent (274) of all jurisdictions in California had more than 1 percent of their waste used as ADC, 104 had less than 1 percent, and only 34 jurisdictions had no waste-derived ADC use (Figure 50).

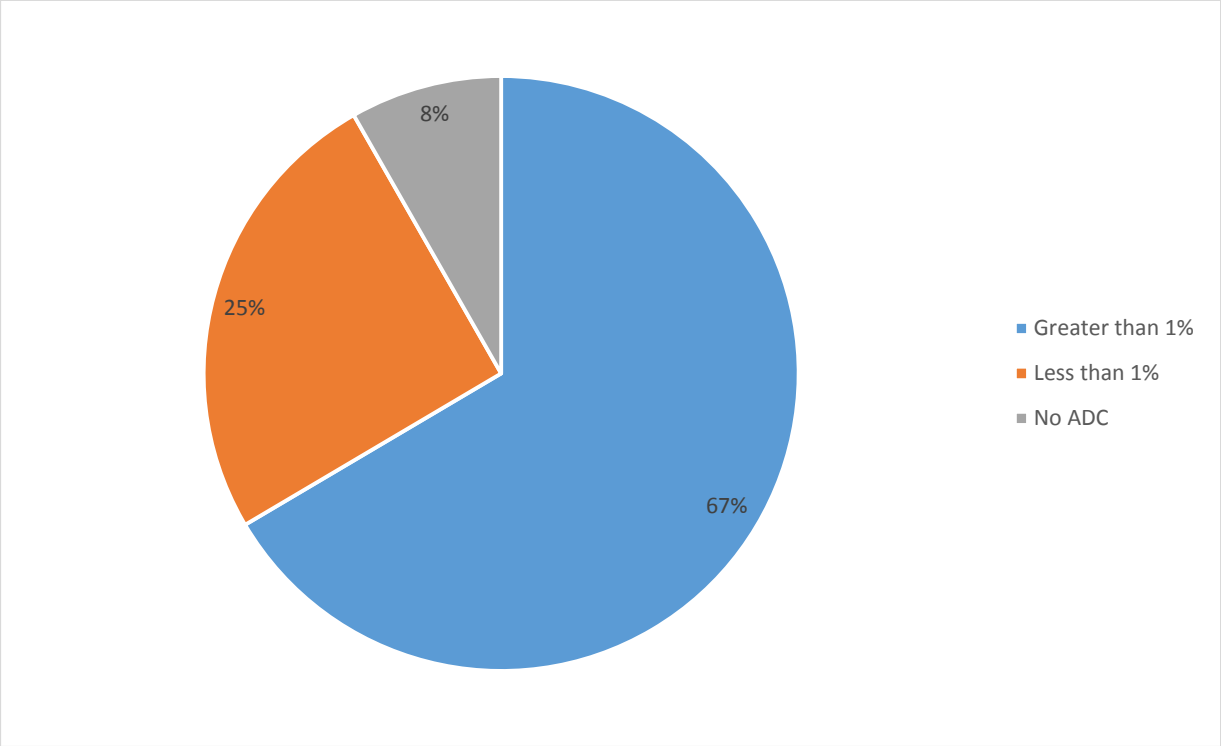

Figure 50. Jurisdiction ADC usage compared to total disposal 2014. Chart showing the percentage of jurisdictions in California with greater than 1 percent of their waste sent to landfills attributed to ADC use (67 percent), less than 1 percent of their waste attributed to ADC use (25 percent), and jurisdictions with none of their waste attributed to ADC use (8 percent). Data from DRS.

For the jurisdictions that had more than 1 percent of their waste attributed to ADC, the amount of ADC use varied. Three jurisdictions had ADC represent more than half of their waste sent to landfills, while 22 had ADC represent 25 to 50 percent of their waste (Figure 51). Many jurisdictions had 1 to 25 percent of their waste used as ADC, with 114 jurisdictions at 10 to 25 percent of disposal and 135 jurisdictions at 1 to 10 percent.

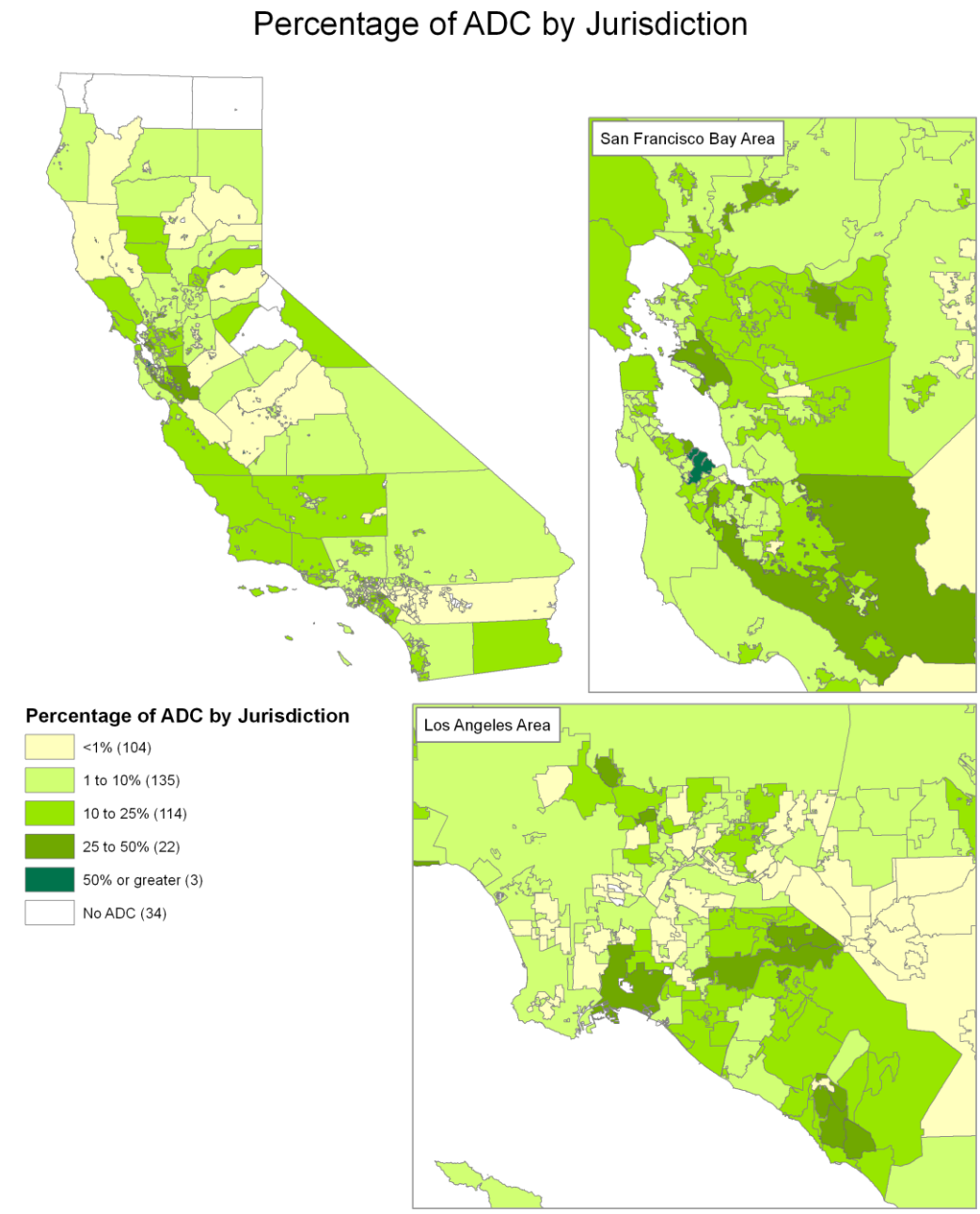

Figure 51. Percentage ratio of ADC to disposal for jurisdictions, 2014. Map showing the percent of jurisdiction waste sent to a landfill that was used as ADC in 2014 for the state with close-ups of the Bay Area and Los Angeles regions. The percentage of ADC use is divided into six categories on the map (less than 1 percent, 1 to 10 percent, 10 to 25 percent, 25 to 50 percent, 50 percent or greater, and no ADC use attributed to a jurisdiction). The number of jurisdictions are listed for each category. Data from DRS.

Under the AB 939 diversion mandate, ADC and AIC do not count as disposal. Under these rules, most jurisdictions received some goal measurement benefit from ADC use, with more than 90 percent of all jurisdictions reducing their 2014 disposal to some degree due to ADC use. AB 1594 will change how green material ADC counts for goal measurement after 2019, but it is unclear how it will affect green material ADC use by jurisdictions. Under AB 1594, in 2020 green material ADC will count as disposal for jurisdiction AB 939 reporting requirements. While this could mean jurisdictions will move away from using green material ADC due to the reclassification as disposal, current data shows the reclassification would not prevent many cities from meeting their goal measurement requirements. In 2014, only nine jurisdictions that used green material ADC would not have met the 50 percent diversion mandate if the material had counted as disposal in 2014. Under AB 1594, landfills can still use green material as ADC, and it will not be subject to the $1.40 per ton integrated waste management tipping fee. This fee exemption creates a situation in which materials that count as disposal under AB 341 can be landfilled without paying the disposal fee. The precedent established under this law may have unintended consequences by further incentivizing the disposal of green materials in landfills rather than composting at the state level.

Is ADC Being Used Correctly by Facilities?

Data on ADC usage indicates that several facilities in the state have ADC-to-disposal ratios that are higher than expected industry norms. Similar to 2013, the ratios of ADC to waste disposed at landfills using ADC varied greatly in 2014 (Figure 52). It is important to note that valid operational reasons may exist for high ADC-to-disposal ratios at landfills, including the need to adequately cover the active face of a landfill at the end of each day. Evaluating the ratio of ADC to disposal is further complicated by many variables, such as thickness of the waste cell, area of the working face, density of materials, frequency of use, and other factors. This means high ratios of ADC to disposal at landfills do not always indicate ADC overuse.

CalRecycle continues to look at ADC usage data and inspect facilities when needed for ADC use. An ADC investigation in 2014 based on 2012/2013 DRS information found that only two facilities had high ratios of ADC to disposal due to overuse. The study found that most of the high ratios of ADC to disposal were the result of errors in the methods used by facilities to track, record, and report on ADC. A 2015 evaluation of ADC use by the facilities in the 2014 investigation found that most of the facilities demonstrated improvements in ADC reporting, with a corresponding decrease in reported ADC use. CalRecycle evaluates ADC use as part of facility inspections and when processing proposed permit actions.

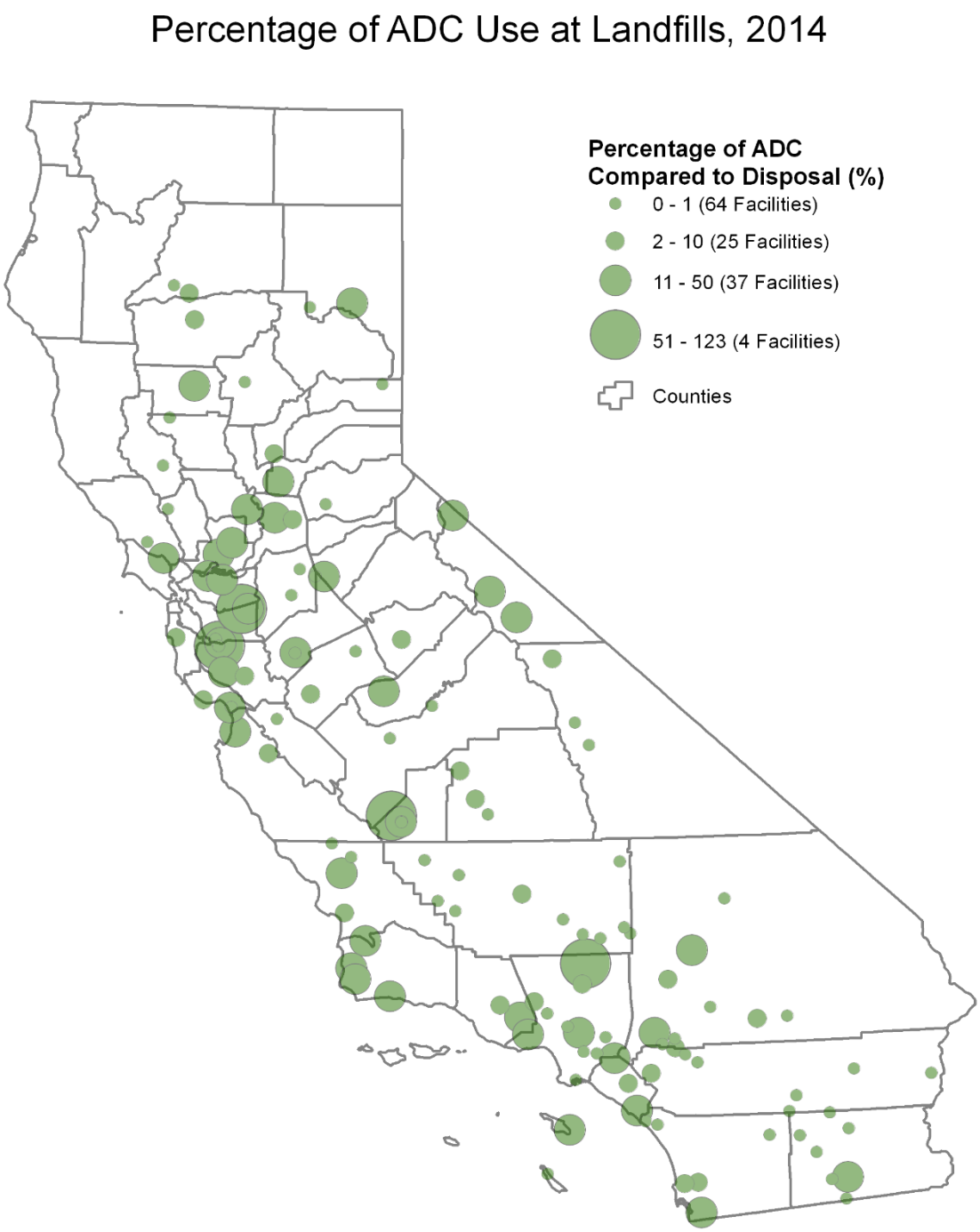

Figure 52. Percentage of ADC use at landfills compared to disposal, 2014. Larger circles represent a higher percentage of ADC use compared to disposal at the facility. Data from DRS.

Disposal-Related Material Findings and Future Use

To reach the 75 percent goal in 2020, a significant portion of the nearly 6 million tons of disposal-related materials used at landfills (3.4 million tons of ADC, 2.2 million tons of other beneficial reuse, and 500.000 tons of AIC) would likely need to be diverted from landfills each year.

How Do Landfill Fees and Funding Mechanisms for Solid Waste Programs Affect Disposal?

Disposal costs and state funding of disposal and recycling infrastructure are important considerations in solid waste management. Studies indicate that higher landfill fees may reduce the amount of disposal while lower fees incentivize disposal. This section presents data on landfill fees for franchised haulers and posted self-haul fees and how those compare to fees charged in the rest of the country. Funding mechanisms influence how both solid waste and recycling programs are funded and operated in a state. This section looks at California's current funding mechanisms and U.S. trends and discusses ongoing issues with California's funding structure.

Landfill Fees

Most landfills fund their operations by charging a fee to self-haulers or negotiating set rates with solid waste haulers, cities, counties, and other facility operators that send waste to a landfill. Some publicly owned sites are funded through different mechanisms, such as property taxes or the General Fund.

Landfill fees fall into two distinct categories based on how waste is hauled to the landfill. Publicly posted tipping fees are fees paid at the gate of a landfill for waste disposal by self-haul customers and are based on the weight or volume of the load, truck type, and customer type. Negotiated rates between landfills and haulers, cities, or counties are usually set in contracts and are usually set at a lower rate than the posted self-haul fees. Facilities primarily fund their operations through negotiated rates since almost 80 percent of the state's waste is hauled to landfills from franchised haulers.

In 2013, CalRecycle conducted a survey of publicly posted tipping fees for municipal solid waste at landfills and published the finding in the 2015 report titled "Landfill Tipping Fees in California." In addition to the tipping fee report, in 2015 CalRecycle conducted research on negotiated rates for landfills in the state by looking at websites for cities and haulers. While this research is not the complete picture of tipping fees in California since it reviewed only a portion of all negotiated rates in the state, both data sets showed general trends for tipping fees in the state.

Analysis of median tipping fees charged by disposal and recycling facilities in California indicates that landfills charge less than other disposal facility types including transfer stations and transformation facilities, but they charge more than out-of-state facilities for waste exported out of California (Figure 53). Conversely, recycling facilities such as compost, chip and grind, and biomass facilities tend to charge lower tipping fees than landfills, transformation facilities, and transfer stations primarily because they receive revenue from other sources.

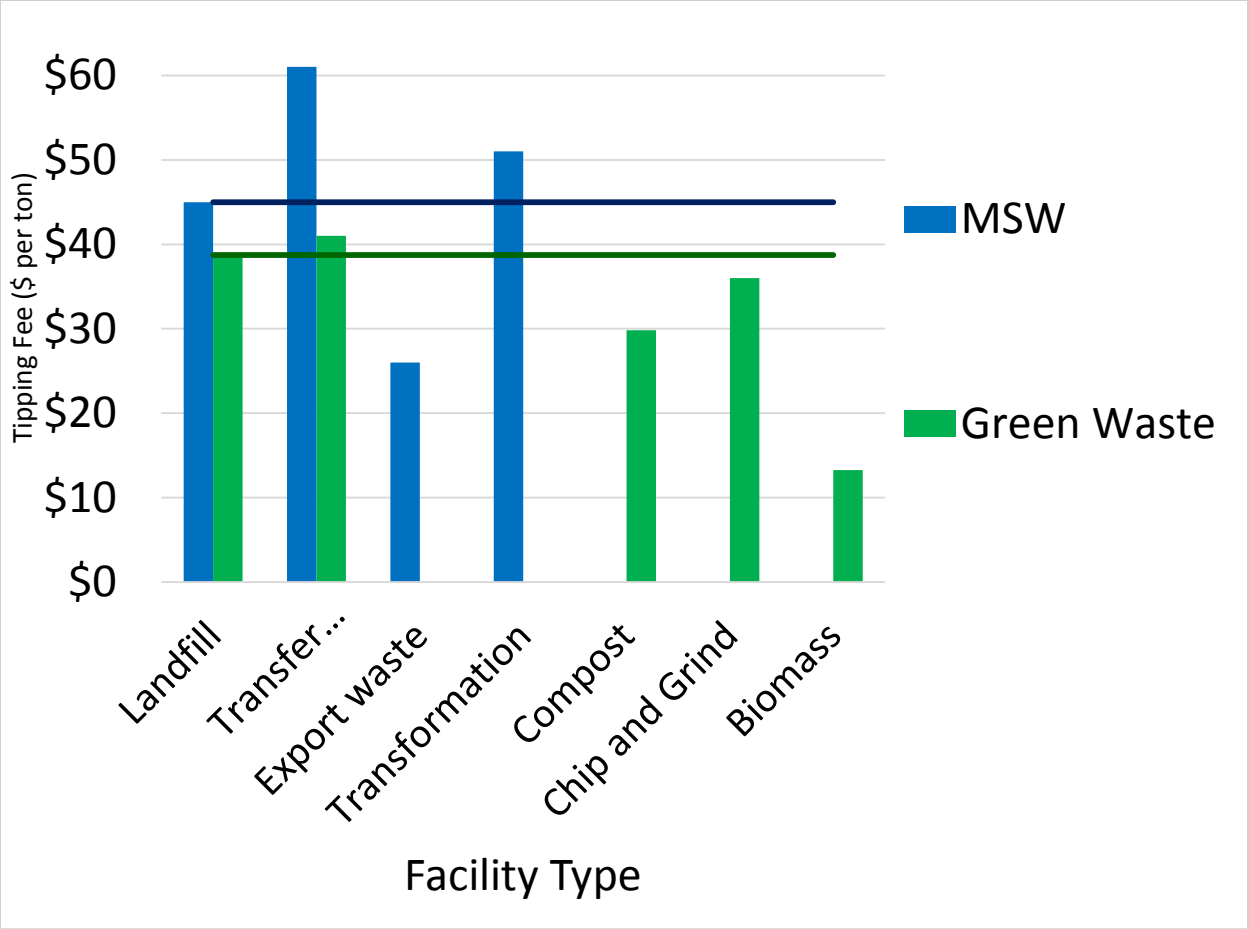

Figure 53. Median tipping fees for disposal and recycling facility types in California. Data from 2015 report "Landfill Tipping Fees in California."

Tipping fees for landfills are a complex data set with regional variations in how much is charged by facilities throughout the state. As discussed in the 2015 Landfill Tipping Fees in California report, California's statewide median publicly posted self-haul tipping fee was $45 per ton, and fees varied by region (Figure 54). These variations in fees reflect many factors, including California's diverse demographics and population distribution, regional waste flow patterns, economic factors, and other factors that influence how much a landfill charges in a region.

CalRecycle research found that negotiated fees were almost always lower than publicly posted self-haul fees. A review by CalRecycle of 47 negotiated agreements between landfills and jurisdictions/haulers showed that negotiated agreements between jurisdictions/haulers averaged $34 with a median of $31, which was $15 less than the publicly posted self-haul median fee. In addition, the tipping fee report found that negotiated rates were discounted between 11 percent and 76 percent from publicly posted fees.[16] It is important to note that CalRecycle's research on negotiated fees

represented a small sample of negotiated fees in California and does not represent all negotiated fee contracts in the state.

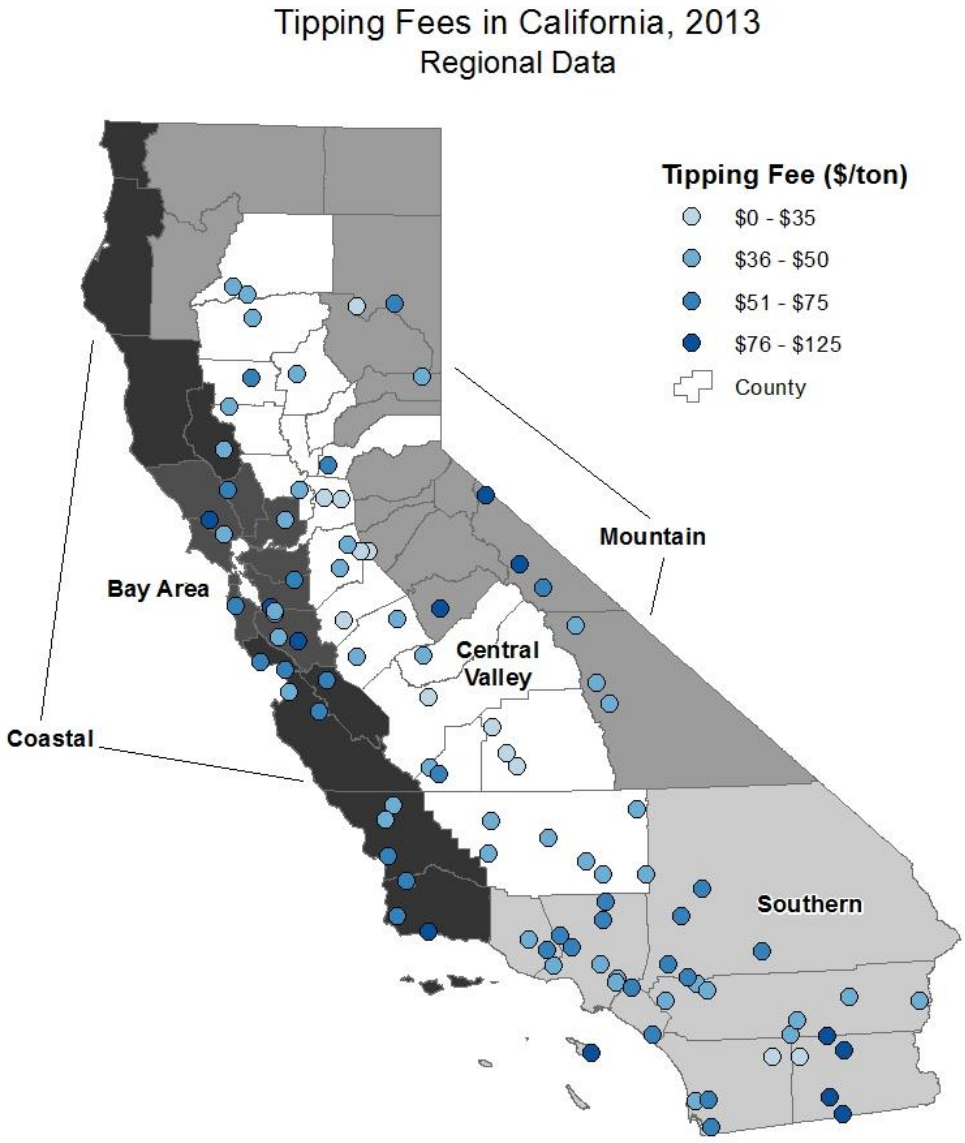

Figure 54. Ranges of publicly posted (not negotiated) tipping fees in California's five regions in 2013. Different color circles represent different tipping fee ranges, with dark blue representing the highest fees. Data from 2015 report "Landfill Tipping Fees in California."

How Do California's Landfill Fees Compare to the Rest of the Country?

As discussed in last year's "State of Disposal in California" report, California's average publicly posted tipping fee of $54 per ton was slightly above the national average of $49 per ton, but the state landfilled a lower percentage of waste compared to states that charged similar fees (Figure 55). This is likely due to California's aggressive mandates, programs, policies, and requirements for increasing diversion and reducing landfilling.

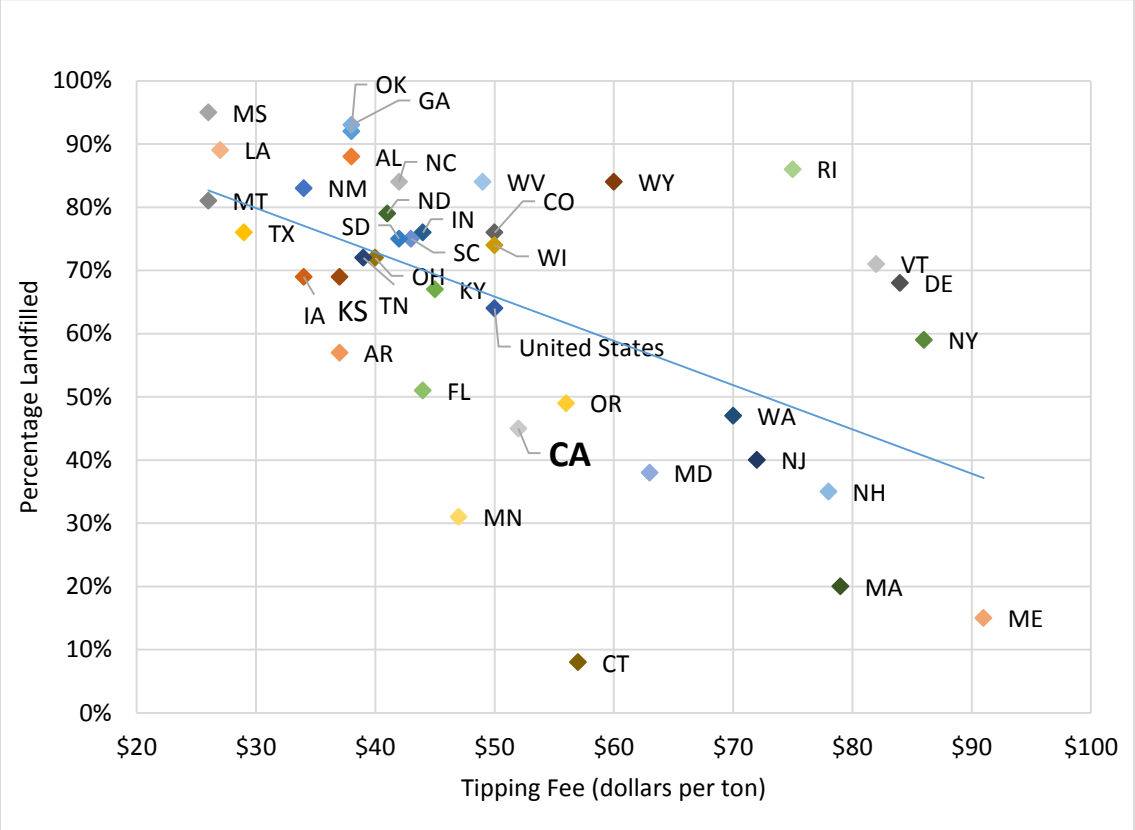

Figure 55. Relation between the average publicly posted landfill tipping fee and percent landfilled, by state. California is shown in gray. The correlation between tipping fee and percentage landfilled is mild (R2 = 0.32). California's tipping fee represents the average publicly posted self-haul gate fee for facilities in California and does not include gate fees negotiated by facilities with commercial haulers. Data from 2014 Columbia University study.

How Do California and the Rest of the Country Fund Their Solid Waste Programs?

While landfills charge fees to fund their facility operations, states use various fees or funding methods to finance solid waste oversight and diversion programs. States also vary in the different types of activities that they are required to fund for their solid waste and recycling programs. For example, some states have the primary responsibility for all solid waste oversight activities including permitting, inspecting, and enforcement for

solid waste facilities in their disposal infrastructure. Some states, including California, share the responsibility for funding solid waste facility permitting, inspection, and enforcement with local governments. Most states are responsible for funding diversion and recycling programs that divert materials from the waste stream.

California funds its solid waste and recycling programs through a landfill fee and fees on special materials such as e-waste, used oil, and beverage containers. California's landfill fee, the Integrated Waste Management Fee (IWMF), assesses $1.40 for each ton of waste disposed at a California landfill. For a detailed discussion on how effective the IWMF fee has been in funding the state's diversion and solid waste programs, see the IWMF section later in the report.

CalRecycle staff surveyed other states on state-level fees and funding sources for solid waste and recycling programs in 2014 and updated this information with another survey in 2015. This survey specifically collected state-level fee information on solid waste, tires, oil, electronics, beverage containers, annual operating or permit fees, and miscellaneous fees. Results showed that funding mechanisms varied among the states that responded, and no two states had identical funding mechanisms.

Government-Imposed Fees on Landfill Disposal

More than 60 percent of the 50 states (31 out of 50), including California, fund their programs using a fee similar to California's IWMF disposal fee. These fees range from 12 cents a ton to $30 a ton, with an average fee of $2.12 per ton and a median of $1.25 per ton (Figure 56). Some states differ from California in how they charge landfill fees and the types of facilities that are charged. California does not charge a fee on waste exported out of state, but six states charged a fee on waste exported out of state through transfer stations. Similarly, 11 states charge fees for transformation facilities operating in their state, while California does not charge transformation facilities the IWMF fee.

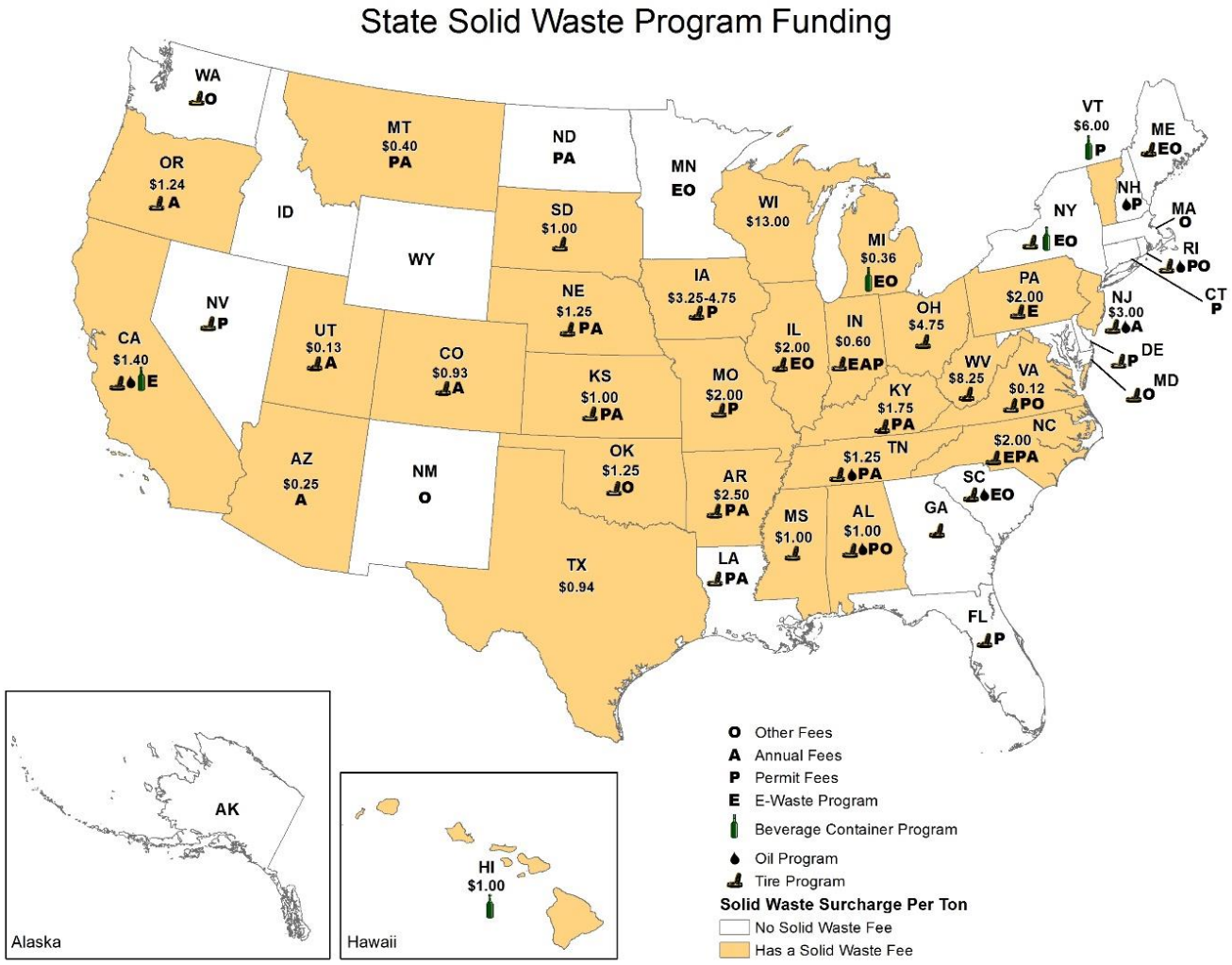

Figure 56. Solid waste funding for the 50 states. Map showing the dollar amounts for solid waste disposal fees and states that use other funding sources such as annual fees, permit fees, e-waste programs, oil programs, and tire programs. States in white have no solid waste disposal fees. Data based on survey conducted by CalRecycle staff, 2015.

Europe's solid waste policies encourage higher landfill fees and landfill taxes as a strategy to drive material away from landfills. The average landfill fee for countries in the European Union was $100 per ton in 2012, with a range of $0 to $215.[17] In the European Union, six member states charge a fee on transformation. Overall, the higher landfill fees and other policies, such as landfill bans, in the European Union make alternative waste management options, such as composting and anaerobic digestion, more competitive and help push materials away from landfills.

Other State Fees

Many states fund their solid waste and recycling programs with a variety of methods besides landfill fees. Table 11 shows a summary of the different type of fees, such as product and facility fees, used by states to fund programs.

Many of the fees used by states are funding mechanisms not utilized in California. CalRecycle's survey data showed that 21 states impose a permitting fee and 15 states collect an annual operating fee on solid waste and/or recycling facilities. Fourteen states used other funding mechanisms than the ones listed in Table 11, such as litter reduction fees, rental car taxes, property taxes, and other fees or taxes to fund their solid waste and recycling programs.

Table 11. Summary of funding mechanisms supporting solid waste and recycling programs. The type of funding mechanism is listed along with the number of states that use the type of mechanism. Data obtained by CalRecycle staff through Internet research, phone calls, and emails to states, 2014 and 2015.

Total States	Disposal Tax/ Surcharge	Tires	Used Oil	Beverage Container	E-Waste	Permit Fee	Annual Fee	Other Fee
50	30	34	7	6	10	21	15	14

In addition to general information on funding sources, the CalRecycle survey sought specific information related to the amount of funding each state receives from different funding mechanisms. Of the 50 states that were surveyed, 31 responded to this part of the survey, and data for five other states was obtained from the U.S. EPA 2013 State Measurement Template survey. The largest proportion of funding for these 36 states was from annual facility fees and permit fees (51 percent). Waste disposal and collection taxes/surcharges and product taxes accounted for the next largest proportion of funding (Figure 57).

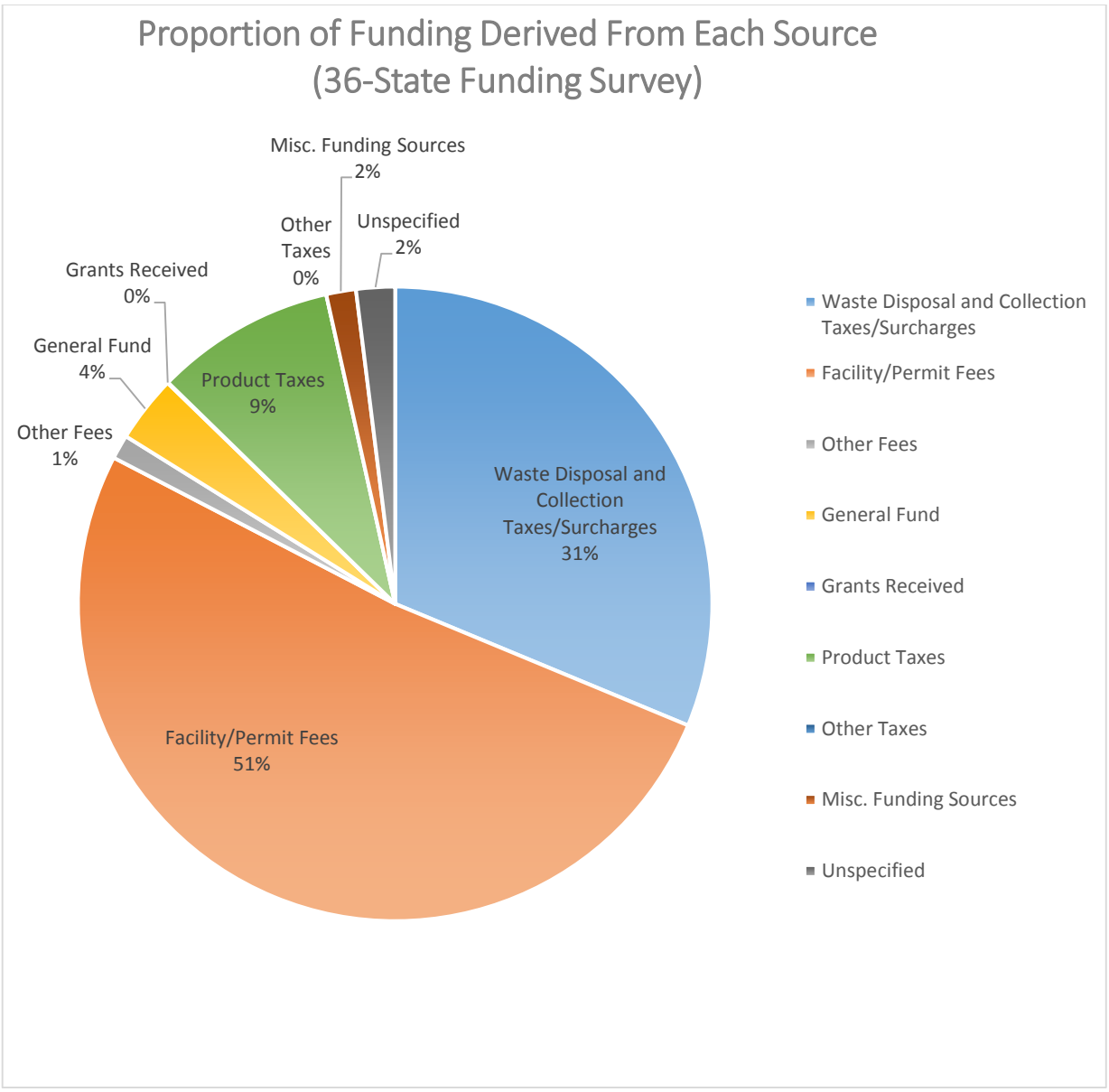

Figure 57. Proportion of all funding derived from each funding mechanism source. Chart showing the total funding percentage by category for the 36 states in the funding survey. The proportion received from each funding mechanism source is shown. For example, of the total funding for the 36 states, 51 percent was from facility/permit fees. "Grants received" and "Other Taxes" both accounted for 0 percent due to rounding. Data obtained by CalRecycle through a survey of 30 states plus California, 2015. Data for five additional states was obtained from U.S. EPA 2013 State Measurement Template, 2015.

The variations in funding mechanisms in other states are due partly to variations in responsibilities for a state. States with the primary responsibility for permitting, inspecting, and enforcement may use a variety of funding sources for their solid waste management and recycling programs. Other factors play a role, such as the size of the

state and state laws related to the disposal and recycling infrastructure. While fee types may vary, it is evident that facility/permit fees and taxes on waste disposal and collection are the main ways states fund solid waste programs, with more than 80 percent of all funding coming from these two sources.

How Does the IWMF Fee Fund California's Solid Waste Programs?

The majority of CalRecycle's activities, from local assistance to enforcement to implementing the state's policy goals, are funded through the Integrated Waste Management Fee, or tipping fee, charged on each ton of material disposed in a landfill. This fee was established by statute in 1989, and increased from $0.75 per/ton to $1.34 per ton in 1995. Aside from a small raise in 2002 to its statutorily mandated cap of $1.40 per ton, the fee has not been adjusted in nearly two decades.

Since the fee was established in 1989, the amount of waste that is annually diverted from landfills or counted as "beneficial reuse" at landfills has increased from 5 million tons to nearly 43 million tons, and the amount of material disposed at landfills has decreased from 45 million tons to 31 million tons. This has meant an overall decrease in the funding available through the IWMF and an increase in the size and complexity of the state's waste management infrastructure. Since 2006, there has been a 29 percent decrease in funding dollar for dollar, and this decrease is amplified by inflation.

In 2012, the state passed legislation setting an ambitious goal for increasing recycling and reducing the amount of material sent to landfills by 75 percent by 2020. As more of the state's post-consumer resources are recycled, the funding for CalRecycle's activities decreases, while the cost of regulating an increasingly diverse set of solid waste facilities increases.

As the state achieves these landmark waste reduction goals, funding in the IWMF is likely to decrease by an additional 30 to 50 percent from current levels (without accounting for inflation).

With this funding shortfall in the immediate future, CalRecycle must transition to a funding mechanism that will enable the Department to support the state's goals and sustainably fund its mandated role in solid waste management as disposal volumes decline across the state. In addition, achieving the state's goals will require significant additional investments in recycling markets and infrastructure.

In 2015, California Assemblyman Das Williams introduced AB 1063, which proposes an increase in the IWMA fee to cover the immediate funding challenges, along with the implementation of a charge on all waste generators in the state. This generator charge would help to fund recycling market development while stabilizing the finances of the Department, so as disposal declines, funding will continue to meet the state's needs in protecting human health and the environment. AB 1063 was held in the Environmental Quality Committee.

During this same period, CalRecycle has been pursuing options for sustainable funding to ensure human and environmental health are protected and the state's recycling goals are met. These include a series of workshops held in December 2015 to discuss mechanisms for achieving a sustainable funding source.

Data Collection and Limitations

The following section looks at data collection methods and limitations of the data for major sections in the report. Throughout the report, the most recent data was used, depending on the data type. Available data may differ due to reporting requirements for when data must be submitted to CalRecycle.

Disposal Data

- See the section “How Waste Is Tracked in the State” for an in-depth discussion of data collection and accuracy limitations for the Disposal Reporting System.

Waste Flow Data

- Misreporting of disposal allocation may affect jurisdiction disposal but should not have a great effect on the accuracy of county data.
- Disposal flow data for Puente Hills Landfill is based on one year of disposal data (2014), so more data will be needed to evaluate future disposal trends.

Disposal Composition and Disposal Sector Data

- Study data is usually collected by taking samples of waste from trucks at disposal facilities, sorting it into material types like newspaper and aluminum cans, and weighing each type.
- Studies estimate the quantity and composition of the commercial, residential, and self-hauled waste streams in California and aggregate the sector data to estimate the overall composition of the waste stream. Samples can also be taken directly from dumpsters at business sites and sorted to obtain detailed information on waste from the commercial sector.
- Study data is a snapshot that can become outdated and misleading over time due to demographic or economic changes, shifts in consumer behavior, changes in business or manufacturing processes, or other changes that affect the waste stream.
- CalRecycle will need to conduct another comprehensive statewide waste characterization study in 2020. An additional, smaller study in 2017 may be useful to identify changes in the waste stream.
- Facility cooperation, cost, and sampling methods and methodology are factors that affect studies. Please see the 2014 waste characterization study for a detailed discussion of these topics.
- Sector data from the 2014 waste characterization study may have had an anomaly in the study data due to a massive change in the residential/commercial percentages for facilities sampled in the Southern region. Please see that study for an in-depth discussion of the issue.
- The 2014 waste characterization study scrutinized the commercial sector by studying business disposal directly from dumpsters and recycling bins located at the

businesses. For an in-depth discussion on data collection, sampling methods, and data limitations, please see the 2014 commercial generator study.

Solid Waste Hauler Data

- CalRecycle collected data on solid waste haulers and their agreements with local governments by reviewing jurisdiction websites, solid waste hauler websites, and jurisdiction annual reports. With this information, CalRecycle updated its database in 2015.
- Hauler data may be inaccurate or incomplete due to out-of-date or incomplete data on hauler websites or agreements.

Transfer Stations and Material Recovery Facilities

- Transfer stations and MSW MRFs are required to report to subsequent disposal facilities on the jurisdictions of origin of the waste they send for disposal (CCR section 18809.6). CalRecycle estimates the maximum capacities of waste a transfer station or MRF is allowed to handle and the maximum amount of waste a facility can accept annually using permit data from SWIS and FacIT.
- CalRecycle tracks unpermitted MRFs in FacIT and records the maximum capacity for the facility and the maximum amounts of waste they can accept annually if the data is provided by the facility or is found from other sources such as facility websites.
- In 2015, CalRecycle requested disposal reports from permitted transfer stations and MRFs, but the majority of the reports were incomplete and/or inaccurate. In addition, only 60 percent of the reports for 2014 were submitted by the end of 2015.
- More information is needed to classify the types of MRFs in FacIT and SWIS—specifically, whether the facility processes mixed-waste loads or only processes clean recyclables.

Landfills

- Landfills are required to report on the total amount of waste disposed, the origin of the waste, and the total amount of material used for disposal-related activities including ADC, AIC, and other beneficial reuse. For an in-depth discussion of the issues and limitations of disposal data and the Disposal Reporting System, see the section titled “How Waste Is Tracked in the State.”

Landfill Capacity

- For an in-depth discussion on landfill capacity data collection methods and limitations please see the “Capacity” section in the 2015 “State of Disposal in California” report.

Disposal-Related Materials

- Landfills are required to report on the total amount of waste disposed and the total amount of materials used for disposal-related activities including ADC, AIC, and other beneficial reuse.
- ADC and other beneficial reuse tracking within DRS may be affected by overuse of ADC, misreporting, bad record-keeping, or mistakes in how facilities record disposal-related use of materials.
- Transformation facility operators are required to report the total tons of waste transformed by jurisdiction of origin. No recent reporting issues have been found for California's three transformation facilities.

Fee and Funding Mechanisms

- Please see the report "Landfill Tipping Fees in California" for more information on tipping fee data collection methods and limitations.
- Data for funding mechanisms in other states was gathered from a survey sent to all 50 states. Thirty states including California originally completed the survey. Data was updated when the survey was sent again in 2015, and one additional state completed the survey in 2015. CalRecycle obtained data for five other states (Alabama, Arkansas, Mississippi, North Carolina, and Ohio) using the U.S. EPA 2013 State Measurement Template.
- Fee data, especially negotiated rates, are considered to be proprietary data by many, so it is difficult to obtain this information. Revenue projections depend on many assumptions about future conditions.

Conclusions

CalRecycle tracks the amount of disposal statewide to monitor progress toward the AB 341 statewide 75 percent recycling goal. In 2014, disposal increased for the second straight year after five years of decline. In addition, disposal-related materials that count as disposal under AB 341 such as ADC, AIC, other beneficial reuse, and transformation continued to be used at a steady rate, at 6.6 million tons of use. While disposal has increased, statewide projections of landfill capacity show that even at the highest disposal rates, the state's landfills would last another 25 years.

Research on whether the economy drives disposal showed that indicators such as wages, real personal consumptive expenditures, and the unemployment rate may correlate with disposal change. Many economists predict that the economy will improve in the next three years, so it is unclear how an improving economy will affect disposal. The state's efforts in diverting materials from the landfill and reaching the 75 percent recycling goal should be the main driver of disposal change and not the improving economy.

The flow of waste in the state is dynamic, with a majority of counties sending some of their waste elsewhere before it is disposed. CalRecycle researched the impact the closing of the Puente Hills Landfill had on waste flow and found that waste that previously would have gone to the landfill flowed across borders to several counties in the region. The waste flow picture is incomplete because the state does not have data on the sources that generated the waste and how much waste flows through transfer stations.

CalRecycle's first waste characterization study in six years showed that similar to the last study in 2006, 40 percent of the disposed waste stream is made up of materials that could be composted or mulched, including food, and another 30 percent is made up of recyclable materials that could be recovered, such as paper, metal, and glass.

Tracking disposal through DRS is critical to determining whether the state meets its AB 939 and AB 341 diversion goals. In the last decade, the Disposal Reporting System has had many issues in the accuracy of the data and the timeliness in reporting. The adoption of AB 901 in 2015 may improve these problems by requiring facilities to report electronically, expanding the types of disposal facilities that report directly to CalRecycle, and adding enforcement penalties for facilities that submit data late, misreport, or falsely report data. CalRecycle will conduct workshops in 2016 to gather stakeholder feedback and develop regulations for AB 901.

CalRecycle has been pursuing options for sustainable funding to ensure human and environmental health are protected, and the state's recycling goals are met. Monitoring important factors in the disposal infrastructure including disposal change, waste composition, waste flow, landfill capacity, and the use of disposal-related materials will be important as the state strives to meet the 75 percent recycling goal.

Glossary of Terms

Alternative daily cover (ADC)/Alternative intermediate cover (AIC): The use of CalRecycle-approved materials (e.g. green waste) 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. Traditionally, earthen materials, such as soil, are used for cover. Alternative cover materials include tire shreds and low-grade wood chips.

Anaerobic digestion (AD): The process of biologically decomposing organic matter with little or no oxygen in a fully enclosed structure (in-vessel digestion) to produce biogas, liquid fertilizer, and compost.

Beneficial reuse: Beneficial reuse of solid wastes at a solid waste landfill shall include, but not be limited to, the following: alternative daily cover, alternative intermediate cover, final cover foundation layer, liner operations layer, leachate and landfill gas collection system, construction fill, road base, wet weather operations pads and access roads, and soil amendments for erosion control and landscaping.

Beneficiation: Glass beneficiation is the process of upgrading the value or utility of glass, typically by sorting, removing contaminants, and crushing so it can be used as an industrial feedstock for glass manufacturing facilities.

Biomass conversion: The process of using controlled combustion of specified types of organic materials (essentially wood, lawn, or crop residue) to produce electricity. Biomass conversion facilities are not permitted as solid waste facilities. See PRC section 40106 (a).

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.

Construction and demolition materials (C&D): Includes but is not limited to concrete, wood, and drywall, usually found as a mixed material. C&D materials are usually taken to a C&D processing facility for intermediate processing, such as sorting by material type and size reduction for construction fill or raw feedstock material.

Disposal facility or "facility" means any facility or location where disposal of solid waste occurs. Section 40121 of the PRC (Definitions)

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.

Facility Information Toolbox (FacIT): Informational database on disposal and recycling activities in the state of California. For more information go to: http://www.calrecycle.ca.gov/FacIT/

Food waste: All surplus food scraps. The term has fallen out of favor with some composters, who prefer to view this material as a resource rather than as waste material. However, this term is interchangeable with food scraps.

Green waste: A term used to refer to 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.

Household hazardous waste (HHW): Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients, other than used oil. HHW is not considered to be municipal solid waste material; non-recyclable household hazardous waste is sent to a specialized landfill and is not reported as disposal.

Inerts: A category of waste that includes concrete, asphalt, asphalt roofing, aggregate, brick, rubble, and soil. Construction and demolition and inert materials are usually taken to a C&D processing facility for intermediate processing such as sorting by material type and size reduction for sale for construction fill or raw feedstock material.

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

Material recovery facility (MRF): An intermediate processing facility that accepts source-separated recyclables from an initial collector and processes them for wholesale distribution. The recyclable material is accumulated for shipment to brokers or recycled content manufacturers, or for export out of state.

Municipal solid waste landfill means a discrete area of land or an excavation that receives household waste and that is not a land application unit, surface impoundment, injection well, or waste pile. See Title 40 of the Code of Federal Regulations (40 CFR), Part 258 (Subtitle D) Section 258.2-Definitions

Municipal solid waste (MSW): Garbage. 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: Using a waste material for a productive use, other than ADC/AIC, at a landfill within regulatory guidelines, such as for road base, erosion control, or cell wall construction.

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

Residue: Unusable waste byproducts remaining after recyclables are processed.

Self-hauler: A person who hauls their own residential or business waste to a solid waste facility.

Solid waste: All putrescible and nonputrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances; dewatered, treated, or chemically fixed sewage sludge that is not hazardous waste; manure, vegetable, or animal solid and semisolid wastes; and other discarded solid and semisolid wastes. See section 40191 of the PRC (Definitions)

Solid waste disposal: The final deposition of solid wastes onto land, into the atmosphere, or into the waters of the state. See section 40192 of the PRC (Definitions)

Solid Waste Information System (SWIS): The database that tracks solid waste facilities in California. For more information go to: http://www.calrecycle.ca.gov/SWFacilities/Directory/Default.htm

Tipping fee: The amount of money per ton of waste charged at the gate of a landfill for a self-hauler. It is publicly disclosed either online or by phone.

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. See PRC section 40201.

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

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