Appendices A-D

The Needed State of Collection, Processing, and End Markets Report

A Plastic Pollution Prevention and Packaging Producer Responsibility Act Needs Assessment Report

February 2026

Produced under contract number DRR24043.

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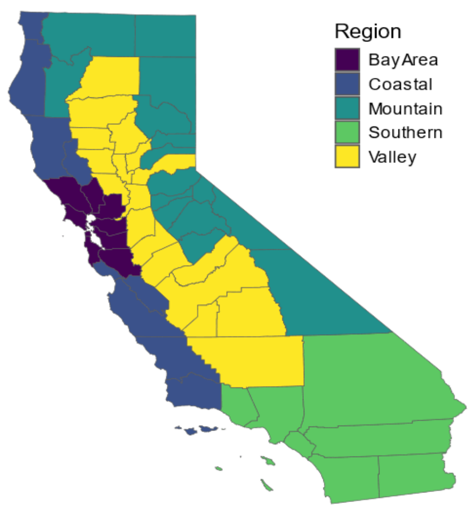
Appendix A: Detailed Methodology

The contractor utilized a combination of primary and secondary data as further described in the following sections.

1. Regional Stratification

Data presented in this report has been aggregated and analyzed by region. These regions—Bay Area, Coastal, Mountain, Southern, and Valley—are defined in CalRecycle's Statewide Waste Characterization Study and shown in Figure A-1.

Figure A-1: Regions



CalRecycle describes each of the regions as follows:

- **Bay Area:** Includes the counties in the San Francisco Bay Area, which are more metropolitan and are a strong industrial component of the economy.
- **Coastal:** Includes the counties on or near the coast that are not in either the Bay Area or Southern Regions. The Coastal Region is more populated than the rural Mountain Region and has a large agricultural component, similar to the Central Valley.
- **Mountain:** Includes counties that are primarily rural, with strong agricultural economies, low population density, and less industry.
- **Southern:** Includes counties that are strongly industrial with large populations and some agricultural influences.
- **Valley:** Includes counties between the Sierra Nevada Mountains and the Coast Range that have a major agricultural base, with important population centers and some manufacturing.

The full list of counties included in each region can be found on CalRecycle's website**:** https://www2.calrecycle.ca.gov/WasteCharacterization/Regions.

Table A-1 shows the total and percent population of each region in the state. This was calculated using the Department of Finance "E-5 Population and Housing Estimates" report[1]. Table A-2 shows the number of jurisdictions within each region, excluding regional agencies but not jurisdictions that are members of regional agencies.

Table A-1: Population of Each Region in California

Metric	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Population	7,656,691	1,813,274	597,801	22,100,945	7,360,390	39,529,101
Percent of State Population	19.4%	4.6%	1.5%	55.9%	18.6%	100%

Table A-2: Number of Jurisdictions per Region

Metric	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Cities and Counties	109	56	42	216	117	540
Special Districts	19	15	6	22	15	77
Total	128	71	48	238	132	617

2. Collection Programs for Covered Materials

The contractor performed the following analyses to evaluate the needed state of collection in future years to achieve the Act's requirements.

A. Access to Collection Programs

As demonstrated in the Current State of Collection Report, not all residential and commercial generators are currently receiving or participating in onsite curbside collection of materials collected for recycling or organics recycling. The contractor calculated the additional cost of providing service to currently nonparticipating generators based on: (i) the current cost per ton for participating generators; and (ii) the additional material that would be collected from the currently nonparticipating generators once they participate in or receive onsite curbside collection.

To calculate the annual tons collected per participating generator, the contractor used the 2024 annual tons of collected material for residential and commercial generators from the Current State of Collection Report (Table 5-2) and divided the respective tons

[1] State of California, Department of Finance. "E-5 Population and Housing Estimates for Cities, Counties, and the State." *dof.ca.gov/Forecasting/Demographics/Estimates*, May 2022.

by the number of participating households and participating commercial generators in 2024. The number of participating household and commercial generators in 2024 was calculated by subtracting the number of nonparticipating households and nonparticipating commercial generators from the total number of households and total number of generators in California respectively as found in Table 3-7 and Table 3-8 in the Current State of Collection Report. Refer to Table A-3 for a summary of each region's residential and commercial collected tons (including both covered and noncovered material) per currently participating generator for materials collected for recycling and organics recycling. Table A-4 summarizes the information from the Current State of Collection Report on the number of households and commercial generators not participating in onsite curbside collection in 2024.

Table A-3: Estimated Annual Tons Covered and Noncovered Material Collected per Currently Participating Generator (2024)

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley
Residential: Materials Collected for Recycling	0.30	0.23	0.18	0.33	0.20
Residential: Materials Collected for Organics Recycling	0.39	0.36	0.21	0.33	0.41
Commercial: Materials Collected for Recycling	11.17	10.07	27.28	11.72	12.90
Commercial: Materials Collected for Organics Recycling	17.50	26.89	26.36	14.11	66.96

Table A-4: Estimated Number of Generators Not Currently Participating in Onsite Curbside Collection (2024)

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Residential: Materials Collected for Recycling	14,577	4,461	3,060	137,836	15,174	175,108
Residential: Materials Collected for Organics Recycling	47,895	40,708	30,361	308,752	156,078	583,794
Commercial: Materials Collected for Recycling	6,688	3,133	1,302	47,051	22,538	80,712
Commercial: Materials Collected for Organics Recycling	21,759	11,482	1,205	96,038	54,631	185,115

The contractor then multiplied the annual tons collected per generator from Table A-3 by the number of generators currently not participating from Table A-4 to estimate the additional tonnage of both covered and noncovered material that may be included in onsite curbside collection of materials collected for recycling and organics recycling if expanded to nonparticipating generators. This calculation assumes that new generators who participate in onsite curbside collection for these materials will participate at the same level as those currently participating within their region. Table A-5 summarizes the estimated additional tonnage of material collected for recycling and organics recycling from these generators.

Table A-5: Estimated Tonnage of Covered and Noncovered Material Added to Collection Streams due to Participation of Currently Nonparticipating Generators (2024)

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Residential: Materials Collected for Recycling	4,373	1,026	551	45,486	3,035	54,471
Residential: Materials Collected for Organics Recycling	18,679	14,655	6,376	101,888	63,992	205,590
Commercial: Materials Collected for Recycling	74,705	31,549	35,519	551,438	290,740	983,951
Commercial: Materials Collected for Organics Recycling	380,783	308,751	31,764	1,355,096	3,658,092	5,734,486

Table A-6 restates the calculated cost per ton of material collected for recycling and organics recycling as determined in the Current State of Collection Report, Table 5-1, for reference. The contractor multiplied the additional tonnage added to each collection stream from Table A-5 by the corresponding cost per ton by region and material stream from Table A-6 to estimate the incremental cost of providing onsite curbside collection to nonparticipating generators by material stream. This is presented by region in Table A-7.

Table A-6: Current State of Collection Cost per Ton of Material Collected

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley
Materials Collected for Recycling	$645	$720	$655	$587	$708
Materials Collected for Organics Recycling	$199	$223	$202	$181	$219

Table A-7: Estimated Incremental Cost of Onsite Curbside Collection for both Covered and Noncovered Material from Expansion to Currently Nonparticipating Generators (2024)

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Residential Materials Collected for Recycling	$2,820,585	$738,720	$360,905	$26,700,282	$2,148,780	$32,769,272
Residential Materials Collected for Organics Recycling	$3,717,121	$3,268,065	$1,287,952	$18,441,728	$14,014,248	$40,729,114
Commercial Materials Collected for Recycling	$48,184,725	$22,715,280	$23,264,945	$323,694,106	$205,843,920	$623,702,976
Commercial Materials Collected for Organics Recycling	$75,775,817	$68,851,473	$6,416,328	$245,272,376	$801,122,148	$1,197,438,142
Total Incremental Change in Collection Costs	$130,498,248	$95,573,538	$31,330,130	$614,108,492	$1,023,129,096	$1,894,639,504

B. Current Collection of Plastic Covered Materials

To calculate the 2024 tons of plastic covered materials collected in the materials collected for recycling stream, the contractor used the Current State of Collection report Appendix C. Table A-8 summarizes the estimated amount of covered material and plastic covered material, by CMC collection group, collected in onsite curbside collection and sent directly to end markets in 2024. The second column provides an estimate of tons collected by CMC collection group while the third column provides the estimate for the tons of that collection group with a plastic component (i.e., plastic covered material). The fourth column is the estimated tons of plastic covered material collected in the recycling stream and sent directly to end markets, and the fifth column is the percentage of plastic covered material collected that was collected in the materials collected for recycling stream.

Table A-8: 2024 Plastic CMC Tons Collected in Onsite Curbside Collection and Directly Sent to End Markets

CMC Collection Group	CMC Tons Collected	Plastic CMC Tons Collected	Plastic CMC Tons Collected in Materials Collected for Recycling Stream	Percent of Plastic CMC Tons Collected from the Recycling Stream
Glass	255,092	127,546	59,591	47%
Ceramic	4,460	2,230	0	0%
Aluminum	148,409	81,974	5,116	6%
Tin/Steel/Bimetal	252,923	144,729	37,477	26%
Other Nonferrous	63,666	31,833	24,910	78%
Other Ferrous	174,134	87,067	67,736	78%
Other Metal	10,866	5,433	0	0%
Mixed Paper	3,017,646	1,614,301	712,471	44%
Paperboard	488,163	195,322	0	0%
Waxed OCC	246,208	123,104	76,815	62%
OCC	7,734,751	2,359,207	1,478,488	63%
Aseptic Cartons	67,452	67,452	16,193	24%
Gable top Cartons	98,732	98,732	25,747	26%
Plastic #1 - PET Rigid	339,768	339,768	53,306	16%
Plastic #2 - HDPE Rigid	305,948	305,948	134,853	44%
Plastic #3 - PVC Rigid	13,367	13,367	0	0%

CMC Collection Group	CMC Tons Collected	Plastic CMC Tons Collected	Plastic CMC Tons Collected in Materials Collected for Recycling Stream	Percent of Plastic CMC Tons Collected from the Recycling Stream
Plastic # 4 - LDPE Rigid	22,600	22,600	0	0%
Plastic #5 - PP Rigid	250,847	250,847	38,434	15%
Plastic #6 - PS Rigid	81,980	81,980	0	0%
Plastic #7 - Other Rigid Designed for Compostability	29,896	29,896	7,340	25%
Other Mixed Plastics	240,044	240,044	66,954	28%
Other Multi-Material Laminate	58,188	58,188	0	0%
Flexible and Film Plastic	1,183,629	1,183,629	138,152	12%
Flexible and Film Plastic Designed for Compostability	180,242	180,242	86,753	48%
Plastic Pouches and Envelopes	47,255	47,255	0	0%
Plastic #6 - Expanded or Foamed Plastic, Rigid	8,758	8,758	0	0%
Plastic #6 - Other Expanded or Foamed Plastic	3,737	3,737	0	0%
Wood - Untreated	752,614	376,307	22,135	6%
Wood - Treated	70,026	35,013	0	0%
Textiles	5,120	2,560	0	0%
Other Mixed Organic	12,160	6,080	0	0%
Total	**16,168,681**	**8,125,149**	**3,052,471**	**38%**

C. Alternative Collection Programs

To identify costs and expansion considerations for alternative collection programs, the contractor used a combination of data collected from program websites, related reports and articles, and data received directly from alternative collection operators in response to a request for information (RFI) from the contractor. RFI responses were received as part of the research efforts conducted to develop the Current State of Collection report. Responses from the following industry representatives were received:

- Goodwill Industries International.
- Ridwell.
- TerraCycle.
- California Product Stewardship Council.
- National Stewardship Action Council.

To identify the type of alternative collection program that accepts the most types of covered materials, the contractor reviewed program websites and identified the types of accepted materials. TerraCycle's mail-back program included the highest number of covered materials accepted in their program.

The contractor estimated the proportion of covered material collected via alternative collection programs in the total covered material sent to landfill in 2024 (as identified in the Current State of Collection Report). While the contractor was able to gather some data on several of the largest alternative collection operators, there may be smaller operations that were not identified as part of the contractor's research. Additionally, not all materials collected by the identified programs are covered materials and detailed data was not available on the breakdown of covered and noncovered materials collected. For these reasons, the percentage of covered materials collected via each alternative collection program type is expected to be an overestimate of the actual amount of covered material collected through these programs.

D. Improving Participation in Collection Programs

1. Establishing Convenient Access

To understand the extent to which convenience plays a role in the success of collection programs, responses from the Community Recycling and Composting Survey were reviewed as well as notes from listening sessions conducted for CBOs, EJ groups, and Tribes. Questions from the Community Recycling and Composting Survey that focused on the most common places where respondents recycle and compost (at home, at school or work, or in public) and the most significant b were evaluated. To identify any differences between responses from CBOs and EJ groups compared to Tribal responses, the two sets of responses were analyzed separately. Collection Survey responses were used to identify which generators local jurisdictions feel are the most challenging to provide onsite curbside collection access. Potential access solutions requiring the smallest changes in generator behavior were explored to reduce the inconvenience of utilizing new or expanded programs.

2. Effective Education

To understand what resources are required to implement effective educational programs across the state, the contractor evaluated example programs at both the statewide and local levels. The contractor focused on educational approaches that reduce generator confusion and enhance motivation through effective messaging and tools. The contractor evaluated several well-resourced public education and outreach (PE&O) programs in the state to understand funding levels to implement robust educational programming to improve participation in collection programs and reduce contamination. The contractor also evaluated case studies of programs with demonstrated success to understand how or if these programs could be scaled statewide. It is expected that local jurisdictions with minimal PE&O funding will require substantial initial investments and additional resources will be needed to expand all programs across the state.

Statewide Initiatives and Campaigns

The contractor reviewed research regarding various methods of statewide engagement. Specifically, research review focused on the use of web and mobile applications, statewide marketing campaigns, and product labeling. For methods of statewide engagement using web and mobile applications two main sources were used: the Recycling Partnership's 2019 "West Coast Contamination Initiative Research Report"[2] and "Time spent on separating waste is never wasted: Fostering people's recycling behavior through the use of a mobile application."[3]

The contractor reviewed data collected from CalRecycle's "iRecycle Smart" campaign to estimate how much of the statewide campaign budget was used for website development. From the contract proposal for the development and implementation of the "iRecycle Smart" campaign, the project costs were estimated to be $22,050 over two years for project oversight and about $170,000 over two years for a website[4].

To understand the effectiveness of statewide marketing campaigns and their relative cost to implement, the contractor reviewed data from two marketing campaigns implemented by the Ad Council and CalRecycle. The Ad Council is a 501(c)3 non-profit that works extensively with state and federal government agencies to create far reaching public service announcement campaigns. While these campaigns are

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[2] Tanimoto, Asami, et al. "2019 West Coast Contamination Initiative Research Report." Apr. 2020.

[3] de Wildt, Kelly K., and Marijn H. C. Meijers. "Time Spent on Separating Waste Is Never Wasted: Fostering People's Recycling Behavior through the Use of a Mobile Application." *Computers in Human Behavior*, vol. 139, 26 Oct. 2022. *ScienceDirect*. Accessed Nov. 2025.

[4] Department of Resources Recycling and Recovery. State of California - Department of General Services Standard Agreement (SCO ID: 3970-DRR23049). 1 Feb. 2024.

nationwide, California is the most populous state with nearly an 8% market share in Neilsen's designated market area rankings.[5] The contractor assumed that the Ad Council campaign budgets were a reasonable proxy for how much investment would be needed to produce large scale mission-driven campaigns in California.

The contractor specifically reviewed financial data and success metrics for the Ad Council's 2016 "Save the Food" campaign to analyze how effective large-scale campaigns might be at increasing participation in collection programs. A presentation from November 30, 2016 by Natural Resources Defense Council, who partnered with the Ad Council to implement the campaign, and a Sustainable Brands digital article from 2017 were the primary sources for information related to this campaign.[6] Much of the Ad Council's budget is discussed as in-kind donations by advertising, digital and social agencies (who donate their creative talents and energy), the media (who contribute space and time), and donors (who provide crucial operating support).[7] The contractor used the ratio of media distribution costs to campaign development and production for the CalRecycle campaign (approximately 60% of total budget on media distribution) to estimate the total costs required to research, develop, produce, and evaluate the Ad Council campaign.

The contractor additionally reviewed CalRecycle's "iRecycle Smart" campaign aimed at increasing awareness on waste reduction, recycling, and composting. A cost analysis of the campaign was reviewed to identify the overall budget of implementing the campaign, the media distribution budget, and performance metrics. The dollar amount spent on media distribution was divided by the total campaign cost to identify the portion of campaign costs associated with media distribution. This ratio was used to determine the approximate, minimum, total cost for the Ad Council's "Save the Food" campaign.

The discussion of product labeling included research from two main sources including a National Academies of Sciences report on "Municipal Solid Waste Recycling in the United States"[8] and an MIT, Science Policy Review article, "Individual, corporate, and national wishcycling: Improving recycling in the U.S. by understanding its complexity."[9] Additionally, the contractor reviewed websites for two established product labeling programs, including the U.S. "How2Recycle" label and Germany's "Green Dot" program,

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[5] The Nielsen Company. "Need to Know: What Is a Designated Market Area® (DMA), and Why Does It Matter?" *The Nielsen Company*, Mar. 2025. Accessed Nov. 2025.

[6] NRDC. "Save the Food." 30 Nov. 2016.

[7] "Advertising Council Inc — Non Profit Data." *Non Profit Light*, Internal Revenue Service (IRS). Accessed Nov. 2025.

[8] National Academies of Sciences, Engineering, and Medicine, et al. Municipal Solid Waste Recycling in the United States: Analysis of Current and Alternate Approaches. National Academies Press EBooks, 18 June 2025.

[9] Kramer, Eli, and Erez Yoeli. "Individual, Corporate, and National Wishcycling: Improving Recycling in the U.S. By Understanding Its Complexity." *MIT Science Policy Review*, vol. 4, 31 Aug. 2023, pp. 41–48.

to gather information on the features and participation rates of each program. Specific costs for implementing and running these programs were not readily available on the program websites or through internet research.

Local Education Initiatives

The contractor utilized findings from Table 6-2 of the Current State of Collection Report describing the total estimated staffing costs for contamination reduction initiatives to establish an estimate of total statewide cost for implementing PE&O initiatives at the local level for all discarded materials. To support the use of this estimate as a proxy for the statewide costs, the contractor compared the total estimated staffing costs to implement contamination reduction initiatives found in the Current State of Collection report to the estimated staffing costs to implement technical assistance programs. Data for both analyses were gathered via responses to the Collection Survey.

For the 94 local jurisdictions that responded to the Collection Survey regarding the number of technical assistance staff employed for discarded materials-related education, the contractor calculated the number of staff per capita by dividing the total number of staff in each local jurisdiction by the total population for that same local jurisdiction. The contractor then calculated the mean of this per capita result across all responding local jurisdictions in the region to get an estimated per capita staffing level by region. The contractor multiplied the mean FTE per capita for each region by the total population of that region to estimate the total number of employees for technical assistance in each region. To estimate the cost of this labor, the contractor used fully loaded salary (salary plus benefits) data from Transparent California, an online database of public pay and pensions. Salaries were downloaded from 2020 to 2024 for the following job titles across the state: Recycling Specialist, Recycling Coordinator, Zero Waste Specialist, and Zero Waste Coordinator. This search resulted in a representative sample of jobs from all regions other than the Mountain region. In total, salaries were included from six local jurisdictions in the Bay Area, six in the Coastal region, ten in the Southern region, and seven in the Valley region. As this result did not identify any job positions in the Mountain region, a further search was done in the County of El Dorado, the County representing the largest population in the Mountain region. The job title, “Haz Mat/Recycling Specialist” was used to determine the estimated salary range for staff conducting technical assistance. The contractor then calculated the mean of the fully loaded annual salaries for all identified staff in each local jurisdiction. Salaries included from years prior to 2024, were adjusted to reflect 2024 dollars. Finally, the mean salary across local jurisdictions within a region was averaged to provide the estimated cost of one FTE in each region. The contractor then multiplied the region-wide mean annual salary by the total staffing level in each region to estimate the total labor cost of conducting technical assistance in the state. Table A-9 shows the estimated staffing levels and associated costs for technical assistance staff across the state.

Table A-9: Estimated Full Time Equivalent Staffing Levels for Technical Assistance

Description	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Estimated FTEs per Region	1,017.5	155.7	43.0	2,460.7	649.4	4,326.3
Estimated Regional Salary ($)	157,104	119,614	139,722	136,228	105,877	N/A
Estimated Cost for all FTEs ($)	159,847,667	18,624,087	6,012,515	335,215,093	68,760,812	588,460,174

As described in Section 2.2.6.2.2, the contractor assumed the staff identified by local jurisdictions for conducting contamination monitoring initiatives were the same staff as those conducting technical assistance and that the total statewide budget for discarded material related education and outreach was therefore not a sum of the two estimates but rather somewhere between the two.

To estimate the cost per generator for conducting education and outreach related to all discarded materials in the state, the total estimated statewide budget as described in Section 2.2.6.2.2 of this report ($532,000,000) was divided by the total number of occupied households in the state (10,556,579) and commercial businesses including multi-family properties of five units or more in the state (464,392), as identified in the Current State of Collection Report. As indicated in Section 2.2.6.2.2, the current estimated cost per generator is assumed to be an overestimation of the actual cost to educate generators on information directly relevant to the capture of covered materials given that these estimates capture the costs related to both covered and noncovered material.

To understand what an appropriate funding level for local jurisdictions PE&O programs in the state might be, the contractor conducted an analysis of 11 local jurisdictions with well-resourced PE&O programs, that have been established for a minimum of five years. The contractor identified well-resourced local jurisdictions based on the type of programs they offered and the number of staff they had available for conducting PE&O initiatives. The contractor began the analysis by selecting several local jurisdictions that currently implement PE&O activities that are considered best practices for educating the public on environmental initiatives. Examples of these best practices include:

- Site visits to single-family homes, multi-family properties, and commercial businesses to conduct audits, provide trainings, and offer tailored recommendations for improving participation. These site visits are often considered part of a “technical assistance” program.
- Resources and support offered in multiple languages.

- Printed resources mailed directly to homes and businesses at regular intervals throughout the year.
- School programs that provide student trainings and presentations, and technical assistance to school staff and administrators.
- Distribution of physical resources to support proper recycling such as indoor collection containers, container signage, or monitoring technology.
- Publicly available toolkits for promoting proper recycling strategies.
- Attendance at special events to engage directly with the public and/or hosting events to promote recycling and reuse such as fix-it clinics or clothing swaps.
- Enforcement programs that include consistent monitoring and enforcement actions.
- Ongoing evaluation of collection programs to track progress.

The following local jurisdictions were identified based on the contractor's historical knowledge of where the types of activities described above are implemented within the state:

- City of San Leandro.
- City of Carlsbad.
- StopWaste in Alameda County.
- Monterey Regional Waste Management District (MRWMD).
- The Town of Truckee.

Additional jurisdictions were identified based on Collection Survey responses to questions asking how much local jurisdictions spend annually on education and outreach programs and how many staff were dedicated to implementing these programs. The contractor primarily selected Joint Power Authorities (JPAs) as they operate across larger regional areas. However, some well-resourced cities were also identified. Of the 47 Collection Survey respondents who provided an estimate of their annual PE&O budget, the following JPAs were all within the top 15 of local jurisdictions who spent the most per capita:

- Central Contra Costa Solid Waste Authority (CCCSWA, also known as RecycleSmart).
- West Valley Solid Waste Management Authority.
- San Luis Obispo County Integrated Waste Management Authority (SLOIWMA).

The South Bayside Waste Management Authority (SBWMA, also known as ReThink Waste) did not respond to the Collection Survey. However, seven out of the top 12 local jurisdictions with the highest ratio of education and outreach staff per capita were in San

Mateo County, where SBWMA operates. Therefore, SBWMA was identified as a well-resourced local jurisdiction. The City of Long Beach was also chosen as part of this analysis as it reported the fourth highest annual spend per capita on PE&O for cities over 100,000 people and also contains populations within disadvantaged communities as identified by the SB 535 Disadvantaged Communities Map.[10] The City of Davis had the highest per capita spend of all responding local jurisdictions from the Valley region and was also included in this analysis to provide regional representation.

For each of these local jurisdictions the annual budget, number of staff, and staffing costs for PE&O programs related to discarded materials were determined, utilizing the sources included in Table A-10. Cost and staffing estimates provided by the local jurisdiction and their recycling service provider were added to estimate the total annual budget, staffing levels, and staffing costs dedicated to PE&O within the local jurisdiction.

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[10] "State of California Office of Environmental Health Hazard Assessment." *SB 535 List of Disadvantaged Communities Geodatabase,* 2024. Accessed Dec. 2025.

Table A-10: Data Sources Used to Accquire Local Jurisdiction Annual Budget Information and Staffing Levels for PE&O Programs

Local Jurisdiction	Data Source for the Annual Budget	Data Source for Number of FTE	Data Source for Cost of FTE
Truckee	Adopted fiscal year 2025-2026 operating budget and the city's franchise agreement for the collection and processing of discarded materials commencing in June 2018.	Adopted fiscal year 2025-2026 operating budget and the city's franchise agreement for the collection and processing of discarded materials commencing in June 2018.	The city's franchise agreement for the collection and processing of discarded materials commencing in June 2018 and Current State of Collection Report's Table 6-2, Estimated Staffing Costs for Contamination Reduction Initiatives by Region.
Carlsbad	Adopted fiscal year 2025-2026 operating budget and the city's franchise agreement for recycling, organics, and solid waste collection and recycling, organics, and C&D processing services commencing in April 2021.	Adopted fiscal year 2025-2026 operating budget and the city's franchise agreement for recycling, organics, and solid waste collection and recycling, organics, and C&D processing services commencing in April 2021.	Adopted fiscal year 2025-2026 operating budget and Current State of Collection Report's Table 6-2, Estimated Staffing Costs for Contamination Reduction Initiatives by Region.
City of Davis	Collection Survey response from the local jurisdiction.	Collection Survey response from the local jurisdiction.	Current State of Collection Report's Table 6-2, Estimated Staffing Costs for Contamination Reduction Initiatives by Region.
San Leandro	The city's franchise agreement for recyclables, organics, and solid waste collection services commencing February 2025 and the adopted biennial fiscal year 2023-24 and 2024-25 budget.	The city's franchise agreement for recyclables, organics, and solid waste collection services commencing February 2025 and estimates provided via phone call from City staff.	Current State of Collection Report's Table 6-2, Estimated Staffing Costs for Contamination Reduction Initiatives by Region.

Local Jurisdiction	Data Source for the Annual Budget	Data Source for Number of FTE	Data Source for Cost of FTE
CCCSWA	Adopted fiscal year 2025-2026 operating budget and the franchise agreement for collection services commencing July 2025.	Adopted fiscal year 2025-2026 operating budget and the franchise agreement for collection services from July 2025.	Adopted fiscal year 2025-2026 operating budget and Current State of Collection Report’s Table 6-2, Estimated Staffing Costs for Contamination Reduction Initiatives by Region.
West Valley	The actual 2024-2025 operating budget and the franchise agreement for Organic Materials, Recyclable Materials, and Solid Waste Collection Services and Organics Materials and Recyclable Materials Processing commencing April 2024.	Budgeted consultant hours for WVSWMA staff activities and the franchise agreement for Organic Materials, Recyclable Materials, and Solid Waste Collection Services and Organics Materials and Recyclable Materials Processing commencing April 2024.	The franchise agreement for Organic Materials, Recyclable Materials, and Solid Waste Collection Services and Organics Materials and Recyclable Materials Processing commencing April 2024 and Current State of Collection Report’s Table 6-2, Estimated Staffing Costs for Contamination Reduction Initiatives by Region.
Long Beach	Collection Survey response from the local jurisdiction.	Collection Survey response from the local jurisdiction.	Current State of Collection Report’s Table 6-2, Estimated Staffing Costs for Contamination Reduction Initiatives by Region.
MRWMD	Adopted fiscal year 2025-2026 budget.	Adopted fiscal year 2025-2026 budget.	Current State of Collection Report’s Table 6-2, Estimated Staffing Costs for Contamination Reduction Initiatives by Region.
SBWMA	The 2024 annual report.	The 2024 annual report and the local jurisdiction’s website.	The 2024 annual report.
StopWaste	Adopted 2026 annual budget.	Adopted 2026 annual budget.	Adopted 2026 annual budget.
SLOIWMA	Adopted fiscal year 2025-2026 operating budget.	Adopted fiscal year 2025-2026 operating budget.	Adopted fiscal year 2025-2026 operating budget.

The January 1, 2025, California Department of Finance "E-5 Population and Housing Estimates" Report[11] was used to generate occupied household estimates for each of the 11 local jurisdictions. To estimate the total number of commercial businesses in each local jurisdiction, data from 2023 EAR were used that reported the number of commercial generators subject to AB 1826. These counts include multi-family properties of five or more units. For JPAs, the sum of occupied households or commercial businesses within each member city or county were included. Special districts were not included in the occupied household or commercial business estimates for any of the selected JPAs as many special districts include portions of member cities or counties and would therefore result in a double counting of households and commercial businesses.

To estimate a statewide funding level, the total estimated PE&O budget for each of the 11 local jurisdictions was divided by total occupied households of those local jurisdiction to determine a per household cost for implementing education programs within each selected local jurisdiction. The Current State of Collection Report found that direct on-site technical assistance was more commonly provided to commercial and multi-family generators. Therefore, it was assumed that the majority of staffing costs could be attributed to supporting commercial properties, including multi-family buildings. As such, the total staffing costs were divided by the total number of commercial properties to determine the cost of educational outreach per property. The total number of commercial properties was divided by the total number of FTEs to determine the number of properties per FTE within each selected local jurisdiction.

This provided an estimated minimum per household and per commercial property cost for well-resourced local jurisdictions. In the Collection Survey, local jurisdictions did not break out staffing costs from the total public education and outreach costs reported. For this reason, the contractor additionally estimated the total education and outreach cost per generator from both Collection Survey responses and the identified, well-resourced, local jurisdictions to offer a comparison. To estimate the per generator cost in the identified, well-resourced local jurisdictions, the contractor added the total public and education budget and staffing budget and then divided this total by the number of households and commercial properties. To estimate the cost per generator in local jurisdictions that responded to the Collection Survey, the total reported education and outreach budget was divided by the total number of households and total number of commercial properties as determined via the January 1, 2025 California Department of Finance "E-5 Population and Housing Estimates" Report and the 2023 EAR. For Collection Survey respondents, the contractor also divided the reported number of technical assistance staff in each local jurisdiction by that local jurisdiction's total population to calculate the estimated FTE per population. As further discussed in Section 2.2.6.2.2, data on the PE&O budgets for all local jurisdictions across the state was unavailable. Therefore, the contractor was unable to estimate how much budgets may need to increase in each local jurisdiction.

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[11] State of California, Department of Finance. "E-5 Population and Housing Estimates for Cities, Counties, and the State." *Ca.gov*, May 2022.

Evaluating the impact of education and outreach on collection of covered materials

To estimate how much specific education and outreach activities could improve the collection of covered materials, the contractor utilized two approaches. The first was to identify the estimated rate at which the collection of material in the containers for recycling and organics recycling increases each year in local jurisdictions with robust PE&O programs. Second, the contractor evaluated case studies with demonstrated success in improving participation in collection programs.

To estimate the former of these two methods, the contractor identified three local jurisdictions utilized in the aforementioned analysis of well-resourced PE&O programs for which diversion data was readily available. Diversion is defined as a percentage, calculated by dividing the total tonnage of material collected in the material streams for recycling and organics recycling by the total tonnage of material collected in these collection streams and the stream collected for landfill. A higher diversion percentage represents that more material is collected in the containers for recycling and organics recycling than in the containers for landfill disposal. Diversion percentages do not adjust for materials that is collected in the material streams for recycling but is ultimately not captured for recycling at a recycling processing facility. This analysis does not consider the actual collection rates of covered materials because they were not available due to the limitations in how material characterizations are conducted, specifically that none of the waste characterizations reports received from local jurisdictions documented the collection of material at the CMC level.

While diversion percentages may not represent an accurate picture of the total amount of covered material collected for recycling, it does represent how much material transitions from containers used for the collection of landfill materials to containers used for the collection of materials for recycling and organics recycling and may therefore serve as a reasonable proxy to estimate how collection of covered material may increase over time.

The following local jurisdiction diversion rates were used: the South Bayside Waste Management Authority (SBWMA), West Valley Solid Waste Management Authority (WVSWMA), and the Monterey Regional Waste Management District (MRWMD). For the MRWMD diversion rates for each member city along with their populations were used to calculate a weighted average for the entire waste management district. Diversion rates were gathered from the following sources:

- SBWMA: Recology San Mateo's annual reports to the SBWMA from 2024[12] and 2022,[13] and the quarterly report for the fourth quarter of 2023.[14]

[12] Recology ("Annual Report to the SBWMA for Year 2024")

[13] Recology. "Annual Report to the SBWMA for Year 2022." 14 Feb. 2023.

[14] Recology ("Quarterly Report to the SBWMA for 4th Quarter 2023")

- WVSWMA: HF&H multi-jurisdiction reporting database[15]
- MRWMD: HF&H multi-jurisdiction reporting database[16]

Diversion rates reported for years 2022 to 2024 are noted in Table A-11 and Table A-12:

Table A-11: Diversion Percentages for SBWMA and WVSWMA from 2022-2024

Local Jurisdiction	2022	2023	2024	Percentage Point Change from 2022-2024
SBWMA	50.66%	51.39%	51.02%	0.36
WVSWMA	48.1%	52.1%	53.1%	5

Table A-12: Diversion Percentages for the Monterey Regional Waste Management District's Member Cities from 2022-2024

Member Agency	Population	2022	2023	2024	Percentage Point Change from 2022-2024
Carmel-by-the-Sea	3,049	58%	62%	60%	2
Del Rey Oaks	1,546	43%	46%	50%	7
Marina	23,086	40%	39%	40%	0
Pacific Grove	27,273	48%	51%	50%	2
Sand City	373	35%	31%	40%	5
Seaside	32,019	37%	36%	37%	0
Pebble Beach	4500	62%	64%	64%	2
Weighted Average	**N/A**	**43.04%**	**43.59%**	**43.93%**	**0.9**

Populations for all MRWMD member agencies except for Pebble Beach were taken from the January 1, 2025 California Department of Finance "E-5 Population and Housing Estimates" Report. The population estimate for Pebble Beach was identified utilizing the contractor's Multi-Jurisdictional Reporting Database.

Community-Based Social Marketing and Implementation of Pilot Programs

In addition to the case studies described in the next subsection, multiple research papers, reports, and books were reviewed to determine the most effective tools and

[15] HF&H Consultants, LLC. Multi-Jurisdictional Reporting Database. HF&H Consultants Intranet. Accessed August 15, 2025.

[16] HF&H Consultants, LLC. Multi-Jurisdictional Reporting Database. HF&H Consultants Intranet. Accessed August 15, 2025.

methods for implementing behavior change campaigns. In particular, the contractor used these sources to identify how pilot programs can be utilized to develop effective PE&O programs by testing various strategies and the cost considerations for implementing such programs. Reports detailing the implementation process and results of the following pilot programs were also reviewed to provide concrete considerations for how to effectively implement pilot programs.

- The Northern Cook County, Illinois Curbside Recycling Cart Tagging Pilot Program:[17]
- The Anti-Contamination Project from Spokane, Washington.[18]

Case Studies of Successful Local Education Initiatives

The contractor identified the following case studies with demonstrated success in increasing generator participation in collection programs and evaluated the types of activities implemented, their associated costs, and success metrics.

REYNOLDSBURG, OHIO

Program Summary: In Reynoldsburg, Ohio, a pilot study utilized cart tags and mailers to test three different messages to increase participation in onsite curbside collection programs for single-family residents[19]. Participation was measured by the weight of material collected. Cart tags and mailers used three different message types:

- A message that empathized with confused recyclers (empathetic message).
- A message that encouraged residents to think about where their waste was going (emotional message).
- A message that explained what happened to recyclable materials after collection (logical message).

Approximate Cost per Unit: $5.37 per household. This cost was determined by dividing the total reported cost of printed materials and labor to conduct the study over four weeks, by the number of households who participated.

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[17] Solid Waste Agency of Northern Cook County (SWANCC). “Curbside Recycling Cart-Tagging Pilot Program.” July 2022.

[18] Chapman, Lindsay, and Gina Claeys. “Anti-Contamination Project -Final Report Community Name: Spokane County and City of Spokane Additional Partners: Waste Management and Sunshine Disposal and Recycling.” 9 Dec. 2020.

[19] The Recycling Partnership. “Reynoldsburg, Ohio Pilot Project Report: Increasing Recycling by Utilizing Cart Tags and Mailers with Motivational Messages, How Messaging and Methods Can Affect Recycling Behavior.” 2022.

Sunnyvale, CA

Program Summary: A pilot study in Sunnyvale, California utilized community based social marketing (CBSM) methods to determine effectiveness of different outreach treatments to increase participation (measured by weight of material collected) in organics recycling in five unique multi-family buildings[20]. The treatments included various combinations of different door hanger messages, in-person knock-and-talks, container colors and labeling, and emails.

Approximate Cost per Unit: $752.69 per household. This cost was calculated by dividing the total third-party consultant budget utilized to implement the pilot program by the number of households in the study. The total budget was $153,548 and reflects the actual cost to complete the study as sourced from the contractor's internal budget management system as they were the selected third-party consultant to perform this study by the City of Sunnyvale.

Mojave Desert and Mountain Recycling Authority (Pilot Program)

Program Summary: The pilot program utilized "oops" tags in one test group and "oops" tags plus direct contact in another to determine the best method to reduce contamination in onsite curbside containers[21, 22]. The study visited 1,263 households and included waste audits before and after the interventions to determine effectiveness.

Approximate Cost per Unit: $31.67 per household. This cost was calculated by dividing the total reported cost of $40,000 of running the pilot program by the total number of households in the study.

Mojave Desert and Mountain Recycling Authority (Ongoing Program)

Program Summary: A third-party contractor was hired to conduct a wide range of monitoring, enforcement, and education activities including: AB 341, 1826, and 827, and SB 1383 implementation; waste characterization studies; edible food recovery needs assessments; inspection of commercial edible food generators and food recovery organizations; organic waste education and outreach to commercial and residential customers; container contamination minimization monitoring; organics recycling waiver eligibility assessments and service adjustments; assistance with CalRecycle grant writing, enforcement approach

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[20] HF&H Consultants, LLC. "City of Sunnyvale: CBSM Multi-Family Food Scraps Pilot Results Meeting." 3 Oct. 2025.

[21] Mojave Desert and Mountain Recycling Joint Powers Authority. "Mojave Desert and Mountain Recycling Joint Powers Authority Teleconference Notice." Aug. 2022.

[22] Mojave Desert and Mountain Recycling Joint Powers Authority. "Mojave Desert and Mountain Recycling Joint Powers Authority Teleconference Notice." May 2023.

development; pilot program development and execution; and development of educational material (e.g., print, online, social media) [23, 24].

Approximate Cost per Unit: $8.04 per household. This cost was calculated using the reported contamination monitoring budget of $80,000 over two years and dividing it by the reported 9,952 households that received lid flips as part of the monitoring efforts. As discussed in Section 2.2.6.2.2.2, this cost does not include the cost of conducting waste audits to evaluate the program's ongoing efforts. The Mojave Desert and Mountain Authority contracted a third-party to perform one characterization at approximately $60,000. This cost would be expected to repeat for each additional characterization.

CITY OF LIVERMORE

Program Summary: The City of Livermore tested the effectiveness of in-bin cameras to detect contamination in commercial businesses. Cameras were installed in the collection bins of commercial customers and monitored over a period of two years[25], [26].

Approximate Cost per Unit: $1,388.24 per camera calculated by dividing the total reported program budget of $236,000 by the number of cameras installed (170).

Engaging Priority Populations

To inform recommendations for how to effectively engage with priority populations, the contractor evaluated Community Recycling and Composting Survey responses and notes from listening sessions with CBOs, EJ groups, and Tribes to hear directly from community members and priority populations. Results from direct engagement, responses to the Collection Survey, and findings related to current engagement conducted by local jurisdictions and recycling service providers were used to understand how to improve engagement outcomes with priority populations in California. The contractor also conducted online research to identify best practices for fostering meaningful engagement among diverse communities.

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[23] Mojave Desert and Mountain Recycling Joint Powers Authority. "Mojave Desert and Mountain Recycling Joint Powers Authority Meeting Agenda." Feb. 2025.

[24] Mojave Desert and Mountain Recycling Joint Powers Authority. "Mojave Desert and Mountain Recycling Joint Powers Authority Meeting Agenda." Aug. 2025.

[25] Waste360. "StopWaste Chooses Compology's Dumpster Monitoring Technology." *Waste360*, 7 Nov. 2018. Accessed Nov. 2025.

[26] Erlandson, Judy. *Personal Interview*. 10 Oct. 2025.

3. Additional Collection Opportunities

In addition to strong educational initiatives, there are programs that can support added convenience for generators and reduce confusion about what materials are allowable in collection containers for recycling and organics recycling. The contractor reviewed articles, reports, and program websites documenting strategies to overcome participation barriers to alternative collection programs and the methods and effectiveness of closed-loop recycling systems at large venues and events and color-coded source separation systems for collection of materials that are difficult to capture at MRFs. The objective was to identify where these programs were currently in place, how they operate, and the benefits, challenges, and successes of implementing each type of program.

4. Monitoring and Penalty Programs

The contractor conducted a review of white papers, academic literature, and news articles on effective strategies for reducing contamination, as well as evaluated the success of programs from case studies. The objective was to identify different methods of identifying contamination and appropriate interventions to reduce instances of future contamination. Case studies provided examples of the cost and labor resources required to implement these programs and data on the potential reductions in contamination that might be achieved.

5. Overcoming Cost Barriers for Generators

Survey responses from the Collection Survey and the Community Recycling and Composting Survey were used to evaluate how costs impact the participation of generators in collection programs and potential strategies to overcome those barriers. Data from the contractor’s internal database of contract modifications and municipal ordinances[27] was used to estimate the potential cost of making programmatic changes to collection programs.

E. Environmental and Public Health Impacts of Collection Programs

The contractor utilized the Collection Survey, Community Recycling and Composting Survey, MRF and OPF surveys, introductory meetings, and listening sessions with CBOs, EJ groups, and Tribes to understand how communities may be impacted by increased collection operations and infrastructure. The objective of direct engagement through surveys and listening sessions was to identify the most prevalent PHEC impacts on communities and determine appropriate strategies to mitigate negative impacts. The contractor additionally utilized online research to help identify strategies for building resiliency within impacted communities and to support recommendations made by engaged parties for mitigating PHEC impacts.

[27] HF&H Consultants, LLC. “Contract and Municipal Ordinance Database.” “HF&H Consultants Intranet.” Accessed November 12, 2025.

F. Tonnage Flow Model

To estimate the material flows necessary to achieve the proxy recycling rates, the contractor developed a tonnage flow model. The contractor estimated the tonnage collected of covered materials within the three material collection streams (solid waste stream, material collected for recycling, and material collected for organics recycling) including material collected in onsite curbside collection, material sent directly to end markets, and material collected in alternative collection programs in future years. The tonnage flow model also projected processing and end market facility inflows and outflows during the Act's milestone years (2028, 2030, and 2032).

As part of the tonnage flow model, the contractor estimated the amount of material collected in onsite curbside collection. As noted in Appendix A, Section 2.G Assumptions, this analysis is limited to residential and commercial tons collected through onsite curbside collection due to data limitations and excludes self-haul. Commercial tons are also assumed not to change over the milestone years (discussed further in Appendix A., Section 2.F.1). Compared to onsite curbside collection in 2024, the contractor modeled two adjustments to account for movement of covered materials between collection streams based on modeled interventions. One intervention affected the tons of covered material collected from onsite curbside collection and the other intervention affected the presence of covered materials within the three collection streams and thereby the availability of covered materials to be captured by processing facilities. Additionally, the contractor also estimated the amount of noncovered material that would be collected in the milestone years. The contractor calculated the incremental costs of collecting additional material (covered and noncovered) necessary to reach the proxy recycling rates in each milestone year for the materials collected for recycling and organics recycling stream.

The following narrative describes the modeling process performed to calculate the amount and composition of tons collected at the milestone years and the final calculation of incremental onsite curbside collection costs within each year.[28,29]

1. Projection of Covered Materials Collected from Onsite Curbside Collection

The Current State of Collection Report calculated the 2024 tons of covered material categories (Appendix C) collected within each collection stream and by region. To account for the additional covered materials collected due to population growth over the duration of the Act's milestone years, the contractor used the increase in occupied households as a proxy inflation factor for residential covered material tons collected. The contractor modeled an increase only to residential tons, excluding commercial tons, because the contractor had no way to reliably estimate the change in the number of

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[28] CalRecycle. California Recycling Program Rates. 1 Jan. 2025.

[29] American Chemistry Council (ACC). "2021 Resin Review: The Annual Statistical Report of the North American Plastics Industry." *American Chemistry Council*, June 2021. Accessed Nov. 2025.

businesses in California between 2024 and 2032. Note that this methodology therefore assumes that tons from the commercial sector will remain constant from 2024 through 2032.

To project residential tons, the contractor first estimated the residential covered materials collected per participating occupied household in 2024 in each collection stream (solid waste, recycling, and organics recycling). This was done by multiplying the annual tons collected in each collection stream by the residential allocation factor, or the proportion of total collected material that was derived from the residential sector. The residential allocation factor was estimated based on the CalRecycle's *Disposal Facility-based Characterization of Solid Waste 2021* report and excluded self-haul.[30] The residential allocation factor was calculated by dividing residential tons disposed by residential tons plus commercial tons. The resulting residential covered material tonnage was then divided by the number of participating occupied households in each region, as reported in the Current State of Collection Report Table 3-7, to determine the average annual covered material tons collected per participating occupied household in each collection stream. Refer to the following Table A-13 for the result of the calculation.

Table A-13: Annual Tons Collected of Covered Materials per Participating Occupied Residential Household (2024)

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley
Solid Waste	0.17	0.21	0.15	0.28	0.22
Materials Collected for Recycling	0.22	0.17	0.13	0.24	0.15
Materials Collected for Organics Recycling	0.04	0.04	0.02	0.04	0.05

Since the Department of Finance has not published a specific report that projects occupied households in future years, the contractor used the Department of Finance's P-2A Report [31], which projects population growth through the duration of the Act's milestone years, and the Department of Finance's E-5 Report[32] to estimate the future number of occupied households. The contractor divided the 2024 regional population by the number of occupied households to calculate the average households per person, and then multiplied the result by the P-2A projected population for a milestone year to estimate the number of occupied households in the milestone year. The difference in

[30] CalRecycle. "2021 Disposal Facility-Based Characterization of Solid Waste in California." *Ca.gov*, 30 May 2024.

[31] State of California: Department of Finance. "P-2: County Population Projections (2020-2070)." *Ca.gov*, 2019.

[32] State of California: Department of Finance. "E-5 Population and Housing Estimates for Cities, Counties, and the State." *Ca.gov*, May 2022.

the occupied households between the milestone year and that in 2024 represents the change in occupied households from 2024 to the milestone year.

The contractor attributed the same tons of covered materials collected per participating occupied household in 2024 to the change in occupied household numbers in 2028 through 2032. Then, the contractor multiplied the average annual covered material residential tons collected per participating occupied household by the change in occupied households to determine the change in tons of collected residential covered materials within each collection stream. This change in tons was added to the residential and commercial covered material tons collected in 2024 to generate the total projected tons collected in the future year. This process was performed for each milestone year (2028, 2030, and 2032) to determine a baseline tonnage of covered materials before the contractor applies the potential impacts of interventions on the amount of material collected by material stream.

The following formula demonstrates an example calculation to project tonnage of covered materials collected for recycling in onsite curbside collection in 2028 before interventions.

$$T_{r,2028BI}^{CMC} = T_{r,2024}^{CMC} + \left(\frac{T_{resi,r,2024}^{CMC}}{H_{2024}^{Occupied}} \times \Delta H_{2028}^{Occupied}\right)$$

$T_{r,2028BI}^{CMC}$ = Population adjusted tons of the covered material in the materials collected for recycling stream in onsite curbside collection in 2028 (before interventions)

$T_{r,2024}^{CMC}$ = Residential and commercial tons of the covered material collected for recycling in onsite curbside collection in 2024

$T_{resi,r,2024}^{CMC}$ = Tons of the covered material in residential material collected for recycling in onsite curbside collection in 2024

$H_{2024}^{Occupied}$ = Number of participating occupied households in 2024 per the Current State of Collection report

$\Delta H_{2028}^{Occupied}$ = Change in occupied households from 2024 to 2028

The results of the calculations are shown in Table A-14, Table A-15, and Table A-16 for each milestone year. The P-2A report projects a slight population reduction in 2028 compared to 2024 and the projected tons of covered materials collected reflect this overall reduction.

Table A-14: Projected Tons of Covered Material Collected in Onsite Curbside Collection Before Interventions (2028)

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Solid Waste	876,730	285,833	88,211	3,846,704	1,180,612	6,278,090
Materials Collected for Recycling	1,122,463	230,194	75,903	3,280,871	794,312	5,503,743
Materials Collected for Organics Recycling	225,631	53,616	12,048	487,549	234,554	1,013,398
Total Covered Material Tons Collected	**2,224,824**	**569,643**	**176,162**	**7,615,124**	**2,209,478**	**12,795,231**

Table A-15: Projected Tons of Covered Material Collected in Onsite Curbside Collection Before Interventions (2030)

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Solid Waste	878,433	286,044	88,090	3,849,344	1,185,004	6,286,915
Materials Collected for Recycling	1,125,289	230,333	75,817	3,282,801	796,332	5,510,572
Materials Collected for Organics Recycling	225,726	53,622	12,048	487,597	234,758	1,013,751
Total Covered Material Tons Collected	**2,229,448**	**569,999**	**175,955**	**7,619,742**	**2,216,094**	**12,811,238**

Table A-16: Projected Tons of Covered Material Collected in Onsite Curbside Recycling Before Interventions (2032)

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Solid Waste	880,752	286,471	88,004	3,852,480	1,190,144	6,297,851
Materials Collected for Recycling	1,129,139	230,615	75,747	3,285,091	798,693	5,519,285
Materials Collected for Organics Recycling	225,866	53,632	12,048	487,651	234,984	1,014,181
Total Covered Material Tons Collected	**2,235,757**	**570,718**	**175,799**	**7,625,222**	**2,223,821**	**12,831,317**

2. Determination of Needed Covered Material Interventions

After estimating the amount of covered material collected in each onsite curbside collection stream, adjusted for population growth in future years, the contractor applied two interventions for each milestone year. The contractor assumed that the two modeled interventions would be associated with changes to processing and end markets to enable more and new types of materials to be recycled. These intervention mechanisms directly alter both the quantity and distribution of covered materials managed within the system. These targeted interventions drive measurable changes in total plastic tonnage and relative presence of each CMC.

1. CMC-Level Interventions: The contractor modeled changes in the types and amounts of covered material, by CMC, that will be collected in future years due to modeled material design changes and reduction in the amount of plastic covered material as a result of the source reduction requirements under the Act. These modeled interventions, denoted CMC-level interventions, include substituting alternative CMCs for certain CMCs that face significant processing and end-market barriers (such as limited or no technological viability, inability to be effectively captured at material recovery facilities, or the absence of viable or emerging end markets due to economic or low-volume constraints). These interventions have an impact on overall covered material tonnage and tonnage by CMC. As an example, for the purposes of modeling, 24_G2N (Glass-Other Forms w/o plastic component) was identified as the alternative CMC to 24_G2P (Glass-Other Forms w/plastic component), which would transition 24_G2P tonnage into 24_G2N tonnage. The contractor systematically applied these interventions to better

reflect the anticipated state of disposal and recycling in the Act's milestone years.

2. Waste Stream Composition Interventions: The contractor modeled the effects of external factors expected to influence waste stream composition over time as waste stream composition interventions. These include education and outreach efforts and changes in consumer and business behaviors that directly influence the distribution of materials among the three waste streams. As an example, it was modeled that increased education and outreach would transition 20% of 24_P1P's (PET #1 Bottles, jugs, and jars, [Clear/Natural]) tons currently discarded in the solid waste stream to the recycling stream by 2030.

CMC-Level Interventions

CMC-level interventions include changes that alter the presence of specific covered materials. The contractor designed this approach to illustrate how the changes in the composition of materials in the waste stream over time can help achieve the recycling rate, recyclability, and compostability requirements set forth in the Act. For more information on alternative CMCs that were modeled as part of this intervention, see section on Design Improvements for Covered Material.

The interventions were modeled across the Act's milestone years:

- **2028:** 30% plastic covered material recycling rate and 10% source reduction in plastic covered materials.
- **2030:** 40% plastic covered material recycling rate and 20% source reduction in plastic covered materials.
- **2032:** 65% plastic covered material recycling rate, covered material be recyclable or eligible to be labeled compostable, and 25% source reduction in plastic covered materials.

For each milestone year, the contractor estimated the tonnage and covered material distributions to reflect phased changes in the material stream.

To estimate covered material tonnage for a particular waste stream in a milestone year, the contractor represented the impact of CMC-level interventions through the following notation:

$$T^{CMC}_{r,sub2028BI}$$

$T^{CMC}_{r,sub2028BI}$ = Tonnage adjustment for a CMC due to modeled alternative CMCs from material redesign, representing reassigned or reclassified material tonnage. This could refer to an increase or decrease in tonnage depending on the CMC. For example, 24_P22P (PP #5 Other Flexible and Film) was modeled as the alternative CMC to 24_P12P (PVC #3 Flexible and Film), thus the $T^{CMC}_{r,sub2028BI}$ term for that transition would be negative for 24_P12P (i.e., representing a reduction of that CMC due to an alternative being modeled) but positive for 24_P22P (i.e., representing an increase of that CMC due to it being modeled as an alternative to another CMC).

CMC = The CMC whose tonnage is being estimated.

r = The collection stream being analyzed, in this case, the material collected for recycling stream (r).

sub2028BI = 2028 population adjusted tonnage of covered material being substituted before waste stream composition interventions.

Appendix A, Section 5 further discusses CMC-level interventions related to modeled alternatives for specific CMCs. Table A-17 summarizes the modeling, by CMC, as part of CMC-level interventions that occurs through the Act's milestone years. If a CMC is identified as "collected," no alternative CMC was modeled. If an alternative CMC was modeled, the new CMC ID is listed in the year that the CMC is modeled to be redesigned. All CMCs are modeled to be redesigned beginning in 2028 other than 24_PF14P (Paper and Fiber- Molded Fiber- All Forms w/ plastic component) which is modeled to begin in 2030.

Table A-17: Modeled Alternative CMCs by Milestone Year

CMC ID	CMC Material Type	CMC Material Form	2028 Modeled Alternative CMC	2030 Modeled Alternative CMC	2032 Modeled Alternative CMC
24_G1N	Glass	Bottles and Jars w/o plastic component	Collected	Collected	Collected
24_G1P	Glass	Bottle and Jars w/ plastic component	Collected	Collected	Collected
24_G2N	Glass	Other Forms w/o plastic component	Collected	Collected	Collected
24_G2P	Glass	Other Forms w/ plastic component	Collected	Collected	Collected
24_G3N	Glass	Small – Two or more sides measuring 2" or less w/o plastic component	Collected	Collected	Collected
24_G3P	Glass	Small – Two or more sides measuring 2" or less w/ plastic component	Collected	Collected	Collected

CMC ID	CMC Material Type	CMC Material Form	2028 Modeled Alternative CMC	2030 Modeled Alternative CMC	2032 Modeled Alternative CMC
24_C1N	Ceramic	All Forms w/o plastic component	24_G1N	24_G1N	24_G1N
24_C1P	Ceramic	All Forms w/ plastic component	24_G1N	24_G1N	24_G1N
24_C2N	Ceramic	Small – Two or more sides measuring 2” or less w/o plastic component	24_G3N	24_G3N	24_G3N
24_C2P	Ceramic	Small – Two or more sides measuring 2” or less w/ plastic component	24_G3N	24_G3N	24_G3N
24_M1N	Aluminum	Non-aerosol container w/o plastic component	Collected	Collected	Collected
24_M1P	Aluminum	Non-aerosol container w/ plastic component	Collected	Collected	Collected
24_M2N	Aluminum	Foil sheets w/o a plastic component	Collected	Collected	Collected
24_M2P	Aluminum	Foil sheets w/ a plastic component	24_M2N	24_M2N	24_M2N
24_M3N	Aluminum	Foil Molded Containers w/o plastic component	Collected	Collected	Collected
24_M3P	Aluminum	Foil Molded Containers w/ plastic component	24_M3N	24_M3N	24_M3N
24_M4P	Aluminum	Aerosol can w/ plastic component	Collected	Collected	Collected
24_M5N	Aluminum	Other Forms w/o plastic component	Collected	Collected	Collected
24_M5P	Aluminum	Other Forms w/ plastic component	Collected	Collected	Collected

CMC ID	CMC Material Type	CMC Material Form	2028 Modeled Alternative CMC	2030 Modeled Alternative CMC	2032 Modeled Alternative CMC
24_M6N	Tin/Steel/Bimetal	Non-aerosol container w/o plastic component	Collected	Collected	Collected
24_M6P	Tin/Steel/Bimetal	Non-aerosol container w/ plastic component	Collected	Collected	Collected
24_M7P	Tin/Steel/Bimetal	Aerosol can w/ plastic component	Collected	Collected	Collected
24_M8N	Tin/Steel/Bimetal	Other Forms w/o plastic component	Collected	Collected	Collected
24_M8P	Tin/Steel/Bimetal	Other Forms w/ plastic component	Collected	Collected	Collected
24_M9N	Other Nonferrous	All Forms w/o plastic component	Collected	Collected	Collected
24_M9P	Other Nonferrous	All Forms w/ plastic component	Collected	Collected	Collected
24_M10N	Other Ferrous	All Forms w/o plastic component	Collected	Collected	Collected
24_M10P	Other Ferrous	All Forms w/ plastic component	Collected	Collected	Collected
24_M12N	Metal	Small – Two or more sides measuring 2” or less w/o plastic component	Collected	Collected	Collected
24_M12P	Metal	Small – Two or more sides measuring 2” or less w/ plastic component	Collected	Collected	Collected
24_PF1N	Kraft Paper	All Forms w/o plastic component	Collected	Collected	Collected
24_PF1P	Kraft Paper	All Forms w/ plastic component	Collected	Collected	Collected

CMC ID	CMC Material Type	CMC Material Form	2028 Modeled Alternative CMC	2030 Modeled Alternative CMC	2032 Modeled Alternative CMC
24_PF14P	Molded Fiber	All Forms w/ plastic component	Collected	24_PF14N	24_PF14N
24_PF14N	Molded Fiber	All Forms w/o plastic component	Collected	Collected	Collected
24_PF15P	Multi-Material Laminate	Aseptic Cartons	Collected	Collected	Collected
24_PF5P	Multi-Material Laminate	Gable-top Cartons	Collected	Collected	Collected
24_PF7P	Multi-Material Laminate	Other Forms w/ plastic component	Collected	Collected	Collected
24_PF8N	OCC	Waxed Cardboard w/o plastic component	Collected	Collected	Collected
24_PF8P	OCC	Waxed Cardboard w/ plastic component	Collected	Collected	Collected
24_PF9N	OCC	Cardboard w/o plastic component	Collected	Collected	Collected
24_PF9P	OCC	Cardboard w/ plastic component	Collected	Collected	Collected
24_PF10N	Paperboard	All Forms w/o plastic component	Collected	Collected	Collected
24_PF10P	Paperboard	All Forms w/ plastic component	Collected	Collected	Collected
24_PF11N	White Paper	All Forms w/o plastic component	Collected	Collected	Collected
24_PF11P	White Paper	All Forms w/ plastic component	Collected	Collected	Collected
24_PF12N	Other/Mixed Paper	All Forms w/o plastic component	Collected	Collected	Collected
24_PF12P	Other/Mixed Paper	All Forms w/ plastic component	Collected	Collected	Collected
24_PF16N	Paper and Fiber	Small – Two or more sides	Collected	Collected	Collected

CMC ID	CMC Material Type	CMC Material Form	2028 Modeled Alternative CMC	2030 Modeled Alternative CMC	2032 Modeled Alternative CMC
		measuring 2” or less w/o plastic component			
24_PF16P	Paper and Fiber	Small – Two or more sides measuring 2” or less w/ plastic component	24_PF16N	24_PF16N	24_PF16N
24_P1P	PET (#1)	Bottles, Jugs, and Jars (Clear/Natural)	Collected	Collected	Collected
24_P2P	PET (#1)	Bottles, Jugs, and Jars (Pigmented/Color)	Collected	Collected	Collected
24_P38P	PET (#1)	Other Rigid Containers, Cups, Lids, Plates, Trays, Tubs	Collected	Collected	Collected
24_P39P	PET (#1)	Other Rigid Items	Collected	Collected	Collected
24_P6P	HDPE (#2)	Bottles, Jugs and Jars (Clear/Natural)	Collected	Collected	Collected
24_P7P	HDPE (#2)	Bottles, Jugs and Jars (Pigmented/Color)	Collected	Collected	Collected
24_P8P	HDPE (#2)	Pails & Buckets	Collected	Collected	Collected
24_P40P	HDPE (#2)	Other Rigid Items	Collected	Collected	Collected
24_P11P	PVC (#3)	Rigid Items	24_P2P	24_P2P	24_P2P
24_P13P	LDPE (#4)	Bottles, Jugs and Jars	Collected	Collected	Collected
24_P14P	LDPE (#4)	Other Rigid Items	Collected	Collected	Collected
24_P17P	PP (#5)	Bottles, Jugs and Jars	Collected	Collected	Collected
24_P41P	PP (#5)	Other Rigid Containers, Cups,	Collected	Collected	Collected

CMC ID	CMC Material Type	CMC Material Form	2028 Modeled Alternative CMC	2030 Modeled Alternative CMC	2032 Modeled Alternative CMC
		Lids, Plates, Trays, Tubs			
24_P19P	PP (#5)	Utensils	24_WO6N	24_WO6N	24_WO6N
24_P20P	PP (#5)	Other Rigid Items	Collected	Collected	Collected
24_P23P	PS (#6)	Expanded/Foamed Hinged Containers, Plates, Cups, Tubs, Trays, and Other Foamed Containers	24_PF10N	24_PF10N	24_PF10N
24_P42P	PS (#6)	Other Expanded/Foamed Forms	24_PF14N	24_PF14N	24_PF14N
24_P27P	PS (#6)	Utensils	24_WO6N	24_WO6N	24_WO6N
24_P43P	PS (#6)	Solid Hinged Containers, Plates, Cups, Tubs, Trays, and Other Solid Forms	24_P38P	24_P38P	24_P38P
24_P44P	Plastics and Polymers Designed for Compostability	Rigid Items	24_P1P	24_P1P	24_P1P
24_P5P	PET (#1)	Flexible and Film Items	24_P16P	24_P16P	24_P16P
24_P10P	HDPE (#2)	Flexible and Film Items	Collected	Collected	Collected
24_P12P	PVC (#3)	Flexible and Film Items	24_P22P	24_P22P	24_P22P
24_P15P	LDPE (#4)	Clear Non-Bag Film	Collected	Collected	Collected
24_P16P	LDPE (#4)	Other Flexible and Film Items	Collected	Collected	Collected
24_P21P	PP (#5)	Clear Non-Bag Film	Collected	Collected	Collected

CMC ID	CMC Material Type	CMC Material Form	2028 Modeled Alternative CMC	2030 Modeled Alternative CMC	2032 Modeled Alternative CMC
24_P22P	PP (#5)	Other Flexible and Film Items	Collected	Collected	Collected
24_P29P	PS (#6)	Flexible and Film Items	24_P16P	24_P16P	24_P16P
24_P45P	Plastics and Polymers Designed for Compostability	Flexible and Film Items	24_P16P	24_P16P	24_P16P
24_P36P	Other/Mixed Plastics	Flexible and Film Items	24_P16P	24_P16P	24_P16P
24_P46P	Multi-Material Laminate	Pouches and Envelopes	24_P10P	24_P10P	24_P10P
24_P33P	Multi-Material Laminate	Other Forms	24_P10P	24_P10P	24_P10P
24_P34P	Other/Mixed Plastics	Textiles	24_PF1N	24_PF1N	24_PF1N
24_P35P	Other/Mixed Plastics	Rigid Items	24_P20P	24_P20P	24_P20P
24_P47P	Plastic	Small – Two or more sides measuring 2” or less	Collected	Collected	Collected
24_WO1N	Wood	All Untreated Forms w/o plastic component	Collected	Collected	Collected
24_WO1P	Wood	All Untreated Forms w/ plastic component	24_WO1N	24_WO1N	24_WO1N
24_WO2N	Wood	All Treated or Painted Forms w/o plastic component	24_WO1N	24_WO1N	24_WO1N
24_WO2P	Wood	All Treated or Painted Forms w/ plastic component	24_WO1N	24_WO1N	24_WO1N

CMC ID	CMC Material Type	CMC Material Form	2028 Modeled Alternative CMC	2030 Modeled Alternative CMC	2032 Modeled Alternative CMC
24_WO3N	Other/Mixed Organic	Textiles w/o plastic component	24_PF1N	24_PF1N	24_PF1N
24_WO3P	Other/Mixed Organic	Textiles w/ plastic component	24_PF1N	24_PF1N	24_PF1N
24_WO4N	Other/Mixed Organic	Other Forms w/o plastic component	24_WO1N	24_WO1N	24_WO1N
24_WO4P	Other/Mixed Organic	Other Forms w/ plastic component	24_WO1N	24_WO1N	24_WO1N
24_WO6N	Wood and Other Organic Materials	Small – Two or more sides measuring 2” or less w/o plastic component	Collected	Collected	Collected
24_WO6P	Wood and Other Organic Materials	Small – Two or more sides measuring 2” or less w/ plastic component	24_WO6N	24_WO6N	24_WO6N

The CMC-level interventions also included an adjustment for the estimated additional percentage of source reduction of plastic covered material to achieve the Act’s plastic reduction goals by milestone year (see Table A-18). No CMCs are estimated to have 25% additional tonnage reduction in 2032, to align with the required reduction, because it was assumed that switching to alternative CMCs modeled to address existing challenges with recycling would also result in reduction of plastic for some CMCs. For example, the molded pulp with a plastic component was modeled to be switched to molded pulp without a plastic component. The alternative CMC results in lesser plastic, contributing to the source reduction requirements. Therefore, in order to achieve the 10% source reduction requirement in 2028, only an additional 4% reduction in CMC tons with a plastic component was modeled, as it was assumed that the additional 6% was achieved through the modeled redesigns. The contractor assumed that CMCs with a plastic component not within the plastic material class would have greater additional tonnage reductions than CMCs within the plastic material class.

Table A-18: Modeled Tonnage Reductions by CMC and Milestone Year from Source Reduction

CMC ID	CMC Form	2028 Modeled Additional Tonnage Reduction	2030 Modeled Additional Tonnage Reduction	2032 Modeled Additional Tonnage Reduction
24_G1P	Glass Bottle and Jars w/ plastic component	4%	10%	15%
24_G2P	Glass Other Forms w/ plastic component	4%	10%	15%
24_G3P	Small Format Glass – Two or more sides measuring 2” or less w/ plastic component	4%	10%	15%
24_C1P	Ceramics All Forms w/ plastic component	Not Modeled	Not Modeled	Not Modeled
24_C2P	Small Format Ceramics – Two or more sides measuring 2” or less w/ plastic component	Not Modeled	Not Modeled	Not Modeled
24_M1P	Aluminum Non-aerosol container w/ plastic component	4%	10%	15%
24_M2P	Aluminum Foil sheets w/ a plastic component	Not Modeled	Not Modeled	Not Modeled
24_M3P	Aluminum Foil Molded Containers w/ plastic component	Not Modeled	Not Modeled	Not Modeled
24_M4P	Aluminum Aerosol can w/ plastic component	4%	10%	15%
24_M5P	Aluminum Other Forms w/ plastic component	4%	10%	15%
24_M6P	Tin/Steel/Bimetal Non-aerosol container w/ plastic component	4%	10%	15%
24_M7P	Tin/Steel/Bimetal Aerosol can w/ plastic component	4%	10%	15%
24_M8P	Tin/Steel/Bimetal Other Forms w/ plastic component	4%	10%	15%
24_M9P	Nonferrous Metal All Forms w/ plastic component	4%	10%	15%
24_M10P	Ferrous Metal All Forms w/ plastic component	4%	10%	15%
24_M12P	Small Format Metal– Two or more sides measuring 2” or less w/ plastic component	4%	10%	15%
24_PF1P	Kraft Paper All Forms w/ plastic component	4%	10%	15%
24_PF14P	Molded Fiber All Forms w/ plastic component	4%	Not Modeled	Not Modeled
24_PF15P	Multi-Material Laminate Aseptic Cartons	0%	0%	0%

CMC ID	CMC Form	2028 Modeled Additional Tonnage Reduction	2030 Modeled Additional Tonnage Reduction	2032 Modeled Additional Tonnage Reduction
24_PF5P	Multi-Material Laminate Gable-top Cartons	0%	0%	0%
24_PF7P	Multi-Material Laminate Other Forms w/ plastic component	4%	10%	15%
24_PF8P	Old Corrugated Waxed Cardboard w/ plastic component	4%	10%	15%
24_PF9P	Old Corrugated Cardboard w/ plastic component	4%	10%	15%
24_PF10P	Paperboard All Forms w/ plastic component	4%	10%	15%
24_PF11P	White Paper All Forms w/ plastic component	4%	10%	15%
24_PF12P	Mixed Paper All Forms w/ plastic component	4%	10%	15%
24_PF16P	Small Format Paper and Fiber – Two or more sides measuring 2” or less w/ plastic component	Not Modeled	Not Modeled	Not Modeled
24_P1P	PET (#1) Bottles, Jugs, and Jars (Clear/Natural)	0%	7%	10%
24_P2P	PET (#1) Bottles, Jugs, and Jars (Pigmented/Color)	0%	7%	10%
24_P38P	PET (#1) Other Rigid Containers, Cups, Lids, Plates, Trays, Tubs	0%	7%	10%
24_P39P	PET (#1) Other Rigid Items	0%	7%	10%
24_P6P	HDPE (#2) Bottles, Jugs and Jars (Clear/Natural)	0%	7%	10%
24_P7P	HDPE (#2) Bottles, Jugs and Jars (Pigmented/Color)	0%	7%	10%
24_P8P	HDPE (#2) Pails & Buckets	0%	7%	10%
24_P40P	HDPE (#2) Other Rigid Items	0%	7%	10%
24_P11P	PVC (#3) Rigid Items	Not Modeled	Not Modeled	Not Modeled
24_P13P	LDPE (#4) Bottles, Jugs and Jars	0%	7%	10%
24_P14P	LDPE (#4) Other Rigid Items	0%	7%	10%
24_P17P	PP (#5) Bottles, Jugs and Jars	0%	7%	10%

CMC ID	CMC Form	2028 Modeled Additional Tonnage Reduction	2030 Modeled Additional Tonnage Reduction	2032 Modeled Additional Tonnage Reduction
24_P41P	PP (#5) Other Rigid Containers, Cups, Lids, Plates, Trays, Tubs	0%	7%	10%
24_P19P	PP (#5) Utensils	Not Modeled	Not Modeled	Not Modeled
24_P20P	PP (#5) Other Rigid Items	0%	7%	10%
24_P23P	PS (#6) Expanded/Foamed Hinged Containers, Plates, Cups, Tubs, Trays, and Other Foamed Containers	Not Modeled	Not Modeled	Not Modeled
24_P42P	PS (#6) Other Expanded/Foamed Forms	Not Modeled	Not Modeled	Not Modeled
24_P27P	PS (#6) Utensils	Not Modeled	Not Modeled	Not Modeled
24_P43P	PS (#6) Solid Hinged Containers, Plates, Cups, Tubs, Trays, and Other Solid Forms	Not Modeled	Not Modeled	Not Modeled
24_P5P	PET (#1) Flexible and Film Items	Not Modeled	Not Modeled	Not Modeled
24_P10P	HDPE (#2) Flexible and Film Items	0%	7%	10%
24_P12P	PVC (#3) Flexible and Film Items	Not Modeled	Not Modeled	Not Modeled
24_P15P	LDPE (#4) Clear Non-Bag Film	0%	7%	10%
24_P16P	LDPE (#4) Other Flexible and Film Items	0%	7%	10%
24_P21P	PP (#5) Clear Non-Bag Film	0%	7%	10%
24_P22P	PP (#5) Other Flexible and Film Items	0%	7%	10%
24_P29P	PS (#6) Flexible and Film Items	Not Modeled	Not Modeled	Not Modeled
24_P45P	Plastics and Polymers Designed for Compostability Flexible and Film Items	Not Modeled	Not Modeled	Not Modeled
24_P44P	Plastics and Polymers Designed for Compostability Rigid Items	Not Modeled	Not Modeled	Not Modeled
24_P36P	Mixed Plastics Flexible and Film Items	Not Modeled	Not Modeled	Not Modeled
24_P46P	Multi-Material Laminate Pouches and Envelopes	Not Modeled	Not Modeled	Not Modeled
24_P33P	Multi-Material Laminate Other Forms	Not Modeled	Not Modeled	Not Modeled

CMC ID	CMC Form	2028 Modeled Additional Tonnage Reduction	2030 Modeled Additional Tonnage Reduction	2032 Modeled Additional Tonnage Reduction
24_P34P	Mixed Plastics Textiles	Not Modeled	Not Modeled	Not Modeled
24_P35P	Mixed Plastics Rigid Items	Not Modeled	Not Modeled	Not Modeled
24_P47P	Small Format Plastic – Two or more sides measuring 2” or less	0%	7%	10%
24_WO1P	Wood All Untreated Forms w/ plastic component	Not Modeled	Not Modeled	Not Modeled
24_WO2P	Wood All Treated or Painted Forms w/ plastic component	Not Modeled	Not Modeled	Not Modeled
24_WO3P	Mixed Organic Textiles w/ plastic component	Not Modeled	Not Modeled	Not Modeled
24_WO4P	Mixed Organic Other Forms w/ plastic component	Not Modeled	Not Modeled	Not Modeled
24_WO6P	Small Format Wood and Other Organic Materials – Two or more sides measuring 2” or less w/ plastic component	Not Modeled	Not Modeled	Not Modeled

Table A-19 summarizes the projected tons of plastic covered material collected in onsite curbside recycling in the tonnage flow model after adjustments for CMC-level interventions. The contractor modeled that the tonnage reduction of plastic covered material from source reduction would occur across all three material streams in each milestone year according to the reductions set forth in PRC 42057 (except that the 10% reduction for 2027 was also assumed to apply to 2028 for the purposes of this work).

Table A-19: Modeled Tons of Plastic Covered Material Collected in Onsite Curbside Collection After CMC-Level Adjustments by Milestone Year

Description	2024	2028	2030	2032
Tons of Plastic Covered Material Collected	8,125,149	7,296,153	6,541,707	6,103,890
Reduction In Plastic Covered Materials from 2024 (%)	N/A	10%	19.5%	25%

Waste Stream Composition Interventions

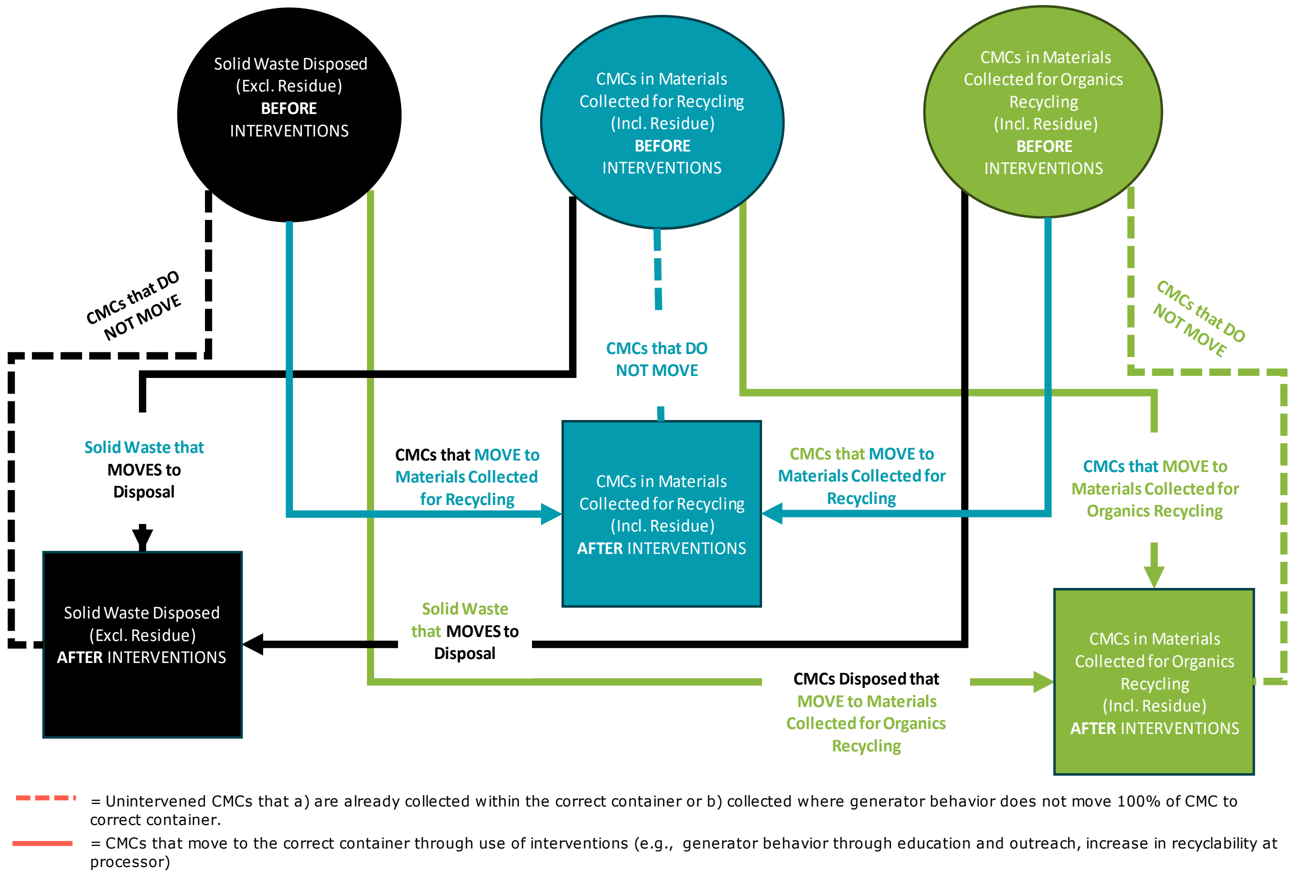
Waste stream composition interventions include the anticipated effects of education and outreach programs and shifts in consumer and business behaviors. These interventions reflect systemwide dynamics that will influence the distribution of covered material across the three material streams. For example, education and outreach is assumed to increase proper sorting in the future thus it was modeled that more covered material would be correctly sorted into the recycling stream, organics recycling stream, or solid waste stream.

Each milestone year incorporated estimated effects of public awareness campaigns and expected shifts in disposal and recycling behavior. This phased approach ensured that the projections reflect the gradual ramp-up of behavioral adoption, rather than a single-step transition.

Because the Act's recycling rate requirements are specific to plastic covered materials, waste stream composition interventions were focused on increasing the collection rate of plastic covered materials. However, waste stream composition interventions are likely to increase collection of nonplastic covered materials as well because the mechanisms employed to increase collection of plastic covered materials (e.g., targeted education and outreach, container audits, contamination monitoring) inherently inform generators of how to properly sort other covered materials. Therefore, the contractor has modeled movement of all covered materials based on waste stream composition interventions.

Figure A-2 demonstrates the simultaneous and overlapping impacts of waste stream composition interventions on onsite curbside collection of covered materials. In the diagram, the solid lines represent waste stream composition interventions to demonstrate how material is moved to the correct onsite curbside collection stream. The dashed lines represent material that does not change containers, either because: (i) the material is already collected within the correct container; or (ii) the material is not sorted correctly, even with extensive interventions.

Figure A-2: Illustration of Waste Stream Composition Intervention



The following formula demonstrates the impacts on CMC tonnage in the material collected for recycling stream in onsite curbside collection due to the waste stream composition interventions.

$$T_{r,2028AI}^{CMC} = T_{sw\rightarrow r}^{CMC} + (T_{r,2028BI}^{CMC} - T_{r\rightarrow sw}^{CMC} - T_{r\rightarrow org}^{CMC}) + T_{org\rightarrow r}^{CMC}$$

$T_{r,2028AI}^{CMC}$ = Tons of a specific CMC in the material collected for recycling stream in 2028 after interventions.

$T_{sw\rightarrow r}^{CMC}$ = Tons of a specific CMC that moved from solid waste stream into recycling stream due to interventions in a milestone year (e.g., in 2028).

$T_{r,2028BI}^{CMC}$ = Population adjusted tons of the same CMC in the recycling stream in 2028 (before interventions).

$T_{r\rightarrow sw}^{CMC}$ = Tons of the same CMC that moved from recycling stream into solid waste stream due to interventions in a milestone year.

$T_{r\rightarrow org}^{CMC}$ = Tons of the same CMC that moved from recycling stream into organics recycling stream due to interventions in a milestone year.

$T_{org \to r}^{CMC}$ = Tons of the same CMC that moved from organics recycling stream into recycling stream due to interventions in a milestone year.

Covered Material Category Tonnage Collected

Following implementation of the previous two interventions, the contractor estimated tonnage by CMC collection group for each onsite curbside collection stream. The following formula shows the combined effect of both the CMC-level and waste stream compositions interventions to estimate the tonnage collected in the recycling stream in onsite curbside collection in 2028. As a reminder, the $T_{r,sub2028BI}^{CMC}$ term can be either a reduction or an increase depending on the directionality of the transition.

$$T_{r,2028AI}^{CMC} = T_{sw \to r}^{CMC} + \left(T_{r,2028BI}^{CMC} - T_{r \to sw}^{CMC} - T_{r \to org}^{CMC}\right) + T_{org \to r}^{CMC} + T_{r,sub2028BI}^{CMC}$$

$T_{r,2028AI}^{CMC}$ = Tons of a covered material in the recycling stream in 2028 (after interventions).

This is an example of CMC processing group Plastic #1 – PET Clear Bottles, Jugs, Jars – Non CRV using the methodology above:

$T_{sw \to r}^{24\_P1P}$ = 14,824 tons

$T_{r,2028BI}^{24\_P1P}$ = 32,327 tons

$T_{r \to sw}^{24\_P1P}$ = 0 tons

$T_{r \to org}^{24\_P1P}$ = 0 tons

$T_{org \to r}^{24\_P1P}$ = 474 tons

$T_{r,sub2028BI}^{24\_P1P}$ = 12,522 tons

$T_{r,2028AI}^{24\_P1P}$ = 14,824 + (32,327 – 0 – 0) + 474 + 12,522

$T_{r,2028AI}^{24\_P1P}$ = 60,147 tons

3. Application of Processing Facility Loss Rates

In order to estimate the tons processed and sent to end markets for recycling, the contractor estimated processing loss. Processing loss refers to a portion of material that enters a facility that is not successfully recovered for recycling, which reduces the tons of covered materials that are received by processing facilities that are sent to end markets. The processing loss estimates are based on the contractor's industry experience and communication with vendors regarding recovery rates and equipment for specific materials. Decreased process loss is modeled across the milestone years because of additional equipment being implemented throughout the state to capture certain materials that were not previously recovered. Secondary processing loss happens when material captured at recycling processing facilities is subsequently sent to secondary processors, where it is subject to additional facility-specific losses. These losses are calculated using the same methodology applied to recycling processing facilities. For modeling purposes, the combined recycling processing facility and secondary processing stages were treated as a single, effective processing loss. For example, if 100 tons of a material is collected for recycling, a 15% processing loss across secondary processors and recycling processing facilities combined would reduce tons sent to end markets by 15 tons, resulting in 85 tons. The contractor applied the processing loss rate to each year of the milestone years to capture the reduction of CMCs sent to end markets. As further described in Appendix A, Section 3, technological advancements in processing equipment will further reduce processing loss of some covered materials.

The modeled processing loss rates at MRFs, mixed waste processing (MWP) facilities, and secondary processing facilities are summarized in Table A-20 by milestone year. Processing losses improving over time provides opportunities necessary to capture sufficient covered material to reach end markets. Secondary processing was not included in the processing loss rates until 2032 due to assumed timing for new facility development. The processing losses in the table for 2032 reflect the net processing loss from sending material through MRFs, MWPs, and secondary processing facilities. Refer to Section 2.3 for additional information on the operational, technological, and economic upgrades associated with the following processing losses. In Table A-20, “N/A” means a material is not accepted by a facility for recovery.

Table A-20: Modeled Processing Loss Rates for MRFs, MWPs, and Secondary Processing by Milestone Year

CMC Category ID	2028 MRF Processing Loss	2030 MRF Processing Loss	2032 Net MRF & Secondary Processing Loss	2028 MWP Loss	2030 MWP Loss	2032 Net MWP & Secondary Processing Loss
24_G1N	35.0%	25.0%	20.0%	N/A	N/A	N/A
24_G1P	35.0%	25.0%	20.0%	N/A	N/A	N/A
24_G2N	35.0%	25.0%	20.0%	N/A	N/A	N/A
24_G2P	35.0%	25.0%	20.0%	N/A	N/A	N/A
24_G3N	35.0%	25.0%	20.0%	N/A	N/A	N/A
24_G3P	35.0%	25.0%	20.0%	N/A	N/A	N/A
24_C1N	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled

CMC Category ID	2028 MRF Processing Loss	2030 MRF Processing Loss	2032 Net MRF & Secondary Processing Loss	2028 MWP Loss	2030 MWP Loss	2032 Net MWP & Secondary Processing Loss
24_M1N	20.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M1P	20.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M2N	30.0%	30.0%	30.0%	30.0%	30.0%	15.0%
24_M2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M3N	30.0%	30.0%	30.0%	30.0%	30.0%	15.0%
24_M3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M4P	20.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M5N	30.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M5P	30.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M6N	20.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M6P	15.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M7P	20.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M8N	15.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M8P	15.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M9N	30.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M9P	30.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M10N	30.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M10P	30.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M12N	30.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_M12P	30.0%	15.0%	15.0%	30.0%	30.0%	15.0%
24_PF1N	8.5%	8.5%	8.5%	N/A	N/A	N/A
24_PF1P	40.0%	20.0%	15.0%	N/A	N/A	N/A
24_PF14P	45.0%	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_PF14N	8.5%	8.5%	8.5%	N/A	N/A	N/A
24_PF15P	45.0%	20.0%	15.0%	N/A	N/A	N/A
24_PF5P	45.0%	20.0%	15.0%	N/A	N/A	N/A

CMC Category ID	2028 MRF Processing Loss	2030 MRF Processing Loss	2032 Net MRF & Secondary Processing Loss	2028 MWP Loss	2030 MWP Loss	2032 Net MWP & Secondary Processing Loss
24_PF7P	45.0%	20.0%	15.0%	N/A	N/A	N/A
24_PF8N	20.0%	20.0%	15.0%	N/A	N/A	N/A
24_PF8P	45.0%	20.0%	15.0%	N/A	N/A	N/A
24_PF9N	8.5%	8.5%	8.5%	50.0%	50.0%	50.0%
24_PF9P	50.0%	20.0%	15.0%	N/A	N/A	N/A
24_PF10N	15.0%	15.0%	15.0%	N/A	N/A	N/A
24_PF10P	50.0%	20.0%	15.0%	N/A	N/A	N/A
24_PF11N	15.0%	15.0%	15.0%	N/A	N/A	N/A
24_PF11P	45.0%	20.0%	15.0%	N/A	N/A	N/A
24_PF12N	15.0%	15.0%	15.0%	N/A	N/A	N/A
24_PF12P	45.0%	20.0%	15.0%	N/A	N/A	N/A
24_PF16N	50.0%	50.0%	50.0%	N/A	N/A	N/A
24_PF16P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P1P	10.0%	10.0%	10.0%	60.0%	20.0%	20.0%
24_P2P	10.0%	10.0%	10.0%	60.0%	20.0%	20.0%
24_P38P	40.0%	10.0%	10.0%	50.0%	50.0%	50.0%
24_P39P	40.0%	10.0%	10.0%	60.0%	60.0%	50.0%
24_P6P	10.0%	10.0%	10.0%	60.0%	20.0%	20.0%
24_P7P	10.0%	10.0%	10.0%	60.0%	20.0%	20.0%
24_P8P	20.0%	15.0%	15.0%	60.0%	60.0%	50.0%
24_P40P	20.0%	15.0%	15.0%	60.0%	60.0%	50.0%
24_P11P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P13P	10.0%	10.0%	10.0%	60.0%	60.0%	60.0%
24_P14P	10.0%	10.0%	10.0%	60.0%	60.0%	50.0%
24_P17P	15.0%	15.0%	15.0%	60.0%	60.0%	20.0%
24_P41P	25.0%	15.0%	15.0%	60.0%	60.0%	50.0%

CMC Category ID	2028 MRF Processing Loss	2030 MRF Processing Loss	2032 Net MRF & Secondary Processing Loss	2028 MWP Loss	2030 MWP Loss	2032 Net MWP & Secondary Processing Loss
24_P19P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P20P	25.0%	20.0%	15.0%	60.0%	60.0%	50.0%
24_P23P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P42P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P27P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P43P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P44P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P5P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P10P	50.0%	20.0%	14.5%	50.0%	50.0%	19.3%
24_P12P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P15P	50.0%	20.0%	14.5%	50.0%	50.0%	19.3%
24_P16P	50.0%	20.0%	14.5%	50.0%	50.0%	19.3%
24_P21P	50.0%	20.0%	14.5%	50.0%	50.0%	19.3%
24_P22P	50.0%	20.0%	14.5%	50.0%	50.0%	19.3%
24_P29P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P45P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P36P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P46P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P33P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled

CMC Category ID	2028 MRF Processing Loss	2030 MRF Processing Loss	2032 Net MRF & Secondary Processing Loss	2028 MWP Loss	2030 MWP Loss	2032 Net MWP & Secondary Processing Loss
24_P34P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P35P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P47P	50.0%	40.0%	19.3%	N/A	N/A	33.5%
24_WO1N	N/A	N/A	N/A	N/A	N/A	N/A
24_WO1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3N	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4N	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO6N	N/A	N/A	N/A	N/A	N/A	N/A
24_WO6P	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled	Not Modeled

4. Application of CMC Conversion Rates

The tons of CMCs estimated to be sent to end markets accounted for losses at end markets using the CMC conversion rate to ensure the proxy recycling rates were met for each milestone year. The CMC conversion rate is the percent of a CMC that is accepted by end markets and effectively converted into a recycled product to be used in lieu of virgin material. Additionally, not all CMCs were identified to have end markets in the Current State of End Markets report, indicating that end markets will need to be developed or expanded. Refer to Appendix A, Section 4 for a more detailed discussion of end market development. Decreased end market losses are modeled across the milestone years because of additional equipment being implemented to improve CMC conversion rates and capture certain materials that were not previously. The contractor modeled the increased CMC conversion rates by CMCs for each milestone year (see Table A-21). The projected end market CMC conversion rates for all covered material categories are discussed in more detail in Section 2.4.1.

Table A-21: CMC Conversion Rates by Milestone Year and Covered Material Category

CMC ID	2028	2030	2032
24_G1N	97.0%	97.0%	97.0%
24_G1P	97.0%	97.0%	97.0%
24_G2N	97.0%	97.0%	97.0%
24_G2P	97.0%	97.0%	97.0%
24_G3N	97.0%	97.0%	97.0%
24_G3P	97.0%	97.0%	97.0%
24_C1N	Not Modeled	Not Modeled	Not Modeled
24_C1P	Not Modeled	Not Modeled	Not Modeled
24_C2N	Not Modeled	Not Modeled	Not Modeled
24_C2P	Not Modeled	Not Modeled	Not Modeled
24_M1N	95.0%	95.0%	95.0%
24_M1P	95.0%	95.0%	95.0%
24_M2N	65.0%	75.0%	85.0%
24_M2P	Not Modeled	Not Modeled	Not Modeled
24_M3N	65.0%	75.0%	85.0%
24_M3P	Not Modeled	Not Modeled	Not Modeled
24_M4P	95.0%	95.0%	95.0%
24_M5N	65.0%	75.0%	85.0%
24_M5P	65.0%	75.0%	85.0%
24_M6N	97.0%	97.0%	97.0%
24_M6P	97.0%	97.0%	97.0%
24_M7P	97.0%	97.0%	97.0%
24_M8N	97.0%	97.0%	97.0%
24_M8P	97.0%	97.0%	97.0%
24_M9N	65.0%	75.0%	85.0%
24_M9P	65.0%	75.0%	85.0%
24_M10N	97.0%	97.0%	97.0%
24_M10P	97.0%	97.0%	97.0%

CMC ID	2028	2030	2032
24_M12N	65.0%	75.0%	85.0%
24_M12P	65.0%	75.0%	85.0%
24_PF1N	96.0%	96.0%	96.0%
24_PF1P	96.0%	96.0%	96.0%
24_PF14P	65.0%	Not Modeled	Not Modeled
24_PF14N	65.0%	75.0%	85.0%
24_PF15P	70.0%	75.0%	85.0%
24_PF5P	70.0%	75.0%	85.0%
24_PF7P	70.0%	75.0%	85.0%
24_PF8N	65.0%	75.0%	85.0%
24_PF8P	70.0%	75.0%	85.0%
24_PF9N	96.0%	96.0%	96.0%
24_PF9P	96.0%	96.0%	96.0%
24_PF10N	96.0%	96.0%	96.0%
24_PF10P	96.0%	96.0%	96.0%
24_PF11N	65.0%	75.0%	85.0%
24_PF11P	70.0%	75.0%	85.0%
24_PF12N	65.0%	75.0%	85.0%
24_PF12P	70.0%	75.0%	85.0%
24_PF16N	65.0%	75.0%	85.0%
24_PF16P	Not Modeled	Not Modeled	Not Modeled
24_P1P	67.0%	75.0%	85.0%
24_P2P	65.0%	75.0%	85.0%
24_P38P	67.0%	75.0%	85.0%
24_P39P	67.0%	75.0%	85.0%
24_P6P	90.0%	90.0%	90.0%
24_P7P	90.0%	90.0%	90.0%
24_P8P	90.0%	90.0%	90.0%
24_P40P	85.0%	85.0%	85.0%
24_P11P	Not Modeled	Not Modeled	Not Modeled
24_P13P	65.0%	75.0%	85.0%
24_P14P	65.0%	75.0%	85.0%
24_P17P	65.0%	75.0%	85.0%
24_P41P	65.0%	75.0%	85.0%

CMC ID	2028	2030	2032
24_P19P	Not Modeled	Not Modeled	Not Modeled
24_P20P	65.0%	75.0%	85.0%
24_P23P	Not Modeled	Not Modeled	Not Modeled
24_P42P	Not Modeled	Not Modeled	Not Modeled
24_P27P	Not Modeled	Not Modeled	Not Modeled
24_P43P	Not Modeled	Not Modeled	Not Modeled
24_P44P	Not Modeled	Not Modeled	Not Modeled
24_P5P	Not Modeled	Not Modeled	Not Modeled
24_P10P	65.0%	75.0%	85.0%
24_P12P	Not Modeled	Not Modeled	Not Modeled
24_P15P	65.0%	75.0%	85.0%
24_P16P	65.0%	75.0%	85.0%
24_P21P	65.0%	75.0%	85.0%
24_P22P	65.0%	75.0%	85.0%
24_P29P	Not Modeled	Not Modeled	Not Modeled
24_P45P	Not Modeled	Not Modeled	Not Modeled
24_P36P	Not Modeled	Not Modeled	Not Modeled
24_P46P	Not Modeled	Not Modeled	Not Modeled
24_P33P	Not Modeled	Not Modeled	Not Modeled
24_P34P	Not Modeled	Not Modeled	Not Modeled
24_P35P	Not Modeled	Not Modeled	Not Modeled
24_P47P	65.0%	75.0%	85.0%
24_WO1N	99.0%	99.0%	99.0%
24_WO1P	Not Modeled	Not Modeled	Not Modeled
24_WO2N	Not Modeled	Not Modeled	Not Modeled
24_WO2P	Not Modeled	Not Modeled	Not Modeled
24_WO3N	Not Modeled	Not Modeled	Not Modeled
24_WO3P	Not Modeled	Not Modeled	Not Modeled
24_WO4N	Not Modeled	Not Modeled	Not Modeled
24_WO4P	Not Modeled	Not Modeled	Not Modeled
24_WO6N	65.0%	75.0%	85.0%
24_WO6P	Not Modeled	Not Modeled	Not Modeled

5. Integration of Alternative Collection Programs and Material Delivered Directly to End Markets

Material delivered directly to end markets were incorporated into the tonnage flow model by treating them as a distinct collection stream separate from onsite curbside collection and alternative collection programs. Because these materials move directly from generators to end markets, their tonnage was integrated as direct end market supply without additional intermediate processing or collection. The contractor estimated the tons collected, collection rates, and the proxy recycling rates for the combined availability of and impact from alternative collection programs, material sent directly to end markets, and onsite curbside collection programs. Refer to Appendix A, Section 2.G, Assumptions and Section 2.H, Limitations and Barriers for additional information. To estimate CMC tonnage sent directly to end markets through business-to-business (B2B) streams, the contractor developed the following notation:

$$T_{B2B,2028}^{CMC}$$

$T_{B2B,2028}^{CMC}$ = Covered material category tonnage sent directly to end markets in 2028. Material delivered directly to end markets is assumed to be mostly from businesses.

The extent and impact of alternative collection programs is challenging to model given the variability and limited scope of current programs as found in the Current State of Collection report. The contractor's approach to increase collection of covered materials is based on maximizing the most currently accessible means of collection (i.e., onsite curbside collection) followed by other types of collection including alternative collection programs to collect targeted plastic covered materials, mainly flexible and film plastics.

Alternative collection programs were assumed to have different processing facility losses than material received through onsite curbside collection (refer to Appendix A, Section 2.F.3) but are anticipated to have the same CMC conversion rates (refer to Appendix A, Section 2.F.4). Given the challenges for processing facilities to recover flexible and film covered materials from materials collected for recycling, the contractor's model assumed alternative collection programs would support increased collection of flexible and film covered material. Refer to Section 2.2.6.3 for additional discussion on expansion of, addition to, and estimated effectiveness of alternative collection program for flexible and film covered materials.

To estimate the amount of CMCs collection through alternative collection, the contractor developed the following notation:

$$T_{Alt,2028AI}^{CMC}$$

$T_{Alt,2028AI}^{CMC}$ = Covered material category tonnage in 2028 from alternative collection programs after interventions and processing loss.

According to the Closed Loop Foundations, 2020 Film Recycling Investment Report, residential polyethylene film has an estimated 4% recycling rate and is primarily captured through film bag and wrap drop-off collection programs offered by retailers. With increased convenient access and focused education to divert these materials from curbside collection through alternative collection systems, a 20% capture rate is modeled in future years. The Film Recycling Investment Report indicates that approximately 7% of retail carryout bags are currently returned to stores, however, case studies in Germany indicate drop-off return rates as high as a 98% on eligible single-use drink containers.[33] While these are generally not covered material, the high collection rates indicate a 20% collection rate is achievable. High deposit values are indicated as a key factor to participation, along with convenient access.

Table A-22 summarizes the modeled impact of expanded alternative collection systems on increasing collection, processing, and recycling of flexible and film plastic covered materials. Given that alternative collection programs focus on specific covered materials, the contractor assumed that the material collected by such programs would have less contamination (than material collected in onsite curbside collection) and that it would be brought to a processor specific to that collected material. The contractor additionally assumed that the CMC conversion rates would be the same for flexible and film plastics collected via onsite curbside collection and alternative collection, since material from both sources are assumed to go to the same end markets. The processing loss rates were estimated in the tonnage flow model to be the estimated value that would still enable flexible and film covered materials to meet the proxy recycling rates, given the assumed collection and CMC conversion rates, which are included in Table A-22.

Table A-22: Projected Impact of Flexible and Film Alternative Collection Programs by Milestone Year

Description	2028	2030	2032
Projected Tons Collected by Alternative Collection Systems	290,802	133,920	129,121
Projected Tons Collected in Onsite Curbside Collection and Alternative Collection Programs	1,454,008	1,339,197	1,291,211
Alternative Programs Collection Rate (%)	20%	10%	10%
Processing Loss (%)	15%	15%	15%
Projected Tons Sent to End Markets	247,181	113,832	109,753
CMC Conversion Rate (%)	65%	75%	85%
Projected Tons of Recycled Material	160,668	85,374	93,290

[33] TOMRA. “Deposit Return Scheme in Germany: The World’s Highest-Performing Drink Container Recycling System.” *TOMRA.com*, 30 Aug. 2023, www.tomra.com/reverse-vending/media-center/feature-articles/germany-deposit-return-scheme.

6. Estimating Collection Rate

The eventual proxy recycling rate achieved for a material is the product of three sequential efficiencies: (i) the portion of material captured from the post-consumer stream through the onsite curbside recycling collection stream, alternative collection systems, and direct conveyance to end markets; (ii) the portion of captured material that survives sorting and recovery at the processing facility (the processing yield [i.e., 1 − processing loss]); and (iii) the portion of material that is recovered by end markets and, for materials not sent to composting or in-vessel digestion, sent by end markets to be used in lieu of virgin material in the creation of new or reconstituted products.

The formula demonstrates the interplay between the proxy recycling rate, required collection rate, processing loss, and CMC conversion rate specific to material that flows through a processing facility.

$$Collection\ Rate = \frac{Target\ Proxy\ Recycling\ Rate}{(1 - Processing\ Loss) * (CMC\ Conversion\ Rate)}$$

- **Collection Rate** — For a given covered material, the share of post-consumer covered material that is collected through the onsite curbside recycling collection stream, collected through alternative collection systems, and delivered directly to end markets (i.e., diverted from disposal and delivered to processing facilities or end markets).
- **Processing Loss** — The fraction of captured material that is not recovered at the processing facility (e.g., residue due to contamination, sorting limits, equipment inefficiencies). Processing yield = 1 − processing loss.
- **CMC Conversion Rate** — The proportion of a CMC accepted by end markets that is converted into a recycled product to be used in lieu of virgin material. It is inclusive of both the end market acceptance and end market recovery.

To illustrate the impact factors, the calculation assumes a 15% processing loss and a CMC conversion rate of 85% for 24_P1P in 2032, where the target proxy recycling rate is 65%.

$$Collection\ Rate_{24P1P} = \frac{65\%}{(1 - 15\%) * 85\%} = 90\%$$

Table A-23 summarizes the estimated collection rates to achieve the proxy recycling rate. Collection rates estimated can be reduced through further reducing processing or end market losses and utilizing strategies that allow for additional capture of material, such as MWP of material collected in the solid waste stream. Currently available permitted capacity at MWP facilities may be effective to support collection rate reductions.

In instances where the estimated collection rate in the milestone year is lower than the existing collection rate or the collection rate for a prior milestone year, it was modeled that the collection rate would remain steady and not decline.

Table A-23: Estimated Plastic Covered Material Collection Rates by Milestone Year

CMC ID	CMC Description	CMC Collection Group	2024 Collection Rate	2028 Collection Rate	2030 Collection Rate	2032 Collection Rate
24_G1P	Glass Bottle and Jars with a plastic component	Glass	44%	48%	55%	85%
24_G2P	Glass Other Forms with a plastic component	Glass	70%	70%	70%	85%
24_G3P	Glass Small – Two or more sides measuring 2” or less with a plastic component	Glass	Unknown	48%	55%	84%
24_C1P	Ceramic All Forms with a plastic component	Ceramic	Unknown	Not Modeled	Not Modeled	Not Modeled
24_C2P	Ceramic Small – Two or more sides measuring 2” or less with a plastic component	Ceramic	Unknown	Not Modeled	Not Modeled	Not Modeled
24_M1P	Aluminum Non-aerosol container with a plastic component	Aluminum	30%	40%	51%	81%
24_M2P	Aluminum Foil sheets with a plastic component	Aluminum	Unknown	Not Modeled	Not Modeled	Not Modeled
24_M3P	Aluminum Foil Molded Containers with a plastic component	Aluminum	Unknown	Not Modeled	Not Modeled	Not Modeled
24_M4P	Aluminum Aerosol can with a plastic component	Aluminum	Unknown	40%	50%	81%
24_M5P	Aluminum Other Forms with a plastic component	Aluminum	Unknown	68%	68%	90%
24_M6P	Tin/Steel/Bimetal Non-aerosol container with a plastic component	Tin/Steel/Bimetal	36%	37%	49%	79%

CMC ID	CMC Description	CMC Collection Group	2024 Collection Rate	2028 Collection Rate	2030 Collection Rate	2032 Collection Rate
24_M7P	Tin/Steel/Bimetal Aerosol can with a plastic component	Tin/Steel/Bimetal	13%	39%	49%	80%
24_M8P	Tin/Steel/Bimetal Other Forms with a plastic component	Tin/Steel/Bimetal	Unknown	38%	50%	79%
24_M9P	Other Nonferrous All Forms with a plastic component	Other Nonferrous	78%	79%	79%	90%
24_M10P	Other Ferrous All Forms with a plastic component	Other Ferrous	78%	80%	80%	80%
24_M12P	Metal Small – Two or more sides measuring 2" or less with a plastic component	Other Metal	Unknown	66%	66%	90%
24_PF1P	Kraft Paper All Forms with a plastic component	Mixed Paper	38%	53%	54%	80%
24_PF14P	Molded Fiber All Forms with a plastic component	Mixed Paper	21%	36%	Not Modeled	Not Modeled
24_PF15P	Multi-Material Laminate Aseptic Cartons	Aseptic Cartons	24%	75%	75%	89%
24_PF5P	Multi-Material Laminate Gable-top Cartons	Gable top Cartons	26%	76%	76%	90%
24_PF7P	Multi-Material Laminate Other Forms with a plastic component	Mixed Paper	Unknown	78%	78%	90%
24_PF8P	OCC Waxed Cardboard with a plastic component	Waxed OCC	62%	79%	80%	90%
24_PF9P	OCC Cardboard with a plastic component	OCC	63%	63%	64%	80%

CMC ID	CMC Description	CMC Collection Group	2024 Collection Rate	2028 Collection Rate	2030 Collection Rate	2032 Collection Rate
24_PF10P	Paperboard All Forms with a plastic component	Paperboard	Unknown	63%	63%	80%
24_PF11P	White Paper All Forms with a plastic component	Mixed Paper	91%	91%	91%	91%
24_PF12P	Other/Mixed Paper All Forms with a plastic component	Mixed Paper	60%	84%	84%	90%
24_PF16P	Paper and Fiber Small – Two or more sides measuring 2" or less with a plastic component	Mixed Paper	Unknown	Not Modeled	Not Modeled	Not Modeled
24_P1P	PET (#1) Bottles, Jugs, and Jars (Clear/Natural)	Plastic #1 - PET Rigid	33%	47%	54%	83%
24_P2P	PET (#1) Bottles, Jugs, and Jars (Pigmented/Color)	Plastic #1 - PET Rigid	Unknown	48%	53%	83%
24_P38P	PET (#1) Other Rigid Containers, Cups, Lids, Plates, Trays, Tubs	Plastic #1 - PET Rigid	3%	70%	70%	83%
24_P39P	PET (#1) Other Rigid Items	Plastic #1 - PET Rigid	43%	73%	73%	84%
24_P6P	HDPE (#2) Bottles, Jugs and Jars (Clear/Natural)	Plastic #2 - HDPE Rigid	76%	83%	89%	89%
24_P7P	HDPE (#2) Bottles, Jugs and Jars (Pigmented/Color)	Plastic #2 - HDPE Rigid	Unknown	33%	59%	77%
24_P8P	HDPE (#2) Pails & Buckets	Plastic #2 - HDPE Rigid	Unknown	37%	50%	84%
24_P40P	HDPE (#2) Other Rigid Items	Plastic #2 - HDPE Rigid	Unknown	40%	60%	89%

CMC ID	CMC Description	CMC Collection Group	2024 Collection Rate	2028 Collection Rate	2030 Collection Rate	2032 Collection Rate
24_P11P	PVC (#3) Rigid Items	Plastic #3 - PVC Rigid	Unknown	Not Modeled	Not Modeled	Not Modeled
24_P13P	LDPE (#4) Bottles, Jugs and Jars	Plastic # 4 - LDPE Rigid	Unknown	48%	57%	85%
24_P14P	LDPE (#4) Other Rigid Items	Plastic # 4 - LDPE Rigid	Unknown	48%	57%	85%
24_P17P	PP (#5) Bottles, Jugs and Jars	Plastic #5 - PP Rigid	80%	89%	90%	90%
24_P41P	PP (#5) Other Rigid Containers, Cups, Lids, Plates, Trays, Tubs	Plastic #5 - PP Rigid	Unknown	60%	60%	89%
24_P19P	PP (#5) Utensils	Plastic #5 - PP Rigid	44%	Not Modeled	Not Modeled	Not Modeled
24_P20P	PP (#5) Other Rigid Items	Plastic #5 - PP Rigid	Unknown	58%	64%	89%
24_P23P	PS (#6) Expanded/Foamed Hinged Containers, Plates, Cups, Tubs, Trays, and Other Foamed Containers	Plastic #6 - Expanded or Foamed Plastic, Rigid	Unknown	Not Modeled	Not Modeled	Not Modeled
24_P42P	PS (#6) Other Expanded/Foamed Forms	Plastic #6 - Other Expanded or Foamed Plastic	Unknown	Not Modeled	Not Modeled	Not Modeled
24_P27P	PS (#6) Utensils	Plastic #6 - PS Rigid	Unknown	Not Modeled	Not Modeled	Not Modeled
24_P43P	PS (#6) Solid Hinged Containers, Plates, Cups, Tubs, Trays, and Other Solid Forms	Plastic #6 - PS Rigid	Unknown	Not Modeled	Not Modeled	Not Modeled

CMC ID	CMC Description	CMC Collection Group	2024 Collection Rate	2028 Collection Rate	2030 Collection Rate	2032 Collection Rate
24_P5P	PET (#1) Flexible and Film Items	Flexible and Film Plastic	Unknown	Not Modeled	Not Modeled	Not Modeled
24_P10P	HDPE (#2) Flexible and Film Items	Flexible and Film Plastic	31%	66%	66%	86%
24_P12P	PVC (#3) Flexible and Film Items	Flexible and Film Plastic	Unknown	Not Modeled	Not Modeled	Not Modeled
24_P15P	LDPE (#4) Clear Non-Bag Film	Flexible and Film Plastic	Unknown	80%	85%	90%
24_P16P	LDPE (#4) Other Flexible and Film Items	Flexible and Film Plastic	35%	76%	76%	89%
24_P21P	PP (#5) Clear Non-Bag Film	Flexible and Film Plastic	37%	85%	87%	89%
24_P22P	PP (#5) Other Flexible and Film Items	Flexible and Film Plastic	Unknown	75%	81%	90%
24_P29P	PS (#6) Flexible and Film Items	Flexible and Film Plastic	Unknown	Not Modeled	Not Modeled	Not Modeled
24_P45P	Plastics and Polymers Designed for Compostability Flexible and Film Items	Flexible and Film Plastic Designed for Compostability	48%	Not Modeled	Not Modeled	Not Modeled
24_P44P	Plastics and Polymers Designed for Compostability Rigid Items	Plastic #7 - Other Rigid Designed for Compostability	25%	Not Modeled	Not Modeled	Not Modeled
24_P36P	Other/Mixed Plastics Flexible and Film Items	Flexible and Film Plastic	Unknown	Not Modeled	Not Modeled	Not Modeled
24_P46P	Multi-Material Laminate Pouches and Envelopes	Plastic Pouches and Envelopes	Unknown	Not Modeled	Not Modeled	Not Modeled
24_P33P	Multi-Material Laminate Other Forms	Other Multi-Material Laminate	Unknown	Not Modeled	Not Modeled	Not Modeled

CMC ID	CMC Description	CMC Collection Group	2024 Collection Rate	2028 Collection Rate	2030 Collection Rate	2032 Collection Rate
24_P34P	Other/Mixed Plastics Textiles	Other Mixed Plastics	Unknown	Not Modeled	Not Modeled	Not Modeled
24_P35P	Other/Mixed Plastics Rigid Items	Other Mixed Plastics	31%	Not Modeled	Not Modeled	Not Modeled
24_P47P	Plastic Small – Two or more sides measuring 2” or less	Other Mixed Plastics	29%	93%	93%	94%
24_WO1P	Wood All Untreated Forms with a plastic component	Wood - Untreated	6%	Not Modeled	Not Modeled	Not Modeled
24_WO2P	Wood All Treated or Painted Forms with a plastic component	Wood - Treated	Unknown	Not Modeled	Not Modeled	Not Modeled
24_WO3P	Other/Mixed Organic Textiles with a plastic component	Textiles	Unknown	Not Modeled	Not Modeled	Not Modeled
24_WO4P	Other/Mixed Organic Other Forms with a plastic component	Other Mixed Organic	Unknown	Not Modeled	Not Modeled	Not Modeled
24_WO6P	Wood and Other Organic Materials Small – Two or more sides measuring 2” or less with a plastic component	Other Mixed Organic	Unknown	Not Modeled	Not Modeled	Not Modeled
Overall Plastic Covered Material Collection Rate	**N/A**	**N/A**	**55%**	**64%**	**68%**	**83%**

7. MWP as an Additional Strategy

The analysis explored the potential for MWP facilities as an additional recovery pathway for certain plastic covered materials. This approach allows recovery of materials that would otherwise remain in the solid waste stream. Specifically, the contractor identified certain types of plastic CMCs, such as flexible and film plastics, that likely need additional strategies beyond those initially modeled to further increase the amount of material collected or increase the amount sent to end markets. For those CMCs, the contractor estimated the CMC tons that would need to be processed by MWP facilities in order to deliver sufficient tons of specific CMCs to end markets.

The following steps describe the estimation method used:

1. **Estimating Required End-Market Tonnage Based on Amount Collected.** For each plastic CMC, the contractor estimated the tons required to be delivered to end markets to meet the proxy recycling rate in milestone years. This was estimated as:

$$T_{EM,2028AI}^{CMC} = \frac{T_{All,2028AI}^{CMC} * Target\ Proxy\ Recycling\ Rate}{CMC\ Conversion\ Rate}$$

   $T_{EM,2028AI}^{CMC}$ = CMC tonnage required to be delivered to end markets in 2028 to achieve the proxy recycling rate after adjustments for population growth and interventions.

   $T_{All,2028AI}^{CMC}$ = CMC tonnage collected across all 3 collection streams after adjustments for population growth and interventions.

2. **Identifying Estimated Additional Tonnage Needed Beyond Already Modeled Inflows to End Markets.** From the required end market tonnage estimated in the previous step, the contractor subtracted the modeled amounts of MRF outbound tons sent to end markets from onsite curbside recycling stream, tons sent directly to end markets, and tons sent to end markets from alternative collection (primarily relevant for flexible and film plastics). The resulting value represents the estimated additional tonnage that needs to reach end markets beyond what was modeled.

$$T_{MWP,2028AI}^{CMC} = T_{EM,2028AI}^{CMC} - T_{MRF,2028AI}^{CMC} - T_{B2B,2028}^{CMC} - T_{Alt,2028AI}^{CMC}$$

   $T_{MWP,2028AI}^{CMC}$ = CMC tonnage (after interventions) needed in 2028 to reach end markets through additional strategies beyond inflows already modeled. When considering MWP as an additional strategy, this amount would be the tons delivered to end markets in 2028 by MWP facilities.

   $T_{EM,2028AI}^{CMC}$ = CMC tonnage (after interventions) needed to be sent to end markets from all sources in 2028 to achieve the proxy recycling rate.

   $T_{MRF,2028AI}^{CMC}$ = CMC tonnage (after interventions) delivered by MRFs to end markets in 2028 to achieve the proxy recycling rate.

$T_{B2B,2028}^{CMC}$ = CMC tonnage sent directly to end markets in 2028. Material delivered directly to end markets is assumed to be mostly from business to business (B2B) arrangements.

$T_{Alt,2028AI}^{CMC}$ = CMC tonnage (after interventions) sent from alternative collection programs to end markets in 2028.

3. **The Estimated Plastic Covered Material Tonnage to be Processed at MWP Facilities to Capture Targeted Plastic Covered Material.** The inbound tonnage of each plastic CMC that must be processed to achieve the outbound tonnage from step 2, is calculated as:

$$T_{MWP,2028AI}^{CMC,Process} = \frac{T_{MWP,2028AI}^{CMC}}{1 - Processing\ Loss}$$

$T_{MWP,2028AI}^{CMC,Process}$ = CMC tonnage (after interventions) required to be processed at MWP facilities to account for processing loss and deliver the necessary end market tonnage.

4. **Estimating Total Solid Waste Tonnage Needed at MWP Facilities**
For each plastic CMC, the contractor determined its relative composition in the solid waste stream by dividing the plastic CMC tons by total collected solid waste tons. This composition factor was then used to estimate the availability of the plastic covered material category in the collected solid waste stream. This yields an estimate of total tons of solid waste that need to reach MWP to supply the estimated amount of plastic covered material from Step 2.

$$T_{CMC,2028AI}^{SW,Process} = T_{MWP,2028AI}^{CMC,Process} \div \left(\frac{T_{SW,2028AI}^{CMC}}{T_{SW,2028AI}^{All}}\right)$$

$T_{CMC,2028AI}^{SW,Process}$ = Solid waste tonnage (after interventions) that needs to be processed through MWP facilities to capture the necessary tons.

$T_{SW,2028AI}^{CMC}$ = CMC tonnage in the solid waste collection stream after interventions

$T_{SW,2028AI}^{All}$ = Total tonnage in the solid waste stream after interventions

For this analysis, the contractor modeled plastic covered material and did not model recovery of nonplastic covered material tonnage because nonplastic covered materials are not subject to the Act's recycling rate requirements. However, the contractor acknowledges that the use of MWP as a strategy would also likely result in the collection of high-value nonplastic covered materials, like metal, alongside targeted plastic covered materials. This is because MWP facilities are assumed to have technology to capture metals and other high-value materials.

The results of the exploration of MWP as an additional strategy are summarized in Table A-24 through Table A-32. These tables are organized into three groups: one group per milestone year, with three tables per group. Table A-24, Table A-25, and Table A-26 are for milestone year 2028; Table A-27, Table A-28, and Table A-29 for 2030; and Table A-30, Table A-31, and Table A-32 for 2032. The three tables within each group show the three steps in the estimation of tons that could be processed by MWP facilities as an additional strategy to support achieving the proxy recycling rates (corresponding to steps 2 through 4 as described previously).

The first table of each milestone year group (Table A-24, Table A-27, and Table A-30) summarizes the estimated tons that must be sent to end markets from all sources for a CMC to achieve the proxy recycling rate. This value is shown in the fifth column of the table. The value is calculated as the CMC Tons Collected (second column in the table) multiplied by the applicable proxy recycling rate and divided by the end market CMC conversion rate (see Appendix A, Section 2.F.4 for CMC conversion rate). If CMC tons sent to end markets from the curbside collection recycling stream, alternative collection, and directly to end markets (fourth column) are less than the tons that end markets must receive (fifth column), then additional strategies beyond those models are estimated to be needed. While nonplastic CMCs are included in these tables, the last column for such rows shows “n/a” given that nonplastic covered material is not subject to the recycling rate requirements.

The second table of each milestone year table group (Table A-25, Table A-28, and Table A-31) summarizes the difference between the CMC tons required to meet the proxy recycling rates and the amount estimated to be sent to end markets from modeled collection and processing. If the amount required to reach end markets is greater than the amount modeled to be sent to end markets, it indicates that additional strategies are needed to meet the proxy recycling rate. The second column of the tables shows the additional CMC tons that need to be sent to end markets, calculated as the difference between the required and estimated CMC tons sent to end markets (the fifth minus the fourth column in Table A-24, Table A-27, and Table A-30). Dividing the additional needed CMC tons by the MWP recovery rate (1 minus the MWP loss rate reported in the third column) yields the estimated tonnage of CMC that needs to be processed at MWP facilities (the fourth column in Table A-25, Table A-28, and Table A-31) to capture the amount of additional material in the second column. Covered materials that are not modeled are not specifically indicated in Table A-25, Table A-28, and Table A-31; refer to Table A-17. CMCs that are not estimated to require additional strategies are shown to have “n/a” in the tables.

The third table of each milestone year table group (Table A-26, Table A-29, and Table A-32) summarizes the tons of solid waste, comprising both covered and noncovered material, estimated to be processed at MWPs to manage the estimated additional tons in the previous table group (Table A-25, Table A-28, and Table A-31). The fourth column of this table shows the percentage of solid waste collected that is CMC, calculated as the second column (tons of CMC collected in the solid waste stream) divided by the third column (total tons collected in the solid waste stream). The fifth column shows the estimated tons of covered and noncovered material in the solid waste stream that would need to be processed by MWPs and is calculated as the CMC tons that need to be processed (the fourth column in Table A-25, Table A-28, and Table A-31) divided by the percentage of solid waste collected that is CMC (the fourth column of Table A-26, Table A-29, and Table A-32). CMCs that are not estimated to require additional strategies are shown to have “n/a” in the tables.

Table A-24: CMC Tonnage to be Sent to End Markets to Achieve 30% Proxy Recycling Rate (2028)

CMC ID	CMC Tons Collected	CMC Tons Collected for Recycling	CMC Tons Sent to End Markets	CMC Tons to be Sent to End Markets to Achieve 30% Proxy Recycling Rate
24_G1N	99,872	48,628	31,608	n/a
24_G1P	93,232	44,859	29,159	28,835
24_G2N	22,801	16,003	10,402	n/a
24_G2P	21,249	14,919	9,697	6,572
24_G3N	9,287	4,458	2,898	n/a
24_G3P	5,536	2,657	1,727	1,712
24_C1N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M1N	17,119	7,515	6,012	n/a
24_M1P	16,230	6,417	5,134	5,125
24_M2N	53,128	10,626	7,438	n/a
24_M2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M3N	25,810	5,162	3,613	n/a
24_M3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M4P	14,916	5,967	4,773	4,710
24_M5N	9,830	1,966	1,376	n/a
24_M5P	9,435	6,416	4,491	4,355
24_M6N	90,472	34,294	27,436	n/a
24_M6P	85,551	31,620	26,877	26,459
24_M7P	34,866	13,505	10,804	10,783
24_M8N	17,686	531	451	n/a
24_M8P	16,979	6,452	5,484	5,251
24_M9N	31,819	26,281	18,397	n/a
24_M9P	29,550	23,329	16,331	13,639
24_M10N	87,031	71,568	50,097	n/a

CMC ID	CMC Tons Collected	CMC Tons Collected for Recycling	CMC Tons Sent to End Markets	CMC Tons to be Sent to End Markets to Achieve 30% Proxy Recycling Rate
24_M10P	80,842	64,491	45,144	25,003
24_M12N	5,432	1,086	760	n/a
24_M12P	5,215	3,442	2,409	2,407
24_PF1N	331,307	274,549	259,739	n/a
24_PF1P	194,102	101,948	61,169	60,657
24_PF14P	118,616	42,538	23,396	54,746
24_PF14N	128,360	46,123	42,208	n/a
24_PF15P	67,434	50,522	29,170	28,900
24_PF5P	98,702	75,353	42,522	42,301
24_PF7P	422,606	329,633	181,298	181,117
24_PF8N	123,055	112,874	90,299	n/a
24_PF8P	115,062	91,397	50,268	49,312
24_PF9N	5,374,601	5,048,816	4,876,275	n/a
24_PF9P	2,204,823	1,397,087	698,544	689,007
24_PF10N	301,543	226,054	206,774	n/a
24_PF10P	187,457	118,098	59,049	58,580
24_PF11N	399,152	392,273	341,435	n/a
24_PF11P	319,383	290,566	159,811	136,878
24_PF12N	568,007	491,147	428,864	n/a
24_PF12P	460,628	386,842	212,763	197,412
24_PF16N	11,260	2,252	1,126	n/a
24_PF16P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P1P	128,728	60,147	54,132	57,639
24_P2P	47,179	22,646	20,381	21,775
24_P38P	228,652	159,149	97,269	102,382
24_P39P	38,543	28,186	17,319	17,258
24_P6P	178,444	147,448	132,703	59,481
24_P7P	36,320	11,986	10,787	12,107

CMC ID	CMC Tons Collected	CMC Tons Collected for Recycling	CMC Tons Sent to End Markets	CMC Tons to be Sent to End Markets to Achieve 30% Proxy Recycling Rate
24_P8P	50,433	18,660	14,928	16,811
24_P40P	40,641	16,256	13,005	14,344
24_P11P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P13P	7,090	3,403	3,063	3,272
24_P14P	15,505	7,442	6,698	7,156
24_P17P	38,703	34,586	29,398	17,863
24_P41P	141,141	84,685	63,513	65,142
24_P19P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P20P	194,529	113,118	84,838	89,783
24_P23P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P42P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P27P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P43P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P5P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P10P	167,535	109,761	73,024	77,324
24_P12P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P15P	211,108	168,886	99,221	97,434
24_P16P	606,014	458,065	271,453	279,699
24_P21P	44,774	38,099	22,184	20,665
24_P22P	439,498	329,624	195,577	202,845
24_P29P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P45P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P44P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P36P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P46P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P33P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P34P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P35P	Not Modeled	Not Modeled	Not Modeled	Not Modeled

CMC ID	CMC Tons Collected	CMC Tons Collected for Recycling	CMC Tons Sent to End Markets	CMC Tons to be Sent to End Markets to Achieve 30% Proxy Recycling Rate
24_P47P	78,902	73,327	36,664	36,416
24_WO1N	826,750	37,609	0	n/a
24_WO1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO6N	46,444	6,235	0	n/a
24_WO6P	Not Modeled	Not Modeled	Not Modeled	Not Modeled

Table A-25: Estimated CMC Tons Needed from Additional Strategies Beyond Those Modeled and Estimated Inflow Tons to be Processed at MWP Facilities as Additional Strategy (2028)

CMC ID	CMC Tons Needed from Additional Strategies to Reach End Markets	MWP Loss Rate	Inflow Tons to MWP Facilities to Send CMC Tons Needed to End Markets
24_G1N	0	n/a	n/a
24_G1P	0	n/a	n/a
24_G2N	0	n/a	n/a
24_G2P	0	n/a	n/a
24_G3N	0	n/a	n/a
24_G3P	0	n/a	n/a
24_C1N	0	n/a	n/a
24_C1P	0	n/a	n/a
24_C2N	0	n/a	n/a
24_C2P	0	n/a	n/a
24_M1N	0	n/a	n/a
24_M1P	0	n/a	n/a
24_M2N	0	n/a	n/a
24_M2P	0	n/a	n/a
24_M3N	0	n/a	n/a
24_M3P	0	n/a	n/a
24_M4P	0	n/a	n/a
24_M5N	0	n/a	n/a
24_M5P	0	n/a	n/a
24_M6N	0	n/a	n/a
24_M6P	0	n/a	n/a
24_M7P	0	n/a	n/a
24_M8N	0	n/a	n/a
24_M8P	0	n/a	n/a
24_M9N	0	n/a	n/a
24_M9P	0	n/a	n/a
24_M10N	0	n/a	n/a

CMC ID	CMC Tons Needed from Additional Strategies to Reach End Markets	MWP Loss Rate	Inflow Tons to MWP Facilities to Send CMC Tons Needed to End Markets
24_M10P	0	n/a	n/a
24_M12N	0	n/a	n/a
24_M12P	0	n/a	n/a
24_PF1N	0	n/a	n/a
24_PF1P	0	n/a	n/a
24_PF14P	31,350	100%	*
24_PF14N	0	n/a	n/a
24_PF15P	0	n/a	n/a
24_PF5P	0	n/a	n/a
24_PF7P	0	n/a	n/a
24_PF8N	0	n/a	n/a
24_PF8P	0	n/a	n/a
24_PF9N	0	n/a	n/a
24_PF9P	0	n/a	n/a
24_PF10N	0	n/a	n/a
24_PF10P	0	n/a	n/a
24_PF11N	0	n/a	n/a
24_PF11P	0	n/a	n/a
24_PF12N	0	n/a	n/a
24_PF12P	0	n/a	n/a
24_PF16N	0	n/a	n/a
24_PF16P	0	n/a	n/a
24_P1P	3,507	60%	8,767
24_P2P	1,394	60%	3,484
24_P38P	5,112	50%	10,225
24_P39P	0	n/a	n/a
24_P6P	0	n/a	n/a
24_P7P	1,320	60%	3,299
24_P8P	1,883	60%	4,707

CMC ID	CMC Tons Needed from Additional Strategies to Reach End Markets	MWP Loss Rate	Inflow Tons to MWP Facilities to Send CMC Tons Needed to End Markets
24_P40P	1,339	60%	3,347
24_P11P	0	n/a	n/a
24_P13P	209	60%	524
24_P14P	458	60%	1,145
24_P17P	0	60%	0
24_P41P	1,629	60%	4,071
24_P19P	0	n/a	n/a
24_P20P	4,944	60%	12,361
24_P23P	0	n/a	n/a
24_P42P	0	n/a	n/a
24_P27P	0	n/a	n/a
24_P43P	0	n/a	n/a
24_P5P	0	n/a	n/a
24_P10P	4,300	50%	8,600
24_P12P	0	n/a	n/a
24_P15P	0	n/a	n/a
24_P16P	8,245	50%	16,491
24_P21P	0	n/a	n/a
24_P22P	7,269	50%	14,537
24_P29P	0	n/a	n/a
24_P45P	0	n/a	n/a
24_P44P	0	n/a	n/a
24_P36P	0	n/a	n/a
24_P46P	0	n/a	n/a
24_P33P	0	n/a	n/a
24_P34P	0	n/a	n/a
24_P35P	0	n/a	n/a
24_P47P	0	n/a	n/a
24_WO1N	0	n/a	n/a

CMC ID	CMC Tons Needed from Additional Strategies to Reach End Markets	MWP Loss Rate	Inflow Tons to MWP Facilities to Send CMC Tons Needed to End Markets
24_WO1P	0	n/a	n/a
24_WO2N	0	n/a	n/a
24_WO2P	0	n/a	n/a
24_WO3N	0	n/a	n/a
24_WO3P	0	n/a	n/a
24_WO4N	0	n/a	n/a
24_WO4P	0	n/a	n/a
24_WO6N	0	n/a	n/a
24_WO6P	0	n/a	n/a

*Molded Fiber with a plastic component is not included in the model starting in 2030. While it is estimated that additional strategies are needed to capture this CMC, development of long-term infrastructure for this CMC does not align with proposed redesign.

Table A-26: Estimated Tons of Solid Waste (Covered and Noncovered Material) Inbound to MWP to Capture CMC Tons Needed for End Markets (2028)

CMC ID	CMC Tons Collected in Solid Waste Material Stream	Tons of Solid Waste Collected	Percent of CMC per Ton	Minimum Tons of Solid Waste Processed to Capture Needed CMC Tons
24_G1N	48,430	26,939,495	0.18%	n/a
24_G1P	45,672	26,939,495	0.17%	n/a
24_G2N	3,706	26,939,495	0.01%	n/a
24_G2P	3,451	26,939,495	0.01%	n/a
24_G3N	4,829	26,939,495	0.02%	n/a
24_G3P	2,879	26,939,495	0.01%	n/a
24_C1N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M1N	7,837	26,939,495	0.03%	n/a
24_M1P	8,088	26,939,495	0.03%	n/a

CMC ID	CMC Tons Collected in Solid Waste Material Stream	Tons of Solid Waste Collected	Percent of CMC per Ton	Minimum Tons of Solid Waste Processed to Capture Needed CMC Tons
24_M2N	42,502	26,939,495	0.16%	n/a
24_M2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M3N	20,648	26,939,495	0.08%	n/a
24_M3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M4P	8,950	26,939,495	0.03%	n/a
24_M5N	7,864	26,939,495	0.03%	n/a
24_M5P	3,019	26,939,495	0.01%	n/a
24_M6N	53,390	26,939,495	0.20%	n/a
24_M6P	51,254	26,939,495	0.19%	n/a
24_M7P	20,959	26,939,495	0.08%	n/a
24_M8N	17,155	26,939,495	0.06%	n/a
24_M8P	10,527	26,939,495	0.04%	n/a
24_M9N	3,770	26,939,495	0.01%	n/a
24_M9P	4,524	26,939,495	0.02%	n/a
24_M10N	6,274	26,939,495	0.02%	n/a
24_M10P	7,528	26,939,495	0.03%	n/a
24_M12N	4,346	26,939,495	0.02%	n/a
24_M12P	1,773	26,939,495	0.01%	n/a
24_PF1N	52,508	26,939,495	0.19%	n/a
24_PF1P	88,075	26,939,495	0.33%	n/a
24_PF14P	50,292	26,939,495	0.19%	n/a
24_PF14N	55,378	26,939,495	0.21%	n/a
24_PF15P	15,162	26,939,495	0.06%	n/a
24_PF5P	21,652	26,939,495	0.08%	n/a
24_PF7P	92,973	26,939,495	0.35%	n/a
24_PF8N	9,646	26,939,495	0.04%	n/a
24_PF8P	23,151	26,939,495	0.09%	n/a
24_PF9N	302,816	26,939,495	1.12%	n/a

CMC ID	CMC Tons Collected in Solid Waste Material Stream	Tons of Solid Waste Collected	Percent of CMC per Ton	Minimum Tons of Solid Waste Processed to Capture Needed CMC Tons
24_PF9P	785,685	26,939,495	2.92%	n/a
24_PF10N	75,489	26,939,495	0.28%	n/a
24_PF10P	69,359	26,939,495	0.26%	n/a
24_PF11N	1,632	26,939,495	0.01%	n/a
24_PF11P	6,836	26,939,495	0.03%	n/a
24_PF12N	43,239	26,939,495	0.16%	n/a
24_PF12P	41,510	26,939,495	0.15%	n/a
24_PF16N	9,008	26,939,495	0.03%	n/a
24_PF16P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P1P	65,374	26,939,495	0.24%	3,612,887
24_P2P	24,533	26,939,495	0.09%	3,825,727
24_P38P	69,503	26,939,495	0.26%	3,963,147
24_P39P	9,388	26,939,495	0.03%	n/a
24_P6P	27,124	26,939,495	0.10%	n/a
24_P7P	24,334	26,939,495	0.09%	3,652,245
24_P8P	31,773	26,939,495	0.12%	3,991,036
24_P40P	24,385	26,939,495	0.09%	3,697,578
24_P11P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P13P	3,687	26,939,495	0.01%	3,825,727
24_P14P	8,063	26,939,495	0.03%	3,825,727
24_P17P	1,027	26,939,495	0.00%	n/a
24_P41P	56,456	26,939,495	0.21%	1,942,752
24_P19P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P20P	80,277	26,939,495	0.30%	4,148,164
24_P23P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P42P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P27P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P43P	Not Modeled	Not Modeled	Not Modeled	Not Modeled

CMC ID	CMC Tons Collected in Solid Waste Material Stream	Tons of Solid Waste Collected	Percent of CMC per Ton	Minimum Tons of Solid Waste Processed to Capture Needed CMC Tons
24_P5P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P10P	55,454	26,939,495	0.21%	4,177,738
24_P12P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P15P	42,222	26,939,495	0.16%	0
24_P16P	121,840	26,939,495	0.45%	3,646,163
24_P21P	3,576	26,939,495	0.01%	0
24_P22P	109,875	26,939,495	0.41%	3,564,302
24_P29P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P45P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P44P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P36P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P46P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P33P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P34P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P35P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P47P	3,829	26,939,495	0.01%	0
24_WO1N	637,620	26,939,495	2.37%	0
24_WO1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO6N	34,456	26,939,495	0.13%	0
24_WO6P	Not Modeled	Not Modeled	Not Modeled	Not Modeled

Table A-27: CMC Tonnage to be Sent to End Markets to Achieve 40% Proxy Recycling Rate (2030)

CMC ID	CMC Tons Collected	CMC Tons Collected for Recycling	CMC Tons Sent to End Markets	CMC Tons to be Sent to End Markets to Achieve 40% Proxy Recycling Rate
24_G1N	100,001	48,688	36,516	n/a
24_G1P	84,792	46,920	35,190	34,966
24_G2N	22,826	16,022	12,017	n/a
24_G2P	18,941	13,307	9,981	7,811
24_G3N	9,301	4,464	3,348	n/a
24_G3P	5,199	2,860	2,145	2,144
24_C1N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M1N	17,142	7,525	6,396	n/a
24_M1P	14,916	7,651	6,504	6,280
24_M2N	53,200	10,640	7,448	n/a
24_M2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M3N	25,844	5,169	3,618	n/a
24_M3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M4P	14,002	7,001	5,951	5,896
24_M5N	9,845	1,969	1,674	n/a
24_M5P	8,859	6,024	5,120	4,725
24_M6N	90,592	34,338	29,187	n/a
24_M6P	78,273	38,558	32,774	32,278
24_M7P	32,426	16,026	13,622	13,371
24_M8N	17,711	531	452	n/a
24_M8P	15,940	7,970	6,774	6,573
24_M9N	31,859	26,315	22,368	n/a
24_M9P	26,180	20,681	17,579	13,963
24_M10N	87,131	71,655	60,907	n/a

CMC ID	CMC Tons Collected	CMC Tons Collected for Recycling	CMC Tons Sent to End Markets	CMC Tons to be Sent to End Markets to Achieve 40% Proxy Recycling Rate
24_M10P	71,639	57,216	48,634	29,542
24_M12N	5,439	1,088	925	n/a
24_M12P	4,895	3,231	2,746	2,611
24_PF1N	331,606	274,773	259,944	n/a
24_PF1P	177,335	95,010	76,008	73,889
24_PF14P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_PF14N	253,260	91,606	83,829	n/a
24_PF15P	67,515	50,582	41,080	36,008
24_PF5P	98,830	75,449	60,839	52,709
24_PF7P	396,751	309,465	247,572	211,600
24_PF8N	123,212	82,268	65,815	n/a
24_PF8P	103,204	82,568	66,055	55,042
24_PF9N	5,377,603	5,051,384	4,878,625	n/a
24_PF9P	1,977,180	1,255,766	1,004,613	823,825
24_PF10N	301,831	226,236	206,929	n/a
24_PF10P	175,990	110,873	88,699	73,329
24_PF11N	399,560	392,677	341,779	n/a
24_PF11P	280,092	255,031	204,025	149,382
24_PF12N	568,487	491,556	429,212	n/a
24_PF12P	413,846	347,043	277,634	220,718
24_PF16N	11,278	2,256	1,128	n/a
24_PF16P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P1P	117,098	63,184	56,866	62,452
24_P2P	43,936	23,286	20,957	23,433
24_P38P	213,252	148,523	134,116	113,734
24_P39P	34,875	25,436	22,994	18,600
24_P6P	156,712	140,044	126,040	69,650
24_P7P	33,824	19,956	17,961	15,033

CMC ID	CMC Tons Collected	CMC Tons Collected for Recycling	CMC Tons Sent to End Markets	CMC Tons to be Sent to End Markets to Achieve 40% Proxy Recycling Rate
24_P8P	46,970	23,485	19,962	20,875
24_P40P	37,851	22,711	19,304	17,812
24_P11P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P13P	6,603	3,764	3,387	3,522
24_P14P	14,438	8,230	7,407	7,700
24_P17P	33,854	30,307	25,761	18,055
24_P41P	131,445	78,867	67,037	70,104
24_P19P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P20P	178,088	114,809	91,847	94,980
24_P23P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P42P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P27P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P43P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P5P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P10P	156,749	103,215	88,393	83,599
24_P12P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P15P	196,607	167,116	137,625	104,857
24_P16P	550,949	419,669	291,659	293,839
24_P21P	40,506	35,118	28,905	21,603
24_P22P	409,308	331,539	273,418	218,298
24_P29P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P45P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P44P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P36P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P46P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P33P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P34P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P35P	Not Modeled	Not Modeled	Not Modeled	Not Modeled

CMC ID	CMC Tons Collected	CMC Tons Collected for Recycling	CMC Tons Sent to End Markets	CMC Tons to be Sent to End Markets to Achieve 40% Proxy Recycling Rate
24_P47P	71,840	67,006	40,204	38,315
24_WO1N	827,756	26,582	0	n/a
24_WO1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO6N	46,505	4,408	0	n/a
24_WO6P	Not Modeled	Not Modeled	Not Modeled	Not Modeled

Table A-28: Estimated CMC Tons Needed from Additional Strategies Beyond Those Modeled and Estimated Inflow Tons to be Processed at MWP Facilities as Additional Strategy (2030)

CMC ID	CMC Tons Needed from Additional Strategies to Reach End Markets	MWP Loss Rate	Inflow Tons to MWP Facilities to Send CMC Tons Needed to End Markets
24_G1N	0	n/a	n/a
24_G1P	0	n/a	n/a
24_G2N	0	n/a	n/a
24_G2P	0	n/a	n/a
24_G3N	0	n/a	n/a
24_G3P	0	n/a	n/a
24_C1N	0	n/a	n/a
24_C1P	0	n/a	n/a
24_C2N	0	n/a	n/a
24_C2P	0	n/a	n/a
24_M1N	0	n/a	n/a
24_M1P	0	n/a	n/a

CMC ID	CMC Tons Needed from Additional Strategies to Reach End Markets	MWP Loss Rate	Inflow Tons to MWP Facilities to Send CMC Tons Needed to End Markets
24_M2N	0	n/a	n/a
24_M2P	0	n/a	n/a
24_M3N	0	n/a	n/a
24_M3P	0	n/a	n/a
24_M4P	0	n/a	n/a
24_M5N	0	n/a	n/a
24_M5P	0	n/a	n/a
24_M6N	0	n/a	n/a
24_M6P	0	n/a	n/a
24_M7P	0	n/a	n/a
24_M8N	0	n/a	n/a
24_M8P	0	n/a	n/a
24_M9N	0	n/a	n/a
24_M9P	0	n/a	n/a
24_M10N	0	n/a	n/a
24_M10P	0	n/a	n/a
24_M12N	0	n/a	n/a
24_M12P	0	n/a	n/a
24_PF1N	0	n/a	n/a
24_PF1P	0	n/a	n/a
24_PF14P	0	n/a	n/a
24_PF14N	0	n/a	n/a
24_PF15P	0	n/a	n/a
24_PF5P	0	n/a	n/a
24_PF7P	0	n/a	n/a
24_PF8N	0	n/a	n/a
24_PF8P	0	n/a	n/a
24_PF9N	0	n/a	n/a
24_PF9P	0	n/a	n/a

CMC ID	CMC Tons Needed from Additional Strategies to Reach End Markets	MWP Loss Rate	Inflow Tons to MWP Facilities to Send CMC Tons Needed to End Markets
24_PF10N	0	n/a	n/a
24_PF10P	0	n/a	n/a
24_PF11N	0	n/a	n/a
24_PF11P	0	n/a	n/a
24_PF12N	0	n/a	n/a
24_PF12P	0	n/a	n/a
24_PF16N	0	n/a	n/a
24_PF16P	0	n/a	n/a
24_P1P	5,586	20%	6,983
24_P2P	2,475	20%	3,094
24_P38P	0	n/a	n/a
24_P39P	0	n/a	n/a
24_P6P	0	n/a	n/a
24_P7P	0	n/a	n/a
24_P8P	913	60%	2,283
24_P40P	0	n/a	n/a
24_P11P	0	n/a	n/a
24_P13P	134	60%	336
24_P14P	294	60%	734
24_P17P	0	n/a	n/a
24_P41P	3,067	60%	7,668
24_P19P	0	n/a	n/a
24_P20P	3,133	60%	7,833
24_P23P	0	n/a	n/a
24_P42P	0	n/a	n/a
24_P27P	0	n/a	n/a
24_P43P	0	n/a	n/a
24_P5P	0	n/a	n/a
24_P10P	0	n/a	n/a

CMC ID	CMC Tons Needed from Additional Strategies to Reach End Markets	MWP Loss Rate	Inflow Tons to MWP Facilities to Send CMC Tons Needed to End Markets
24_P12P	0	n/a	n/a
24_P15P	0	n/a	n/a
24_P16P	2,180	50%	4,360
24_P21P	0	n/a	n/a
24_P22P	0	n/a	n/a
24_P29P	0	n/a	n/a
24_P45P	0	n/a	n/a
24_P44P	0	n/a	n/a
24_P36P	0	n/a	n/a
24_P46P	0	n/a	n/a
24_P33P	0	n/a	n/a
24_P34P	0	n/a	n/a
24_P35P	0	n/a	n/a
24_P47P	0	n/a	n/a
24_WO1N	0	n/a	n/a
24_WO1P	0	n/a	n/a
24_WO2N	0	n/a	n/a
24_WO2P	0	n/a	n/a
24_WO3N	0	n/a	n/a
24_WO3P	0	n/a	n/a
24_WO4N	0	n/a	n/a
24_WO4P	0	n/a	n/a
24_WO6N	0	n/a	n/a
24_WO6P	0	n/a	n/a

Table A-29: Estimated Tons of Solid Waste (Covered and Noncovered Material) Inbound to MWP to Capture CMC Tons Needed for End Markets (2030)

CMC ID	CMC Tons Collected in Solid Waste Material Stream	Tons of Solid Waste Collected	Percent of CMC per Ton	Minimum Tons of Solid Waste Processed to Capture Needed CMC Tons
24_G1N	48,498	26,543,174	0.18%	n/a
24_G1P	35,338	26,543,174	0.13%	n/a
24_G2N	3,711	26,543,174	0.01%	n/a
24_G2P	3,073	26,543,174	0.01%	n/a
24_G3N	4,837	26,543,174	0.02%	n/a
24_G3P	2,340	26,543,174	0.01%	n/a
24_C1N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M1N	7,849	26,543,174	0.03%	n/a
24_M1P	5,739	26,543,174	0.02%	n/a
24_M2N	42,560	26,543,174	0.16%	n/a
24_M2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M3N	20,675	26,543,174	0.08%	n/a
24_M3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M4P	7,001	26,543,174	0.03%	n/a
24_M5N	7,876	26,543,174	0.03%	n/a
24_M5P	2,835	26,543,174	0.01%	n/a
24_M6N	53,465	26,543,174	0.20%	n/a
24_M6P	37,205	26,543,174	0.14%	n/a
24_M7P	16,023	26,543,174	0.06%	n/a
24_M8N	17,180	26,543,174	0.06%	n/a
24_M8P	7,970	26,543,174	0.03%	n/a
24_M9N	3,776	26,543,174	0.01%	n/a
24_M9P	3,908	26,543,174	0.01%	n/a
24_M10N	6,283	26,543,174	0.02%	n/a
24_M10P	6,150	26,543,174	0.02%	n/a

CMC ID	CMC Tons Collected in Solid Waste Material Stream	Tons of Solid Waste Collected	Percent of CMC per Ton	Minimum Tons of Solid Waste Processed to Capture Needed CMC Tons
24_M12N	4,351	26,543,174	0.02%	n/a
24_M12P	1,664	26,543,174	0.01%	n/a
24_PF1N	52,581	26,543,174	0.20%	n/a
24_PF1P	78,498	26,543,174	0.30%	n/a
24_PF14P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_PF14N	107,917	26,543,174	0.41%	n/a
24_PF15P	15,183	26,543,174	0.06%	n/a
24_PF5P	21,684	26,543,174	0.08%	n/a
24_PF7P	87,285	26,543,174	0.33%	n/a
24_PF8N	9,660	26,543,174	0.04%	n/a
24_PF8P	20,154	26,543,174	0.08%	n/a
24_PF9N	303,242	26,543,174	1.14%	n/a
24_PF9P	700,734	26,543,174	2.64%	n/a
24_PF10N	75,595	26,543,174	0.28%	n/a
24_PF10P	65,116	26,543,174	0.25%	n/a
24_PF11N	1,634	26,543,174	0.01%	n/a
24_PF11P	5,949	26,543,174	0.02%	n/a
24_PF12N	43,299	26,543,174	0.16%	n/a
24_PF12P	36,533	26,543,174	0.14%	n/a
24_PF16N	9,022	26,543,174	0.03%	n/a
24_PF16P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P1P	51,395	26,543,174	0.19%	3,606,347
24_P2P	20,650	26,543,174	0.08%	3,976,770
24_P38P	64,729	26,543,174	0.24%	n/a
24_P39P	8,557	26,543,174	0.03%	n/a
24_P6P	14,587	26,543,174	0.05%	n/a
24_P7P	13,868	26,543,174	0.05%	n/a
24_P8P	23,485	26,543,174	0.09%	2,580,586
24_P40P	15,140	26,543,174	0.06%	n/a
24_P11P	0	26,543,174	0.00%	n/a
24_P13P	2,839	26,543,174	0.01%	3,137,856
24_P14P	6,208	26,543,174	0.02%	3,137,856

CMC ID	CMC Tons Collected in Solid Waste Material Stream	Tons of Solid Waste Collected	Percent of CMC per Ton	Minimum Tons of Solid Waste Processed to Capture Needed CMC Tons
24_P17P	885	26,543,174	0.00%	n/a
24_P41P	52,578	26,543,174	0.20%	3,870,880
24_P19P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P20P	62,302	26,543,174	0.23%	3,337,014
24_P23P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P42P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P27P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P43P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P5P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P10P	51,757	26,543,174	0.19%	n/a
24_P12P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P15P	29,491	26,543,174	0.11%	n/a
24_P16P	53,553	26,543,174	0.20%	2,161,102
24_P21P	1,784	26,543,174	0.01%	n/a
24_P22P	77,768	26,543,174	0.29%	n/a
24_P29P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P45P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P44P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P36P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P46P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P33P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P34P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P35P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P47P	3,210	26,543,174	0.01%	n/a

CMC ID	CMC Tons Collected in Solid Waste Material Stream	Tons of Solid Waste Collected	Percent of CMC per Ton	Minimum Tons of Solid Waste Processed to Capture Needed CMC Tons
24_WO1N	568,281	26,543,174	2.14%	n/a
24_WO1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO6N	33,125	26,543,174	0.12%	n/a
24_WO6P	Not Modeled	Not Modeled	Not Modeled	Not Modeled

Table A-30: CMC Tonnage to be Sent to End Markets to Achieve 65% Proxy Recycling Rate (2032)

CMC ID	CMC Tons Collected	CMC Tons Collected for Recycling	CMC Tons Sent to End Markets	CMC Tons to be Sent to End Markets to Achieve 65% Proxy Recycling Rate
24_G1N	100,166	48,766	39,012	n/a
24_G1P	77,788	65,985	52,788	52,126
24_G2N	22,859	16,047	12,838	n/a
24_G2P	17,023	14,418	11,534	11,407
24_G3N	9,319	4,473	3,578	n/a
24_G3P	4,919	4,132	3,306	3,296
24_C1N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M1N	17,164	7,534	6,404	n/a
24_M1P	13,820	11,262	9,573	9,456
24_M2N	53,292	10,658	7,461	n/a
24_M2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M3N	25,890	5,178	3,625	n/a
24_M3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M4P	13,247	10,730	9,121	9,064
24_M5N	9,861	1,972	1,676	n/a
24_M5P	8,380	7,542	6,411	6,408
24_M6N	90,740	34,391	29,232	n/a
24_M6P	72,232	57,418	48,806	48,403
24_M7P	30,403	24,201	20,571	20,373
24_M8N	17,742	532	452	n/a
24_M8P	15,081	11,914	10,127	10,106
24_M9N	31,903	26,354	22,401	n/a
24_M9P	23,373	21,073	17,912	17,873
24_M10N	87,257	71,767	61,002	n/a

CMC ID	CMC Tons Collected	CMC Tons Collected for Recycling	CMC Tons Sent to End Markets	CMC Tons to be Sent to End Markets to Achieve 65% Proxy Recycling Rate
24_M10P	63,984	51,147	43,475	42,876
24_M12N	5,448	1,090	926	n/a
24_M12P	4,631	4,168	3,543	3,541
24_PF1N	331,979	275,054	260,201	n/a
24_PF1P	163,416	130,778	111,162	110,646
24_PF14P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_PF14N	253,605	91,739	83,951	n/a
24_PF15P	67,620	60,425	51,822	51,709
24_PF5P	98,986	88,740	75,789	75,695
24_PF7P	375,362	337,826	287,152	287,041
24_PF8N	123,412	43,905	37,319	n/a
24_PF8P	93,351	84,276	71,635	71,386
24_PF9N	5,381,399	5,054,642	4,881,607	n/a
24_PF9P	1,788,012	1,427,697	1,213,542	1,210,633
24_PF10N	302,188	226,461	207,120	n/a
24_PF10P	166,501	133,201	113,221	112,735
24_PF11N	400,082	393,194	342,218	n/a
24_PF11P	247,405	226,114	192,197	189,192
24_PF12N	569,098	378,900	333,454	n/a
24_PF12P	374,938	337,889	287,206	286,717
24_PF16N	11,296	2,259	1,130	n/a
24_PF16P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P1P	112,222	92,926	83,633	85,817
24_P2P	42,593	35,353	31,817	32,571
24_P38P	206,869	172,458	155,657	158,194
24_P39P	33,333	27,962	25,268	25,490
24_P6P	147,536	131,775	118,598	106,553
24_P7P	32,790	25,248	22,723	23,681

CMC ID	CMC Tons Collected	CMC Tons Collected for Recycling	CMC Tons Sent to End Markets	CMC Tons to be Sent to End Markets to Achieve 65% Proxy Recycling Rate
24_P8P	45,535	38,249	32,512	32,886
24_P40P	36,692	32,656	27,758	28,059
24_P11P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P13P	6,401	5,441	4,897	4,895
24_P14P	13,997	11,897	10,708	10,703
24_P17P	31,803	28,712	24,405	24,320
24_P41P	127,427	113,410	96,399	97,444
24_P19P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P20P	171,219	152,504	129,629	130,932
24_P23P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P42P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P27P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P43P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P5P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P10P	152,272	130,432	113,615	116,443
24_P12P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P15P	190,595	171,535	146,567	145,749
24_P16P	527,764	468,314	400,144	403,584
24_P21P	38,707	34,488	29,468	29,599
24_P22P	396,795	357,115	305,135	303,431
24_P29P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P45P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P44P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P36P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P46P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P33P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P34P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P35P	Not Modeled	Not Modeled	Not Modeled	Not Modeled

CMC ID	CMC Tons Collected	CMC Tons Collected for Recycling	CMC Tons Sent to End Markets	CMC Tons to be Sent to End Markets to Achieve 65% Proxy Recycling Rate
24_P47P	68,869	64,963	52,458	52,664
24_WO1N	828,996	4,437	0	n/a
24_WO1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO6N	46,575	736	0	n/a
24_WO6P	Not Modeled	Not Modeled	Not Modeled	Not Modeled

Table A-31: Estimated CMC Tons Needed from Additional Strategies Beyond Those Modeled and Estimated Inflow Tons to be Processed at MWP Facilities as Additional Strategy (2032)

CMC ID	CMC Tons Needed from Additional Strategies to Reach End Markets	MWP Loss Rate	Inflow Tons to MWP Facilities to Send CMC Tons Needed to End Markets
24_G1N	0	n/a	n/a
24_G1P	0	n/a	n/a
24_G2N	0	n/a	n/a
24_G2P	0	n/a	n/a
24_G3N	0	n/a	n/a
24_G3P	0	n/a	n/a
24_C1N	0	n/a	n/a
24_C1P	0	n/a	n/a
24_C2N	0	n/a	n/a
24_C2P	0	n/a	n/a
24_M1N	0	n/a	n/a
24_M1P	0	n/a	n/a
24_M2N	0	n/a	n/a
24_M2P	0	n/a	n/a
24_M3N	0	n/a	n/a
24_M3P	0	n/a	n/a
24_M4P	0	n/a	n/a
24_M5N	0	n/a	n/a
24_M5P	0	n/a	n/a
24_M6N	0	n/a	n/a
24_M6P	0	n/a	n/a
24_M7P	0	n/a	n/a
24_M8N	0	n/a	n/a
24_M8P	0	n/a	n/a
24_M9N	0	n/a	n/a
24_M9P	0	n/a	n/a

CMC ID	CMC Tons Needed from Additional Strategies to Reach End Markets	MWP Loss Rate	Inflow Tons to MWP Facilities to Send CMC Tons Needed to End Markets
24_M10N	0	n/a	n/a
24_M10P	0	n/a	n/a
24_M12N	0	n/a	n/a
24_M12P	0	n/a	n/a
24_PF1N	0	n/a	n/a
24_PF1P	0	n/a	n/a
24_PF14P	0	n/a	n/a
24_PF14N	0	n/a	n/a
24_PF15P	0	n/a	n/a
24_PF5P	0	n/a	n/a
24_PF7P	0	n/a	n/a
24_PF8N	0	n/a	n/a
24_PF8P	0	n/a	n/a
24_PF9N	0	n/a	n/a
24_PF9P	0	n/a	n/a
24_PF10N	0	n/a	n/a
24_PF10P	0	n/a	n/a
24_PF11N	0	n/a	n/a
24_PF11P	0	n/a	n/a
24_PF12N	0	n/a	n/a
24_PF12P	0	n/a	n/a
24_PF16N	0	n/a	n/a
24_PF16P	0	n/a	n/a
24_P1P	2,184	20%	2,730
24_P2P	754	20%	943
24_P38P	2,537	50%	5,074
24_P39P	222	50%	444
24_P6P	0	n/a	n/a

CMC ID	CMC Tons Needed from Additional Strategies to Reach End Markets	MWP Loss Rate	Inflow Tons to MWP Facilities to Send CMC Tons Needed to End Markets
24_P7P	958	20%	1,198
24_P8P	374	50%	749
24_P40P	301	50%	602
24_P11P	0	n/a	n/a
24_P13P	0	n/a	n/a
24_P14P	0	n/a	n/a
24_P17P	0	n/a	n/a
24_P41P	1,046	50%	2,091
24_P19P	0	n/a	n/a
24_P20P	1,304	50%	2,607
24_P23P	0	n/a	n/a
24_P42P	0	n/a	n/a
24_P27P	0	n/a	n/a
24_P43P	0	n/a	n/a
24_P5P	0	n/a	n/a
24_P10P	2,829	19%	3,503
24_P12P	0	n/a	n/a
24_P15P	0	n/a	n/a
24_P16P	3,440	19%	4,260
24_P21P	131	19%	162
24_P22P	0	n/a	n/a
24_P29P	0	n/a	n/a
24_P45P	0	n/a	n/a
24_P44P	0	n/a	n/a
24_P36P	0	n/a	n/a
24_P46P	0	n/a	n/a
24_P33P	0	n/a	n/a
24_P34P	0	n/a	n/a

CMC ID	CMC Tons Needed from Additional Strategies to Reach End Markets	MWP Loss Rate	Inflow Tons to MWP Facilities to Send CMC Tons Needed to End Markets
24_P35P	0	n/a	n/a
24_P47P	207	34%	311
24_WO1N	0	n/a	n/a
24_WO1P	0	n/a	n/a
24_WO2N	0	n/a	n/a
24_WO2P	0	n/a	n/a
24_WO3N	0	n/a	n/a
24_WO3P	0	n/a	n/a
24_WO4N	0	n/a	n/a
24_WO4P	0	n/a	n/a
24_WO6N	0	n/a	n/a
24_WO6P	0	n/a	n/a

Table A-32: Estimated Tons of Solid Waste (Covered and Noncovered Material) Inbound to MWP to Capture CMC Tons Needed for End Markets (2032)

CMC ID	CMC Tons Collected in Solid Waste Material Stream	Tons of Solid Waste Collected	Percent of CMC per Ton	Minimum Tons of Solid Waste Processed to Capture Needed CMC Tons
24_G1N	48,584	25,598,796	0.19%	n/a
24_G1P	11,145	25,598,796	0.04%	n/a
24_G2N	3,717	25,598,796	0.01%	n/a
24_G2P	1,422	25,598,796	0.01%	n/a
24_G3N	4,846	25,598,796	0.02%	n/a
24_G3P	787	25,598,796	0.00%	n/a
24_C1N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_C2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M1N	7,862	25,598,796	0.03%	n/a
24_M1P	2,088	25,598,796	0.01%	n/a
24_M2N	42,634	25,598,796	0.17%	n/a
24_M2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M3N	20,712	25,598,796	0.08%	n/a
24_M3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_M4P	2,517	25,598,796	0.01%	n/a
24_M5N	7,889	25,598,796	0.03%	n/a
24_M5P	838	25,598,796	0.00%	n/a
24_M6N	53,559	25,598,796	0.21%	n/a
24_M6P	14,080	25,598,796	0.06%	n/a
24_M7P	6,117	25,598,796	0.02%	n/a
24_M8N	17,210	25,598,796	0.07%	n/a
24_M8P	3,167	25,598,796	0.01%	n/a
24_M9N	3,781	25,598,796	0.01%	n/a
24_M9P	1,567	25,598,796	0.01%	n/a

CMC ID	CMC Tons Collected in Solid Waste Material Stream	Tons of Solid Waste Collected	Percent of CMC per Ton	Minimum Tons of Solid Waste Processed to Capture Needed CMC Tons
24_M10N	6,294	25,598,796	0.02%	n/a
24_M10P	5,216	25,598,796	0.02%	n/a
24_M12N	4,358	25,598,796	0.02%	n/a
24_M12P	463	25,598,796	0.00%	n/a
24_PF1N	52,672	25,598,796	0.21%	n/a
24_PF1P	29,707	25,598,796	0.12%	n/a
24_PF14P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_PF14N	108,105	25,598,796	0.42%	0
24_PF15P	6,453	25,598,796	0.03%	0
24_PF5P	9,503	25,598,796	0.04%	0
24_PF7P	37,536	25,598,796	0.15%	0
24_PF8N	9,677	25,598,796	0.04%	0
24_PF8P	8,599	25,598,796	0.03%	0
24_PF9N	303,770	25,598,796	1.19%	0
24_PF9P	334,968	25,598,796	1.31%	0
24_PF10N	75,727	25,598,796	0.30%	0
24_PF10P	33,300	25,598,796	0.13%	0
24_PF11N	1,637	25,598,796	0.01%	0
24_PF11P	5,059	25,598,796	0.02%	0
24_PF12N	43,374	25,598,796	0.17%	0
24_PF12P	8,449	25,598,796	0.03%	0
24_PF16N	9,037	25,598,796	0.04%	0
24_PF16P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P1P	18,397	25,598,796	0.07%	3,798,609
24_P2P	7,241	25,598,796	0.03%	3,332,715
24_P38P	34,411	25,598,796	0.13%	3,774,831
24_P39P	4,869	25,598,796	0.02%	2,331,862
24_P6P	13,796	25,598,796	0.05%	n/a

CMC ID	CMC Tons Collected in Solid Waste Material Stream	Tons of Solid Waste Collected	Percent of CMC per Ton	Minimum Tons of Solid Waste Processed to Capture Needed CMC Tons
24_P7P	7,542	25,598,796	0.03%	4,065,509
24_P8P	7,286	25,598,796	0.03%	2,630,987
24_P40P	4,036	25,598,796	0.02%	3,819,286
24_P11P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P13P	960	25,598,796	0.00%	n/a
24_P14P	2,100	25,598,796	0.01%	n/a
24_P17P	772	25,598,796	0.00%	n/a
24_P41P	14,017	25,598,796	0.05%	3,819,286
24_P19P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P20P	18,455	25,598,796	0.07%	3,616,540
24_P23P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P42P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P27P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P43P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P5P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P10P	21,488	25,598,796	0.08%	4,173,089
24_P12P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P15P	19,059	25,598,796	0.07%	n/a
24_P16P	43,772	25,598,796	0.17%	2,491,123
24_P21P	2,125	25,598,796	0.01%	1,956,957
24_P22P	39,679	25,598,796	0.16%	n/a
24_P29P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P45P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P44P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P36P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P46P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P33P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P34P	Not Modeled	Not Modeled	Not Modeled	Not Modeled

CMC ID	CMC Tons Collected in Solid Waste Material Stream	Tons of Solid Waste Collected	Percent of CMC per Ton	Minimum Tons of Solid Waste Processed to Capture Needed CMC Tons
24_P35P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_P47P	2,333	25,598,796	0.01%	3,410,256
24_WO1N	511,701	25,598,796	2.00%	n/a
24_WO1P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO2P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO3P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4N	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO4P	Not Modeled	Not Modeled	Not Modeled	Not Modeled
24_WO6N	34,562	25,598,796	0.14%	n/a
24_WO6P	Not Modeled	Not Modeled	Not Modeled	Not Modeled

8. Calculate Total Tons Collected (Covered and Noncovered Material) Through Onsite Curbside Collection by Material Stream

To project total tons collected, including both covered and noncovered material, for residential and commercial generators by collection stream, the contractor performed a similar calculation as in Appendix A, Section 2.F.1 when projecting covered material tons by material stream. Self-haul was excluded from this analysis. Additionally, this portion of the analysis is specific to onsite curbside collection, thus excludes amounts collected through alternative collection and sent directly to end markets. The contractor started with the Current State of Collection Report’s total tons collected, Table C-8 in the Appendix (which includes covered and noncovered material), disaggregated by generator, material stream, and region. The contractor divided the tons collected from the residential sector within each region for each material stream by the number of participating generators (the number of households) to calculate the annual average tons per generator. This metric provided a basis to estimate future tonnage across material streams as generator counts and population levels change over time.

Using this tons per generator factor and the formula described in Appendix A, Section 2.F.1, the contractor adjusted the total tonnage collected to reflect anticipated population growth. Once the contractor established the adjusted total tonnage collected by material stream, the contractor subtracted the covered material tons (as calculated in Step 1, Appendix A, Section 2.F.1) from total tons collected. For the materials collected for disposal and materials collected for recycling streams, this remainder represents noncovered material. In the materials collected for organics recycling stream, the contractor separated out organic noncovered material from noncovered material tonnage.

The result of this process is a set of stream-specific tonnage estimates that clearly distinguish between covered and noncovered materials before interventions. Each milestone year's tons collected by collection stream is the sum of the noncovered materials identified in the previous calculation and the covered materials after interventions as calculated in Appendix A, Section 2.F.2. The resulting tonnage of both covered and noncovered material enabled evaluation of system composition, recovery potential, and incremental cost of collection under the projected 2028, 2030, and 2032 conditions. Refer to Table A-33, Table A-34, and Table A-35 for the tons collected by material stream and milestone year.

As described in Appendix A, Section 2.F.2, the contractor calculated the total tons collected through onsite curbside collection by CMC and material stream after all CMC-level interventions and waste stream composition interventions were applied. Table A-33, Table A-34, and Table A-35 summarize the tons collected by material stream and region for residential and commercial generators, including covered material and noncovered material. Tons collected are estimated to decrease between milestone years due to the Act's plastic reduction targets of 10% by 2028, 20% by 2030, and 25% by 2032.

Table A-33: Total Tons Collected (Covered and Noncovered Material) in Onsite Curbside Collection After Interventions by Material Stream (2028)

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Solid Waste	3,390,736	1,185,085	374,439	17,047,039	4,942,196	26,939,495
Materials Collected for Recycling	1,945,335	442,348	140,435	6,068,300	1,627,501	10,223,919
Materials Collected for Organics Recycling	1,840,112	436,633	97,651	3,977,022	1,918,231	8,269,649
Total Tons Collected	**7,176,183**	**2,064,066**	**612,525**	**27,092,361**	**8,487,928**	**45,433,063**

Table A-34: Total Tons Collected (Covered and Noncovered Material) in Onsite Curbside Collection After Interventions by Material Stream (2030)

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Solid Waste	3,336,826	1,166,238	367,860	16,793,562	4,878,688	26,543,174
Materials Collected for Recycling	1,888,252	434,277	137,632	5,962,958	1,609,123	10,032,242
Materials Collected for Organics Recycling	1,872,009	444,263	99,580	4,069,860	1,955,698	8,441,410
Total Tons Collected	**7,097,087**	**2,044,778**	**605,072**	**26,826,380**	**8,443,509**	**45,016,826**

Table A-35: Total Tonnage Collected (Covered and Noncovered Material) in Onsite Curbside Collection After Interventions by Material Stream (2032)

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Solid Waste	3,196,832	731,082	353,670	16,594,155	4,723,057	25,598,796
Materials Collected for Recycling	1,921,120	453,552	143,163	6,219,806	1,702,346	10,439,987
Materials Collected for Organics Recycling	1,916,521	843,975	101,531	3,770,788	1,982,612	8,615,427
Total Tons Collected	**7,034,473**	**2,028,609**	**598,364**	**26,584,749**	**8,408,015**	**44,654,210**

9. Calculate Increased Cost of Onsite Curbside Collection for Covered and Noncovered Material

To estimate the increased cost of onsite curbside collection for both covered and noncovered material in milestone years, the contractor inflated the cost per ton of materials collected for recycling and organics recycling by region, as estimated in the Current State of Collection Report, from 2024 to 2028, 2030, and 2032 dollars using the Department of Finance's P-2A report[34] by region. The Bay Area region was inflated using the San Francisco urban consumer price index (CPI-U) for all items; the Southern region was inflated using the percentage increase in the Los Angeles CPI-U for all items; and the Coast, Mountain, and Valley regions were inflated using the California CPI-U for all items. Refer to Table A-36 for a summary of these inflated per ton costs of onsite curbside collection, which is applicable to both covered and noncovered material collection.

[34] State of California: Department of Finance. "P-2: County Population Projections (2020-2070)." *Ca.gov,* 2019.

Table A-36: Inflated Per Ton Cost of Onsite Curbside Collection for Materials Collected for Recycling and Organics Recycling by Region

Collection Stream	Bay Area	Coastal	Mountain	Southern	Valley
Materials Collected for Recycling (2028)	$739	$824	$750	$672	$810
Material Collected for Recycling (2030)	$791	$881	$802	$719	$867
Material Collected for Recycling (2032)	$847	$942	$858	$769	$927
Materials Collected for Organics Recycling (2028)	$228	$255	$231	$207	$251
Materials Collected for Organics Recycling (2030)	$244	$273	$247	$221	$269
Materials Collected for Organics Recycling (2032)	$261	$292	$264	$236	$288

Table A-37 through Table A-42 show the projected changes in the total tons of material including covered and noncovered materials collected for recycling and organics recycling as compared to the tons collected in 2024.

Table A-37: Estimated Change in Tons of Covered and Noncovered Materials Collected for Recycling (2028) as Compared to Tons Collected in 2024

Description	Bay Area	Coast	Mountain	Southern	Valley	Statewide
Tons of Material Collected for Recycling (2024)	1,536,813	315,350	104,379	4,490,200	1,084,441	7,531,183
Tons of Material Collected for Recycling (2028)	1,945,335	442,348	140,435	6,068,300	1,627,501	10,223,919
Change in Tons Collected for Recycling	408,522	126,998	36,056	1,578,100	543,060	2,692,736

Table A-38: Estimated Change in Tons of Covered and Noncovered Materials Collected for Organics Recycling (2028) as Compared to Tons Collected in 2024

Description	Bay Area	Coast	Mountain	Southern	Valley	Statewide
Tons of Material Collected for Organics Recycling (2024)	1,967,586	467,581	105,128	4,251,271	2,043,819	8,835,385
Tons of Material Collected for Organics Recycling (2028)	1,840,112	436,633	97,651	3,977,022	1,918,231	8,269,649
Change in Tons Collected for Organics Recycling	(127,474)	(30,948)	(7,477)	(274,249)	(125,588)	(565,736)

Table A-39: Estimated Change in Tons of Covered and Noncovered Materials Collected for Recycling (2030) as Compared to Tons Collected in 2030

Description	Bay Area	Coast	Mountain	Southern	Valley	Statewide
Tons of Material Collected for Recycling (2024)	1,536,813	315,350	104,379	4,490,200	1,084,441	7,531,183
Tons of Material Collected for Recycling (2030)	1,888,252	434,277	137,632	5,962,958	1,609,123	10,032,242
Change in Tons Collected for Recycling	351,439	118,927	33,253	1,472,758	524,682	2,501,059

Table A-40: Estimated Change in Tons of Covered and Noncovered Materials Collected for Organics Recycling (2030) as Compared to Tons Collected in 2024

Description	Bay Area	Coast	Mountain	Southern	Valley	Statewide
Tons of Material Collected for Organics Recycling (2024)	1,967,586	467,581	105,128	4,251,271	2,043,819	8,835,385
Tons of Material Collected for Organics Recycling (2030)	1,872,009	444,263	99,580	4,069,860	1,955,698	8,441,410
Change in Tons Collected for Organics Recycling	(95,577)	(23,318)	(5,548)	(181,411)	(88,121)	(393,975)

Table A-41: Estimated IChange in Tons of Covered and Noncovered Materials Collected for Recycling (2032) as Compared to Tons Collected in 2024

Description	Bay Area	Coast	Mountain	Southern	Valley	Statewide
Tons of Material Collected for Recycling (2024)	1,536,813	315,350	104,379	4,490,200	1,084,441	7,531,183
Tons of Material Collected for Recycling (2032)	1,921,120	453,552	143,163	6,219,806	1,702,346	10,439,987
Change in Tons Collected for Recycling	384,307	138,202	38,784	1,729,606	617,905	2,908,804

Table A-42: Estimated Change in Tons of Covered and Non-Covered Materials Collected for Organics Recycling (2032) as Compared to Tons Collected in 2024

Description	Bay Area	Coast	Mountain	Southern	Valley	Statewide
Tons of Material Collected for Organics Recycling (2024)	1,967,586	467,581	105,128	4,251,271	2,043,819	8,835,385
Tons of Material Collected for Organics Recycling (2030)	1,916,521	843,975	101,531	3,770,788	1,982,612	8,615,427
Change in Tons Collected for Organics Recycling	(51,065)	376,394	(3,597)	(480,483)	(61,207)	(219,958)

G. Assumptions

The following are the assumptions related to the tonnage flow model and other analyses described in Appendix A:

- The tonnage flow model is specific to onsite curbside collection, material delivered directly to end markets, and alternative collection systems for residential and commercial generators. The model excludes self-haul and local jurisdiction drop-off sites due to data limitations.
- The model assumes that commercial tons do not change through time (see Appendix A, Section 2.F.1 for more details).
- When estimating the needs to meet the requirements of the Act, the contractor did not calculate actual recycling rates. Instead, the contractor used a proxy recycling rate to approximate the needs using available data. Specifically:
  - The contractor's analysis is not inclusive of all covered material generated as there are data limitations in quantifying the tons of covered materials that are currently littered or released into the environment prior to reaching a collection system and therefore cannot be accounted for in the model. Therefore, this analysis focuses on covered material tonnage collected.
- The Act requires that for material to be considered recycled, it must be sent to "responsible" end markets (PRC 42041(aa)(3)). The contractor did not evaluate end market facilities for consideration as a responsible end market. Whether any end market will be considered a responsible end market is only established when an approved producer responsibility plan identifies it as such. For the purposes of this report, the contractor assumed that international end markets would not be considered responsible end markets and that domestic end markets were assumed to be responsible. The recycling rates published by CalRecycle may differ from the results of this analysis.
- Collection rates were not assumed to decrease for plastic covered material between milestone years even if a reduced collection rate combined with improvement in processing loss rates and CMC conversion rates were estimated to reach the proxy recycling rate targets. This resulted in CMCs with currently high collection rates sometimes exceeding the proxy recycling rate targets. The contractor assumed that implementation of interventions to increase collection rates in previous years is likely to continue and will yield at a minimum the same collection rate as the previous milestone year. The contractor assumed projected processing loss and CMC conversion rates based on anticipated technological developments or viable end markets for each milestone year. If technology develops to decrease processing loss of covered materials, or end markets accept more/new covered materials, the calculated collection rate in this analysis may be lower because of the

increased of capture of tonnage after collection. To be conservative, the rates and tonnage of material delivered directly to end markets are assumed to remain constant as limited data was available to estimate or project changes in these tons in future years.

- The contractor assumed that CMC conversion rates would be the same for covered materials collected via onsite curbside versus alternative collection, since end markets should generally be accepting only material that is ready to be recovered by their facility and material from both sources is likely to go to the same end markets. Some end markets do not accept source separated material that is composed of only a single CMC. Often, end markets accept tonnages that are a combination of multiple similar CMCs. Because the contractor is unable to separately identify the CMC conversion rate of each CMC, the contractor applied and projected CMC conversion rates based on the CMC end market groups. All CMCs that are accepted within the same covered material end market groups are assumed to have the same CMC conversion rate.
- In *California Landfills: Measuring Single Use Packaging and Plastic Food Service Ware Disposed (2025),* the tons of covered material disposed within the state did not disaggregate tonnage into CMCs with and without a plastic component (e.g., the sorting categories were not able to differentiate between cardboard with and without a plastic component). The contractor could not identify a third-party source that could estimate the proportionate split between items with and without a plastic component. Instead, the contractor assumed a 50-50 split of tons between CMCs with and without a plastic component.
- The contractor assumed the tonnage of solid waste residue in the materials collected for recycling and organics recycling collection stream would remain similar to the tonnage of solid waste residue calculated in the Current State of Collection Report.

H. Limitations and Barriers

Values presented in this report are based on estimates and may have been rounded for clarity. As a result, some tables, subtotals, and percentages may not add up precisely to the totals shown. These minor discrepancies do not affect the overall analysis or conclusions of this report.

1. Data Collection Limitations

The unique nature of individual alternative collection programs, and the fact that such programs are typically operated by private entities, limited the contractor’s ability to obtain quantitative cost data if it was: (i) not readily available; and/or (ii) considered proprietary by the participating business or operator of alternative collection programs. Cost data available through public websites, such as alternative collection programs offered through companies like Ridwell and TerraCycle, was limited to the published cost to the generator. This may not reflect the full cost of the offered alternative collection programs, due to the fact that some alternative collection programs are not directly or fully funded by consumer fees and are rather funded through other sources of revenue, such as the sale of the product or corporate sponsorship of the program. Subsequently, statewide analysis of costs to operate alternative collection programs and tonnages managed through alternative collection programs was not estimated.

2. Analysis Limitations

Current collection operations include both full and partial routes, since not all service areas require a full route to service all generators within the specified service region. Transition of capital, such as reallocating trucks used for solid waste routes to materials collected for recycling routes, for partial routes may occur irregularly based on need as the number of routes for solid waste decreases, rather than linearly over time. Similarly, partial routes may be required for materials collected for recycling within jurisdictions based on generator need and geography. Because the transition of partial routes is highly variable and contextual, the contractor assumed that the transition of partial solid waste routes to partial material collected for recycling routes would occur over time and would not warrant additional resources or incur additional capital costs outside of the per ton costs calculated in the Current State of Collection report.

3. Public Engagement Limitations

Both the Collection Survey and the Community Recycling and Composting Survey had brief turnaround times, which may have hindered community members and local jurisdictions from participating or submitting complete surveys. Submission deadlines for both surveys were extended to encourage additional participation.

Additionally, the Community Recycling and Composting Survey was finalized in late June, and introductory meetings had to be held prior to distributing the survey to introduce CBOs, EJ groups, and Tribes to the study and the objectives of engagement with priority populations. Most CBOs, EJ groups, and California Native American Tribes need at least one month to schedule a meeting and two months to engage with their community. With the tight time frame, the turnaround time required of the CBOs, EJ groups, and Tribes was shorter than optimal.

Finally, many of the CBOs and EJ groups who participated have community members who would otherwise be hard to reach via phone or e-mail. While partnering with CBOs and EJ groups allowed the project the opportunity to connect with those individuals, there was still a significant barrier in collecting data from individuals with no primary residence or reliable access to a computer or internet.

3. Processing of Covered Materials

A. Recycling Processing Facilities

The following sections discuss the detailed methodology and analysis conducted by the contractor to estimate potential processing facility needs in order to achieve the proxy recycling rates.

1. Access to Recycling Processing Facilities for Covered Materials

This section describes the contractor's methodology in developing an estimate of the improvements needed to capture additional covered materials. The approach was developed using input from facility operators who described potential operational changes that could occur to capture additional materials. Discussions during the site visits and phone interviews provided insight on how facility operators could effectively capture the covered materials given the current operation of the facility, its use or lack thereof of equipment and technology, its current material streams, staffing, site constraints, marketability of the recovered materials, and other metrics. Through these discussions, the contractor developed four categories of facility types, which are provided in the Current State of Processing Report and listed in the next subsection.

With input from operators, the contractor developed a list of potential changes to recover additional covered materials. Generally, the types of improvements could be categorized into capital and operational. Capital improvements are subcategorized into equipment, supporting infrastructure, and building improvements. Operational improvements were quantified as additional staff.

Both capital and operational costs were amortized and combined to reflect an annual cost of improvement, according to the respective facility type. Using an approximate range of annual throughput for materials based on survey results and internal project resources, the amortized additional costs were divided by the annual throughput quantity to yield an approximate additional cost per ton. Thus, the costs and changes are not specific to the needs of any one facility but rather approximate industry needs as distributed through the identified facility types.

2. General Assumptions

Based on interested party engagement, facilities could generally be categorized into one of four groups:

- Small facility for processing materials collected for recycling using manual processing.
- Medium facility for processing materials collected for recycling using modest processing equipment.
- Large facility for processing materials collected for recycling, using robust processing equipment.
- MWP facility with robust processing equipment.

These designations were based upon annual throughput and level of existing automation. Each facility was assigned to a facility type, which was the basis for assigning potential improvements and associated costs in the model. These upgrade costs were applied to each individual facility throughput to derive an approximate average cost-per-ton value for each facility type.

The level of automation for each facility was determined through a combination of survey responses, interviews, and publicly available data. The model assigned development parameters according to the automation level present at each facility.

While automation levels generally correlated with throughput ranges, exceptions to this trend were observed. Tonnage throughput served as a metric to validate and adjust development parameters to ensure accurate facility type classification.

The contractor recognizes that there are outliers to these groups; however, these assumptions for each of these facility categories, their respective feedstock streams, technology implemented, and operational changes are discussed in the following section.

Facility Categories

- **Small facility for processing materials collected for recycling using manual processing:** These facilities process small quantities of materials collected for recycling, less than 20,000 tons per year. The material streams to these facilities are generally cleaner, with minimal contamination, reflecting a single jurisdiction. The jurisdiction of origin is most likely rural but could be urban due to unique circumstances such as a unique collection system (dual stream), a public-owned facility, or other circumstances. The facility generally employs a manual sorting system and lacks sophistication in terms of equipment/technology. Many of these facilities are older and some are constrained by site limitations or other factors that limit their expansion potential. Balers are often the highest level of technology at these facilities.
- **Medium facility for processing materials collected for recycling using modest processing equipment**: These facilities process materials collected for recycling at a range of 20,000 to 40,000 tons per year. The material streams to these facilities vary from somewhat clean, with some contamination, to those with a modest level of contamination. These facilities can receive material from a single or multiple jurisdictions. The jurisdiction(s) of origin could be rural but is more likely urban. The facility typically employs a single-stream processing system. The facility could be privately or publicly owned and operated. The facility generally employs some mechanical assistance in the sorting line. The extent of the mechanical systems varies from minimal features (such as screens, magnets, etc.) to relatively robust systems with multiple screens, air classification, eddy current, magnets and possibly one or two optical sorters. Systems may be limited in growth potential due to factors such as permit or jurisdictional limitations, age of equipment, and site constraints. These systems are more likely to have the ability to direct bale cardboard or other clean source separated materials.
- **Large facility for processing materials collected for recycling using robust processing equipment**: These facilities are relatively large in terms of the quantities of materials collected for recycling, receiving and processing more than 40,000 tons per year. The material streams to these facilities vary from modest to high levels of contamination. These facilities tend to reflect large urban or regional jurisdictions. The facility typically employs a single-stream processing system. The facility could be privately or publicly owned. Operations are typically performed by a private operator but could also be a

public entity. The facility generally uses a higher level of mechanical assistance in the sorting line and thus has fewer manual sorters per ton of processed material. The mechanical systems used are relatively robust with multiple screens, air classification, eddy current, magnets and likely several optical sorters. These facilities generally use newer equipment and process controls and may have replaced or upgraded older equipment more than once. These facilities are more likely to use multiple advanced sorting lines and have processing capability to send some clean source-separated single commodity materials directly to baling.

- **Mixed waste processing (MWP) facility with robust processing equipment:** These facilities are configured to receive and process mixed waste to recover materials collected for recycling; however, source separated material streams, like commercial recycling and residential single stream, are also received and processed. Generally, these facilities are large or receive high quantity of materials – typically, greater than 100,000 tons per year. The major material stream to these facilities is mixed waste which, by definition, contains high levels of contamination. These facilities tend to reflect large urban or regional jurisdictions. The facility typically employs a mixed waste type of processing system designed to extract covered materials from the waste materials. The facility could be privately or publicly owned and is typically operated by a private entity. The facility generally uses advanced mechanical technology in the sorting line. The mechanical systems are relatively robust, with multiple screens, air classification, eddy current, magnets and likely many optical sorters. Some facilities may have multiple sorting lines where specific materials may be processed through a specific set of equipment.

Covered Materials Considered

The Act requires a recycling rate of 65% for plastic covered materials by 2032; therefore, the contractor's analysis focuses on equipment and infrastructure upgrades that are relevant to recovering additional plastic covered materials. Table A-43 summarizes plastic CMCs, their respective CMC Processing Groups, and proposed solutions for recovering this material at the recycling processing facility determined by the contractor for the modeling effort.

Table A-43: Proposed MRF Improvements by CMC Processing Group for Modeling

CMC Class	CMC Material Type	CMC Material Form	CMC Processing Group	Potential Recycling Processing Facility Improvements
Glass	Glass	Bottles and jars w/plastic component	Mixed Glass Bottles and Jars- Non-CRV	Glass cleanup systems

CMC Class	CMC Material Type	CMC Material Form	CMC Processing Group	Potential Recycling Processing Facility Improvements
Glass	Glass	Other Forms w/plastic component	Other Forms of Glass	Glass cleanup systems
Glass	Glass	Small-Two or more sides measuring two inches or less w/plastic component	Small Format-Glass	Glass cleanup systems
Paper and Fiber	Multi-Material Laminate	Other Forms w/ plastic	Other Lined Paper	Install an optical sorter on the fiber line to sort for poly-coated paper products for a dedicated bale. Consider additional storage for these materials.
Paper and Fiber	OCC	Waxed Cardboard w/ plastic component	Waxed OCC	Bale these materials from source separated generators, manually pull these items off the sort line early on in the sorting process.
Paper and Fiber	Paperboard	All Forms w/ plastic component	Paperboard	Install an optical sorter on the fiber line to sort for poly-coated paper products for a dedicated bale. Consider additional storage for these materials. Manual quality control may still be necessary.
Paper and Fiber	White Paper	All Forms w/ plastic component	Mixed Paper	Install an optical sorter on the fiber line to sort for poly-coated paper products for a dedicated bale. Consider additional storage for these materials.

CMC Class	CMC Material Type	CMC Material Form	CMC Processing Group	Potential Recycling Processing Facility Improvements
Paper and Fiber	Other/Mixed Paper	All Forms w/ plastic component	Mixed Paper	Install an optical sorter on the fiber line to sort for poly-coated paper products for a dedicated bale. Consider additional storage for these materials.
Plastic	LDPE (#4)	Bottles, Jugs and Jars	Plastic #4 - LDPE Bottles and Jugs	Use existing optical sorters to include this material with HDPE pigmented materials or keep this as a separate commodity depending on end market availability.
Plastic	LDPE (#4)	Other Rigid Items	Plastic #4 - Other LDPE Rigid	Use existing optical sorters to include this material with HDPE pigmented materials or keep this as a separate commodity depending on end market availability.
Plastic	PP (#5)	Utensils	Plastic #5 - Other PP	Install an optical sorter to sort for plastic #5 – PP rigid items, which may capture these materials if they don’t end up in the glass or residue.
Plastic	PS (#6)	Utensils	Plastic #6 - Other PS	Install an optical sorter for mixed plastics (e.g., plastics #3-7) to be sorted via secondary processing, especially if a facility is constrained for space and cannot accommodate the facility retrofit needed to recover additional materials. These materials are small and may need to be recovered during the glass cleanup process.

CMC Class	CMC Material Type	CMC Material Form	CMC Processing Group	Potential Recycling Processing Facility Improvements
Plastic	PS (#6)	Solid Hinged Containers, Plates, Cups, Tubs, Trays, and Other Solid Forms	Plastic #6 - PS Rigid Items	Install an optical sorter for mixed plastics (e.g., plastics #3-7) to be sorted via secondary processing, especially if a facility is constrained for space and cannot accommodate the facility retrofit needed to recover additional materials.
Plastic	PET (#1)	Other Rigid Containers, Cups, Lids, Plates, Trays, Tubs	Plastic #1 - Other PET Rigid	Install an optical sorter with AI to sort for these materials (e.g., PET thermoforms) into a separate non-bottle, jug, jar bale.
Plastic	PET (#1)	Other Rigid Items	Plastic #1 - Other PET Rigid	Install an optical sorter with AI to sort for these materials (e.g., PET thermoforms) into a separate non-bottle, jug, jar bale.
Plastic	PET (#1)	Flexible and Film Items	Plastic #1 - PET Flexibles and Films	Install up to two optical sorters on the fiber line to recover mixed flexibles and films to be sorted via secondary processing.
Plastic	HDPE (#2)	Flexible and Film Items	Plastic #2 - HDPE Flexibles and Films	Install up to two optical sorters on the fiber line to recover mixed flexibles and films to be sorted via secondary processing.
Plastic	LDPE (#4)	Clear Non-Bag Film	Plastic #4 - Mono LDPE Flexibles and Films	Install up to two optical sorters on the fiber line to recover mixed flexibles and films to be sorted via secondary processing.
Plastic	LDPE (#4)	Other Flexible and Film Items	Plastic #4 - Mono LDPE Flexibles and Films	Install up to two optical sorters on the fiber line to recover mixed flexibles and films to be sorted via secondary processing.

CMC Class	CMC Material Type	CMC Material Form	CMC Processing Group	Potential Recycling Processing Facility Improvements
Plastic	PP (#5)	Clear Non-Bag Film	Plastic #5 - Mono PP Flexibles and Films	Install up to two optical sorters on the fiber line to recover mixed flexibles and films to be sorted via secondary processing.
Plastic	PP (#5)	Other Flexible and Film Items	Plastic #5 - Mono PP Flexibles and Films	Install up to two optical sorters on the fiber line to recover mixed flexibles and films to be sorted via secondary processing.
Plastic	Multi-Material Laminate	Pouches and Envelopes	Multi-Material Laminate	Install up to two optical sorters on the fiber line to recover mixed flexibles and films to be sorted via secondary processing.
Plastic	Multi-Material Laminate	Other Forms	Multi-Material Laminate	Install up to two optical sorters on the fiber line to recover mixed flexibles and films to be sorted via secondary processing.

Capital Upgrades

Capital upgrade costs required to recover additional covered materials vary by facility type. The characterization of each facility type is based on the state of existing facility infrastructure, level of automation, and actual recycling processing facility operational tonnage throughput.

The capital upgrade planning cost model incorporates equipment costs to install the best available technology to divert covered materials. Additionally, costs were included to identify needs for increased bunker capacity, baler capacity, covered bale storage, and overall building envelope. While potential improvements are identified, each facility is unique, requiring customized solutions. Spatial constraints, influenced by site layout and infrastructure, can affect the process of adding or retrofitting equipment.

The following are assumptions and findings made by facility type:

- **Small facility for processing materials collected for recycling using manual processing:** Operators of these types of facilities stated that the requirement of capturing additional plastics or capturing new covered materials would not necessarily be a reason to invest and implement a more sophisticated mechanical sorting system. Rather, these facilities may only require additional mechanical equipment to manage increases in quantities of plastics and to improve and enhance the current use of manual sorting. Capital improvements may include additional conveyors, additional manual sorting platforms, added bale storage capacity and enlarged building footprints to accommodate the expanded mechanical equipment, and additional sorting lines to manage the increased quantities of materials.

- **Medium facility for processing materials collected for recycling using modest processing equipment:** These facilities already implement some mechanically assisted sorting equipment and are likely to increase their use of the same equipment to recover additional materials. The mechanical improvements to capture covered materials are estimated to be up to three additional optical sorters. The addition of an optical sorter into an existing facility requires several other key improvements. An optical sorter requires an acceleration conveyor to present the materials to the sorter such that the device can perform its separation function. A minimum of two, and up to three, take-away conveyors are required to receive the materials the optical sorter separates and directs them to a commodity specific bunker. The increase in recycling quantities and the addition of new material categories may require the addition of bunker capacity for each new material added. Depending on the type, size and weight of the material, a live-bottom floor bunker or a suspended silo would be needed. Also, each added bunker/silo will require access to the baler in-feed conveyor. Additionally, baler storage capacity and building expansions were included for this category of facility.
- **Large facility for processing materials collected for recycling using robust processing equipment:** These facilities use mechanically assisted sorting equipment on a regular basis. Facility operators preferred to increase their use of the same equipment to recover added materials. The mechanical improvements needed to capture covered materials are estimated to be up to six additional optical sorters. The addition of an optical sorter into an existing facility requires a number of other key improvements. An optical sorter requires an acceleration conveyor to present the materials to the sorter such that the device can perform its separation function. Also, a minimum of two, and up to three, take-away conveyors are required to receive the separated materials and direct them to a separate bunker. The addition of increased plastics recovery and new material categories may require the addition of bunker capacity for each new material added. Depending on the type, size and weight of the material, a live-bottom floor bunker or a suspended silo may be most effective. The contractor also added costs for additional bunker/silo capacity in addition to increasing the baler in-feed conveyor system. Additionally, baler storage capacity and building expansions were included for this category of facility.
- **Mixed waste processing (MWP) facility with robust processing equipment:** These facilities use mechanically assisted sorting equipment on a regular basis. Facility operators preferred to increase their use of the same equipment to recover added materials. The mechanical improvements

needed to capture covered materials is estimated to be up to six additional optical sorters. The addition of an optical sorter into an existing facility requires several other key improvements. An optical sorter requires an acceleration conveyor to present the materials to the sorter such that the device can perform its separation function. Also, a minimum of two, and up to three, take-away conveyors are required to receive the separated materials and direct them to a separate bunker. The addition of new material categories may require the addition of bunker capacity for each new material added. Depending on the type, size and weight of the material, a live-bottom floor bunker or a suspended silo would be needed. Each added bunker/silo will require access to the baler in-feed conveyor. Additionally, baler storage capacity and building expansions were included for this category of facility.

Operational Changes

Operational changes considered in this analysis were limited to staff/labor. Staffing increases were designated as follows based on the contractor's industry experience and interested party feedback by facility type:

- **Small facility for processing materials collected for recycling using manual processing:** Two additional FTE staff.
- **Medium facility for processing materials collected for recycling using modest processing equipment:** Three additional FTE staff.
- **Large facility for processing materials collected for recycling using robust processing equipment:** Four additional FTE staff.
- **Mixed waste processing (MWP) facility with robust processing equipment:** Four additional FTE staff.

The contractor assumed no additional cost associated with site rolling stock, baler use, maintenance, electricity, or overhead. Although the contractor anticipates that these costs will incur in some cases, the values are assumed to be minor in terms of having a measurable increase in the facility cost.

Range of Throughput Tonnage by Facility Type

An approximate annual throughput per facility type was estimated based on material throughput per facility (in California) data extracted from survey information and internal project resources. Each facility type was characterized by annual throughput tonnage and level of automation.

- **Small facility for processing materials collected for recycling using manual processing:** 20,000 tons per year.
- **Medium facility for processing materials collected for recycling using modest processing equipment:** 20,000 to 40,000 tons per year.
- **Large facility for processing materials collected for recycling using robust processing equipment:** 40,000 to 100,000 tons per year or more.

- **Mixed waste processing (MWP) facility with robust processing equipment:** more than 100,000 tons per year.

Mixed Waste Processing Facilities

MWP facilities can be used to recover specific materials from mixed waste or solid waste streams and were considered as an additional strategy to capture covered material beyond the strategies initially modeled. In addition to using existing capacity at MWP facilities, the contractor also considered the construction of the new MWP facilities. The contractor identified MWP facilities that can be designed to recover additional covered materials that are not collected in the recycling or organics recycling streams. MWP was considered for covered materials that have existing challenges to recover, including Flexible and film plastics and certain types of rigid plastics.

Generally, current MWP facilities in California sort for plastic #1 and plastic #2 bottles, jugs, and jars, ferrous and non-ferrous metals, OCC, and mixed papers (depending on the quality of the material).

A MWP facility typically involves a higher level of mechanical and technical complexity to develop and operate compared to a standard MRF. Equipment must be more robust due to the high variability of mixed waste and the need to extract the recoverable fraction from the remaining mixed waste. Ownership and operational models at MWP facilities can vary. While these facilities can be publicly owned, the technical expertise, staffing requirements, and equipment maintenance associated with a facility of this scale often make private third-party operation a more practical solution. The quality (contamination rate) of recovered materials by MWP facilities is directly correlated with the marketability of those materials and ultimately impacts the viability of end markets for those materials. MWP facilities must account for the quality of their recovered materials and the downstream effects in their design and operational strategies.

Planning

Siting and permitting MWP facilities can be complex and may face challenges. Historically, these facilities have encountered resistance from local communities and private haulers due to concerns about traffic, noise, odors, and perceived impacts on property values, which should be considered when siting or expanding facilities.

Processing Equipment

A MWP facility is similar to a mechanized MRF but includes several initial devices to remove undesirable materials and to separate the arriving materials into different sizes. MWP facilities typically use a metering device and a bag opener to expose the contents of bagged material. Next, a presorting station enables viewing and removal of large or tangling types of materials. Following this, the use of a trommel screen to separate large items from smaller items is often incorporated. This step protects downstream equipment while exposing the desired materials for recovery. Larger items are typically sorted for cardboard and fibers, while smaller sized materials are processed using systems similar to those used in single stream MRF facilities. Depending on the season and/or amount of wet and food waste, paper and cardboard are often too wet or contaminated for conventional recycling and may be diverted to organics processing, though advanced optical systems can recognize and recover higher-quality paper. Most recyclable output consists of metals and plastics, sorted through magnets, eddy current separators, optical sorters, robotics, and manual methods. Ferrous metals (e.g., tin/steel/bimetal - non-CRV) and nonferrous metals (e.g., aluminum containers - non-CRV) are separated. Flexibles and films can be recovered in conventional MWP facilities. However, existing facilities only recover approximately 10% to 15% of this material.

The contractor assumed that new MWP facilities in California include additional optical systems (six) and looped conveyors to provide for increased rates of plastic recovery, which is not currently how most MWP facilities operate in California. The existing and new MWP facilities were modeled to sort for at least the following CMC processing groups:

- Plastic #1 - PET Clear Bottles, Jugs, Jars – Non-CRV.
- Plastic #1 - PET Pigmented Bottles, Jugs, Jars – Non-CRV.
- Plastic #1 - Other PET Rigid.
- Plastic #2 – HDPE (pigmented and natural) Bottles, Jugs, Jars – Non-CRV.
- Plastic #2 - HDPE Pails and Buckets.
- Plastic #2 - Other HDPE Rigid.
- Mixed Flexibles and Films (sorted as one mixed bale type for secondary processing):
    - Plastic #1 - PET Flexibles and Films.
    - Plastic #2 - HDPE Flexibles and Films.
    - Plastic #4 - Mono LDPE Flexibles and Films.
    - Plastic #5 - Mono PP Flexibles and Films.
- Mixed Plastics #3 – 7 (sorted as one mixed bale type for secondary processing):
    - Plastic #4 - LDPE Bottles and Jugs.
    - Plastic #5 – PP Rigid Items, Other PP.
    - Plastic #6 – PS Rigid Items, Other PS.
    - Plastic #7 – Other Rigid Plastics.
- Aluminum Containers - Non-CRV.
- Other Aluminum.
- Other Nonferrous.

- Tin/Steel/Bimetal - Non-CRV.
- Other Ferrous.
- Small Format - Metal.

The contractor assumes that plastic #1, plastic #2 and metal CMC processing groups will continue to be sent to end markets from the MWP facility. However, mixed flexibles and films and mixed Plastics #3 through #7 will be sent to a secondary processor to be separated further into individual bale types. Given the nature of the incoming material, a significant portion of inbound material often leaves the facility as process residuals, requiring disposal.

Table A-44 summarizes the estimated capital costs associated with constructing a MWP facility with a throughput of approximately 300,000 tons per year. Land acquisition costs are not considered in the capital costs assessment.

Table A-44: Estimated Capital Cost of a New MWP Facility

Capital Cost	Percent of Total Capital Cost (%)	Estimated Capital Costs
Construction		
MWP Building[1]	35	$31,500,000
Equipment: Processing System[2]	26	$23,500,000
Equipment AI or Optical Sorters, Robotics[3]	15	$23,700,000
Equipment: Install and Start-Up[4]	8	$7,400,000
Dust Collection System	2	$2,000,000
Site Investigations	0.3	$300,000
Site Work[5]	1.3	$1,200,000
Site Utilities[6]	1.3	$1,200,000
Surveying	0.05	$40,000
Screening, Landscaping, Signage	0.1	$100,000
Fencing and Gates	0.1	$100,000
Construction Subtotal	90.1	$91,040,000
Engineering and Design		
Engineering, Design, and Permitting	5	$4,500,000
Construction Development Documents	4.1	$3,700,000
Construction Administration and Construction Quality Assurance (CQA)[7]	1	$700,000
Engineering/Design Subtotal	9.9	$8,900,000
Total Construction Cost[8]	100	$99,900,000
Total Cost with Low Contingency Range (-25%)[9]		$75,000,000

Capital Cost	Percent of Total Capital Cost (%)	Estimated Capital Costs
Total Cost with High Contingency Range (+30%)[9]		$129,900,000

[1] Includes building, foundations, floors, HVAC.
[2] Includes screens, magnets, eddy current, balers, etc.
[3] 6-10 optical sorters & robotics.
[4] 30% of vendor equipment cost.
[5] Includes clearing, grubbing, excavation, grading, roadways, and drainage and erosion control.
[6] Includes electricity, water, sewer, natural gas and heating fuel, phone and internet.
[7] 1% of construction costs.
[8] Rounded to the nearest 10,000 when value < 100,000, otherwise to the nearest 100,000.

The estimated operation and maintenance (O&M) costs for the MWP facility are presented in Table A-45. This assumes the facility operates six days per week on a two-shift schedule. O&M costs encompass the contractual service fee paid to the third-party operator, pass-through expenses, utility charges, and additional expenditures such as municipal labor, permitting, consulting services, and property and liability insurance.

Table A-45: Estimated Operating Cost Estimates of MWP Facility

Operating Cost	Estimated Annual Costs (US$)[1]	Approximate Cost per Ton of MSW Processed (US$)
Operator Base Service Fee[2]	$14,700,000	$50
Pass-Through Costs and Utilities[3]	$500,000	$2
Other City Operating Costs[4]	$1,400,000	$4
Disposal of Process Residuals[5]	$20,300,000	$68
Direct Annual Operating Costs Subtotal	$36,900,000	$124
Annual Debt Service[6]	$5,500,000	$18
Capital and Operating Cash Reserve Fund[7]	$4,900,000	$16
Indirect Annual Operating Subtotal	$10,400,000	$34
Estimated Total Annual Operating Costs[8]	$47,300,000	$158

[1] All estimates are rounded to the nearest 10,000 when value is < 100,000, otherwise to the nearest 100,000.
[2] Assumes a base operator fee of $50 per ton waste received.
[3] Estimated pass-through costs and utilities such as electricity, water, sewer, natural gas and heating fuel, and phone and internet.
[4] Costs include property and liability insurance, City labor, office supplies, consulting fees, permits, etc.
[5] Based on the disposal of 225,000 tons of process residuals with assumed tipping fee of $90 per ton.
[6] Assumes financing the project with a 30-year loan at an interest rate of 4.25% interest.
[7] Annual reserves calculated based on a 15-year replacement life of processing equipment, 30-year replacement life of building, and 2% of direct operating costs.
[8] Estimated annual operations and maintenance costs based on full capacity throughput of 300,000 tons per year.

Secondary Processing Facilities

Secondary processing facilities for plastic covered materials were considered for materials where inbound material quantities at a recycling processing facility may not justify capital and operational upgrades at that facility. In such a scenario, the material from the recycling processing facility could be consolidated with like materials from other recycling processing facilities to be sorted at a secondary location. Covered materials that may have benefit from secondary processing include mixed rigid plastics and mixed flexibles and films, specifically the following CMC processing groups:

- Plastic #1 - PET Flexibles and Films.
- Plastic #2 - HDPE Flexibles and Films.
- Plastic #4 - Mono LDPE Flexibles and Films.
- Plastic #5 - Mono PP Flexibles and Films.
- Multi-Material Laminate (plastic).
- Plastic #5 – PP Rigid Items, Other PP.
- Plastic #6 – PS Rigid Items, Other PS.
- Plastic #7 – Other Rigid Plastics.

To better understand the potential costs associated with secondary processing, the contractor developed a theoretical secondary processing facility to help determine the potential size, scale, and planning level costs of a new facility that can recover the covered materials identified. Costs are based on capital inputs of equipment, installation, storage capacity, and building envelope construction. The cost assessment does not consider real estate investment or value.

Due to the complexity of identifying and separating covered materials, secondary processing facilities have reduced processing rates. For example, a 30 ton per hour (TPH) MRF will sort various materials including oversized material, cardboard, fiber, and glass. The container sorting line will handle approximately seven TPH of containers, most of which are plastics. When processing flexibles and films, this throughput may decrease to approximately six TPH due to the lighter weight and added complexity in sorting these materials.

To enhance material separation, the design of this facility was assumed to have a looped sorting system. This approach would require a batch loading process. The assume processing line would include two optical sorters integrated into a loop with a magnet and an eddy current separator (ECS). The equipment footprint for each looped processing line is estimated at 20,000 square feet. The estimated equipment cost for a two looped processing lines, optical sorters, ECS, and a magnet is approximately $15 million to $18 million. This excludes pre-sorting, storage and baling infrastructure, a vacuum extraction system, and new building costs, which are summarized in Table A-46. These estimates do not take into account costs for land acquisition/development, engineering, and permitting.

Table A-46: Estimated Secondary Processing Equipment and Facility Infrastructure Costs (2024)

Capital Upgrades	Equipment Cost (Procured and Installed)	Total Facility Cost (Equipment and infrastructure)[35]
Bale Breaker[36]	$230K	$230K
Pre-sort system	$150K	$450K
Plastic Line #1: Four optical units, looped conveyor systems, magnet, ECS)	$7 - 8M	$7.5 - 9M
Plastic Line #2: Four optical units, magnet, looped conveyor systems	$7 - 8M	$7.5 - 9M
Baler	$1M- $1.5M	$1.5M
Vacuum extraction system	$200K	$500K
Outdoor Covered Bale Storage	$80/SF	$1.2M
Bunkers[37]	$750K	$750K – $2.25M
New Building	$500/SF	$40M
Site Development, Building & Equipment CAPEX	NA	~$10-11M per TPH

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[35] Estimate varies by equipment type. May include reconfiguration of existing system to fit the new equipment, new conveyors, supports (platforms, stairs, etc.), and integration with controls.

[36] Low density bale breaker for 30” x 45” x 62” bales weighing approximately 900 lbs. Does not include the dewirer which would be needed for high throughput requirements.

[37] Will be customized per location.

3. Costs to Upgrade Existing Infrastructure

The contractor approximated capital costs for the infrastructure upgrades required to increase recovery of covered materials. The cost model for this incorporated the best available technology capable of recovering covered materials. To illustrate the potential costs needed to upgrade a facility's capacity to accommodate sorting of more or additional materials, general estimates on equipment requirements, onsite facility improvements, and operational cost increases were included in the cost estimates.

Each facility was assigned to a facility type, which was the basis for assigning potential improvements and associated costs in the model. The annual operational costs were added to the amortized capital cost (expressed per annum) to provide an annual cost per facility type. These upgrade costs were applied to each individual facility throughput to derive an approximate average cost-per-ton value for each facility type. This cost per ton represents the increased cost for the respective facility types on a dollar per ton basis, similar to an increase in the tipping fee for that facility given these improvements and changes. It does not reflect consideration for any value of the commodity recovered.

4. Limitations and Barriers

Data Collection Limitations

As discussed in the Current State of Processing Report, the contractor utilized the California Solid Waste Information System (SWIS), Recycling and Disposal Reporting System (RDRS) data, interested party survey response data, Solid Waste Facility Permit (SWFP) documents, and internal resources to identify current (2024) tons of inbound and outbound materials and overall capacity of MRFs in California. There are limitations with these data sources, including the following:

- MRFs are not easily identified within the RDRS and SWIS as they are categorized as transfer/processing activities, which can apply to transfer stations, consolidation sites, or other activities that may not sort material for recycling (i.e., conduct processing).
- Reported outbound tonnage from MRFs in RDRS was not always usable.
- Only 36 out of the 89 MRFs identified by the contractor as likely to manage covered material in California responded to the survey.
- SWFP documents do not provide specific capacity for MRF operations if the facility also has other operations such as material transfer.

The Current State of Processing Report provides the methodology for determining inbound and outbound tons by CMC Processing Group, as regional or site-specific material audit information was not provided by facilities during interested party engagement.

Considering these data limitations, the contractor determined inbound and outbound tonnage, contamination rates, material composition, and processing efficiency using the resources listed above.

Analysis Limitations

Data collection limitations have downstream effects on the analysis, including the following:

- Increased quantities of inbound materials for MRFs or MWP facilities are driven by changes within the collection system (e.g., increased access to services, increased education). Therefore, the processing analysis was limited to focusing on the technology that could manage additional material and improve quality assuming that the changes in feedstock are influenced by factors beyond the facility's control.
- The lack of regional inbound material characterization limits this analysis as quantities of materials that may be covered may vary by region, impacting the infrastructure needs and associated costs.
- Many facilities provided feedback during interested party engagement that they lack capacity to accommodate the necessary technological enhancements needed to manage covered materials. Many facilities have noted space limitations and inadequate existing infrastructure to accommodate the advanced optical systems necessary to recover covered materials. This was taken into consideration when modeling the potential infrastructure needs and costs throughout the state. However, the contractor only visited 15 MRFs in person. The contractor acknowledges that some generalized costs may not apply at a specific facility level. The contractor could not develop specific planning parameters for each individual facility assessed. Accordingly, generalized upgrade cost parameters were applied to each facility depending on facility type categorization.

Contractor Engagement Limitations

As stated in the Current State of Processing report, companies were often apprehensive to share operational cost data during the interested party engagement process. Additionally, some large-scale operations, in densely populated jurisdictions, chose not to participate in the survey/interview process and assumptions were applied to publicly available data.

B. Organics Processing Facilities

This section describes the methodology used to identify potential infrastructure improvements to process additional covered materials and the estimate associated cost, based on the current conditions of organics facilities in California. The contractor developed this approach using input gathered from facility operators during site visits, survey responses, and phone/virtual interviews, where operators shared specific challenges and opportunities related to equipment, technology, feedstock types, staffing, site constraints, and marketability of products.

From these discussions, four facility size categories were established based on tons per year (TPY) throughput (assuming 260 operating days per year). These categories were originally presented in the Current State of Processing report.

The contractor developed a summary of potential upgrades, including mobile and stationary equipment, additional FTEs, and infrastructure improvements or expansions, that may promote processing of larger quantities of covered materials compared to the current state.

1. Cost to Upgrade Existing Infrastructure

In this report, cost modeling for OPFs isolates capital and operational investments that can promote management of larger quantities of covered materials, which may be suitable for the organics recycling process. The contractor focused on the incremental costs directly attributable to managing these materials, such as equipment upgrades, facility modifications, and labor necessary to address the unique processing and contamination challenges they present. Covered materials represent only a portion of the feedstocks that OPFs manage, making it challenging to provide a consistent and transparent basis for estimating the financial support required to integrate covered materials designed for compostability into existing operations. International best practices, such as Italy's Biorepack[38] system, tie reimbursement rates to processing performance and contamination thresholds to ensure adequate support for composting infrastructure.

2. Assumptions

The following assumptions were used to define the facility categories. While some facilities may fall outside these boundaries, these groupings reflect common operating conditions based on the contractor's experience working in California and findings from outreach with interested parties (i.e., surveys, interviews, and site visits).

Organic Processing Facility Categories

- **Very small facilities (<26,000 TPY):** Very small OPF facilities typically process less than 26,000 tons per year and are primarily located in rural or low-density areas. These sites generally handle yard trimmings and limited quantities of food scraps. Compost processing systems are often basic. Windrows or static piles are managed manually with minimal automation. In-vessel processing is limited in this facility size range. Technological capabilities are limited, with many facilities lacking screening equipment or systems to remove contaminants from incoming materials. Infrastructure is also minimal and may include unpaved surfaces, limited stormwater controls, and limited or no odor management systems. Key constraints for very small facilities include limited land availability, staffing shortages, and challenges in scaling operations to accept more organics. Potential improvements for these sites include the acquisition of additional processing equipment such as grinders and loaders, the addition of covered processing areas, and the implementation of stormwater and odor mitigation measures, along with minimal pre-processing infrastructure.

[38] "Biorepack Consortium Profile." *Biorepack*. Accessed Nov. 2025.

- **Small facilities (26,000–130,000 TPY):** Small facilities, processing between 26,000 and 130,000 tons per year, typically accept yard trimmings and source-separated food waste from one or more jurisdictions. These composting operations often utilize turned windrows or aerated static piles (ASP) for composting, with moderate levels of automation. In-vessel processing is limited in this facility size. Equipment may include grinders, trommels, and conveyors, though de-packaging capabilities are often limited. Infrastructure at small facilities usually includes partial enclosures and basic stormwater and odor control systems. Operators frequently identify increasing contamination from food waste and aging equipment as primary challenges. Potential improvements for small facilities include the installation of de-packaging units, upgrades to aeration systems, enhanced screening and separation equipment, and the addition of quality control staff to better manage feedstock variability and product quality.
- **Medium facilities (130,000–390,000 TPY):** Medium-sized processing facilities, with throughput between 130,000 and 390,000 tons per year, manage mixed organic waste streams—including yard trimmings, food scraps, and possibly some soiled paper—sourced from regional collection programs. These facilities typically operate ASP systems or in-vessel composting, supported by robust pre-processing infrastructure. Equipment includes de-packagers, air separators, conveyors, magnets, and trommels, enabling these facilities to process larger volumes and more contaminated feedstocks. Infrastructure is typically more advanced, often featuring enclosed buildings, engineered pads, and comprehensive systems for odor and leachate management. Key operational challenges include managing feedstock with variable quality and ensuring sufficient staffing to operate and maintain complex equipment. Potential improvements to medium facilities include the installation of advanced sorting and separation lines, upgrades to odor and emissions control systems, implementation of equipment redundancy, and potential expansion of site capacity.
- **Large facilities (>390,000 TPY):** Large facilities process more than 390,000 tons per year and are designed to handle regional volumes of organics. They often deal with high levels of contamination. Feedstock typically includes commercial and residential food waste, yard trimmings, and other mixed organics. These facilities operate integrated systems that may include in-vessel systems or composting. Technology at large facilities is automated, with multiple processing lines designed for contaminant removal and, in some cases, energy generation. Infrastructure is typically enclosed and includes biofilters, digestate management systems, and energy or heat recovery capabilities. Major constraints include high capital investment requirements and achieving a quality finished product. Potential improvements focus on increasing equipment redundancy, incorporating advanced automation and robotics, and employing specialized staff to manage high-volume, high-complexity operations.

Covered Materials Considered

As part of the analysis, the contractor assessed equipment, infrastructure, and processing enhancements that can promote recovery of additional volumes of covered materials, particularly those that present challenges due to contamination, material variability, or lack of end markets. For the purposes of modeling, only CMCs without a plastic component were assumed to be accepted by OPFs in future years. However, the contractor still evaluated potential upgrades for OPFs to accept certain covered material with a plastic component, including plastics designed for compostability.

Table A-47 outlines the covered materials evaluated, grouped by CMC processing group. The table also presents potential actions for improving recovery through processing upgrades, end market development, or product redesign.

For example, the recovery of paper-based materials like OCC, mixed papers, and kraft paper may benefit from enhanced screening systems and changes in product design to reduce coatings that are incompatible with organics processing technologies. Molded pulp and untreated wood may be more easily integrated into existing systems with targeted investments in grinding or aeration capacity. Plastics and polymers designed for compostability—both flexible and rigid items—present challenges due to their similarity in appearance to conventional plastics. Solutions include clearer labeling, product redesign to meet certified compostability standards, and improved facility-level separation technologies.

Table A-47: Potential Improvements to Facilitate Acceptance and Processing of Certain CMC Processing Groups

CMC Class	CMC Processing Group	Potential Improvements
Paper & Fiber	OCC	Upgrade screening equipment and manual sort lines to improve fiber recovery and remove contamination. Encourage product redesign for nonplastic, grease-resistant coatings to enhance compostability. Support end market expansion.
Paper & Fiber	Mixed Paper	Invest in optical sorters and air knife separators to improve separation from plastics and contaminants. Enhance facility infrastructure (e.g., covered sort lines, additional screens).
Paper & Fiber	Kraft Paper	Improve grinder and pre-processing compatibility for thicker materials. Consider increased moisture conditioning via watering systems for pre-processing.

CMC Class	CMC Processing Group	Potential Improvements
Paper & Fiber	Molded Pulp	Add grinder and screen systems to enhance degradation of dense pulp materials. Expand composting capacity to ensure full decomposition. Standardize labeling and appearance (e.g., brown color, labeling) to prevent mis-sorting at processing facilities.
Plastic	Plastics/Polymers Designed for Compostability – Flexibles/Films*	Standardize labeling and appearance to prevent mis-sorting at processing facilities. Support facility upgrades such as optical sorters, manual sort lines, and litter fencing. Provide financial and technical assistance to aid staff training and field tests to ensure compatibility with the operation. Incentivize collection and educate generators on accepted items.
Plastic	Plastics/Polymers Designed for Compostability – Rigid Items*	Standardize labeling and appearance to prevent mis-sorting at processing facilities. Support facility upgrades such as optical sorters, manual sort lines, and litter fencing. Provide financial and technical assistance to aid staff training and field tests to ensure compatibility with the operation. Incentivize collection and educate generators on accepted items.
Wood and Other Organic Materials	Wood - Untreated	Expand chipping/grinding capacity and composting space. Consider the use of untreated wood in compost or mulch products for erosion control and carbon sequestration. Include air separators and screens to remove residual contamination. Provide operational funding for increased throughput handling.

*These CMC processing groups were not included in the tonnage flow model for future years (see Appendix A Section 2.F.2.), however, they are included in this table to provide additional information.

Contamination at OPFs for Covered Materials

While some covered materials have the potential to be recovered and incorporated into finished products, they also introduce contamination and processing challenges. Effective recovery depends on coordinated system design, clear and consistent labeling, public education, and strategic infrastructure investments.

Composting and in-vessel operations may experience higher contamination rates and greater process losses as more covered materials enter the waste stream, particularly if there is confusion about what belongs in green bins. Contaminants disrupt processing, reduce throughput, and compromise the visual and agronomic quality of finished compost. Items that can be present challenges include items that cannot be distinguished from their non-compostable counterparts and items that include plastic. Facilities may meet regulatory requirements while still producing compost that is visually contaminated or unacceptable to end users, particularly in agricultural markets.

The following are potential actions to address these challenges:

- Strengthen PE&O to improve source separation.
- Modernize contamination testing to better reflect the visual and environmental impacts of contaminants (e.g., through surface-area-based quantification).
- Invest in composting technologies and infrastructure capable of handling the unique characteristics of covered materials designed for compostability.

If contamination is not addressed, it can erode market trust and place greater operational challenges on OPFs.

Capital Upgrades

Various types of equipment changes, infrastructure, and operational improvements may support processing of larger quantities of covered materials. For the purposes of modeling, only CMCs without a plastic component were assumed to be accepted by OPFs in future years. However, the contractor still evaluated potential upgrades for OPFs to accept certain covered material with a plastic component, including plastics designed for compostability. The contractor focused specifically on covered materials that could be accepted and incorporated into an end product at OPFs: OCC, mixed papers, kraft paper, molded pulp, plastics and polymers designed for compostability–flexibles and films, plastics and polymers designed for compostability–rigids, and untreated wood.

Respondents of the Organics Processing Facility Survey were given the option to select or write in equipment types that they would need to support additional processing of covered materials. The following equipment types were identified:

- Grinder.
- Loader.
- Reducer.
- Pulverizer.
- Additional screens.
- Optical sorters.
- Additional processing capacity.
- Additional processing lines.

In addition to feedback from OPF operators, the contractor also considered equipment types, infrastructure changes, and operational changes, including additional FTEs, that may be needed to support processing of additional covered. The following potential improvements were identified:

- Pre-processing/sorting (e.g., de-packagers, screens, separators).
- Air, odor, and stormwater control systems.
- Facility enclosure, grading, and paving.
- Infrastructure (e.g., utilities, roads, drainage).

Estimated costs for equipment at OPFs are shown in Table A-48. The planning-level cost estimates include the potential range for various facility sizes, including very small to large facilities. This high-level approach to cost is based on conversations with interested parties and equipment vendors and equipment costs from recent, similar projects.

Table A-48: OPF Equipment Capital Cost Estimates (2024)

Equipment Type	Facility Type (Compost, In-Vessel Digestion, or Both)	Estimated Additional FTEs (Per Additional Equipment Item)	Estimated Cost Range
Screen	Both	1	$200K - $750K
Grinder	Compost only	1	$500K - $1.5M
Loader	Both	1	$400K - $400K
Manual sort line	Both	4	$200K-$300K
Water truck or storage tank	Compost only	1	$350K -$350K
Optical sorting	Both	1	$1M - $1M
De-packager	Both	1	$750K -$750K

Estimated costs for infrastructure improvements and upgrades are shown in Table A-49.

Table A-49: OPF Infrastructure Capital Cost Estimates (2024)

Infrastructure Type	Facility Type (Compost, In-Vessel Digestion, or Both)	Estimated Cost Range
Site improvements	Both	$1M - $1.5M
Litter fencing	Both	$25K - $35K
Lined detention pond	Compost only	$1M - $2.5M
Working surface improvements	Compost only	$500K -$2M
Building modifications - Compost	Compost only	$750K - $3M
Building modifications - In-Vessel (Support building)	In-vessel only	$750K -$3M

Infrastructure Type	Facility Type (Compost, In-Vessel Digestion, or Both)	Estimated Cost Range
Building expansions - Compost	Compost only	$7.5M - $20M
New building - Compost	Compost only	$20M -$40M
New building - In-Vessel (Support building)	In-vessel only	$15M - $40M

Operational Changes

Operational changes considered for OPFs were centered primarily on staffing and labor-related improvements. Interested parties emphasized the need to increase staffing in critical roles such as quality assurance/quality control, maintenance, safety, and compliance monitoring. These additions were viewed as essential for enhancing daily operations, minimizing downtime, and maintaining compliance with regulatory standards.

3. Limitations and Barriers

The following sections summarize the barriers and limitations related to interested party outreach and evaluation for OPFs.

Data Collection Limitations

The contractor conducted surveys with individual composting and in-vessel facilities to understand processing practices, infrastructure capacity, and operational constraints. However, some facilities either did not respond or did not provide tonnage breakdowns by material type, resulting in data gaps. While site visits were used to fill in data gaps, the contractor had limited time onsite for observations at some facilities.

To fill these gaps, information from the Solid Waste Information System (SWIS) and associated SWFPs was reviewed. These documents were used to infer facility throughput and processing characteristics, though they often require operational assumptions such as capacity utilization rates, contamination levels, and organics recovery efficiency.

Analysis Limitations

While facility survey data provided insight into the volume of organics recovered in 2024, they do not reflect the composition of inbound loads, nor the processing efficiency required to achieve reported outbound tonnages. The lack of standardized or site-specific organics characterization data limits the ability to quantify how much recoverable organic material is being lost to disposal, either due to contamination or processing constraints.

Additionally, there is no comprehensive statewide dataset identifying the proportion of covered material organics currently present in disposed waste streams or residuals from source-separated organics. As a result, recovery potential must be estimated based on assumptions tied to facility design, feedstock quality, and operational practices.

Strategies to increase recovery will vary depending on the jurisdiction’s collection system, education programs, and level of investment in organics infrastructure.

4. End Markets for Covered Materials

The contractor performed the following analysis to evaluate actions and investments for end markets in order to achieve the requirements of the Act.

A. Covered Material Categorization

The covered materials that are the focus for the end market assessment are plastic covered materials for which a 30% (2028), 40% (2030), and 65% (2032) recycling rate are required plus covered materials that are currently not classified as recyclable or compostable. CMCs that were not modeled in the tonnage flow model (i.e., CMCs in which alternatives were modeled) were not included in this evaluation. See Appendix A, Section 2.F.2 for the CMCs that were included in the model.

The CMCs in the plastic material class included in the model to meet proxy recycling rate targets are those outlined in Table A-50.

Table A-50: CMCs in Plastic Material Class Included in Modeled End Market Analysis

CMC ID	CMC Material Type	CMC Form	CMC End Market Group
24_P1P	PET (#1)	Bottles, Jugs, and Jars (Clear/Natural)	Plastic #1 - PET Clear Bottles, Jugs, Jars - Non CRV
24_P2P	PET (#1)	Bottles, Jugs, and Jars (Pigmented/Color)	Plastic #1 - PET Pigmented Bottles, Jugs, Jars - Non CRV
24_P38P	PET (#1)	Other Rigid Containers, Cups, Lids, Plates, Trays, Tubs	Plastic #1 - Other PET Rigid
24_P39P	PET (#1)	Other Rigid Items	Plastic #1 - Other PET Rigid
24_P6P	HDPE (#2)	Bottles, Jugs and Jars (Clear/Natural)	Plastic #2 – HDPE (pigmented and natural) Bottles, Jugs, Jars - Non CRV
24_P7P	HDPE (#2)	Bottles, Jugs and Jars (Pigmented/Color)	Plastic #2 – HDPE (pigmented and natural) Bottles, Jugs, Jars - Non CRV
24_P8P	HDPE (#2)	Pails & Buckets	Plastic #2 - HDPE Pails and Buckets

CMC ID	CMC Material Type	CMC Form	CMC End Market Group
24_P40P	HDPE (#2)	Other Rigid Items	Plastic #2 - Other HDPE Rigid
24_P17P	PP (#5)	Bottles, Jugs and Jars	Plastic #5 - PP Rigid Items
24_P41P	PP (#5)	Other Rigid Containers, Cups, Lids, Plates, Trays, Tubs	Plastic #5 - PP Rigid Items
24_P20P	PP (#5)	Other Rigid Items	Plastic #5 - PP Rigid Items
24_P33P	Multi-Material Laminate	Other Forms	Multi-Material Laminate
24_P46P	Multi-Material Laminate	Pouches and Envelopes	Multi-Material Laminate
24_P47P	Plastic	Small – Two or more sides measuring 2” or less	Small Format – Plastics
24_P10P	HDPE (#2)	Flexible and Film Items	Plastic #2 - HDPE Flexibles and Films
24_P15P	LDPE (#4)	Clear Non-Bag Film	Plastic #4 - Mono LDPE Flexibles and Films
24_P16P	LDPE (#4)	Other Flexible and Film Items	Plastic #4 - Mono LDPE Flexibles and Films
24_P21P	PP (#5)	Clear Non-Bag Film	Plastic #5 - Mono PP Flexibles and Films
24_P22P	PP (#5)	Other Flexible and Film Items	Plastic #5 - Mono PP Flexibles and Films

The CMCs in nonplastic material classes that include a plastic component considered in this analysis include the following as outlined in Table A-51.

Table A-51: CMCs in Nonplastic Materials with Plastic Component Included in Modeled End Market Analysis

CMC ID	CMC Class	CMC Material Type	CMC Form	CMC End Market Group
24_G1P	Glass	Glass	Bottle and Jars w/ plastic component	Mixed Glass Bottles and Jars - Non-CRV
24_G3P	Glass	Glass	Small – Two or more sides measuring 2" or less w/ plastic component	Small Format - Glass
24_M1P	Metal	Aluminum	Non-aerosol container w/ plastic component	Aluminum Containers - Non-CRV
24_M4P	Metal	Aluminum	Aerosol can w/ plastic component	Aluminum Containers - Non-CRV
24_M5P	Metal	Aluminum	Other Forms w/ plastic component	Other Aluminum
24_M9P	Metal	Other Nonferrous	All Forms w/ plastic component	Other Nonferrous
24_M6P	Metal	Tin/Steel/Bimetal	Non-aerosol container w/ plastic component	Tin/Steel/Bimetal - Non-CRV
24_M7P	Metal	Tin/Steel/Bimetal	Aerosol can w/ plastic component	Tin/Steel/Bimetal - Non-CRV
24_M8P	Metal	Tin/Steel/Bimetal	Other Forms w/ plastic component	Tin/Steel/Bimetal - Non-CRV
24_M10P	Metal	Other Ferrous	All Forms w/ plastic component	Other Ferrous

CMC ID	CMC Class	CMC Material Type	CMC Form	CMC End Market Group
24_PF1P	Paper and Fiber	Kraft Paper	All Forms w/ plastic component	Kraft Paper
24_PF15P	Paper and Fiber	Multi-Material Laminate	Aseptic Cartons	Aseptic Cartons
24_PF5P	Paper and Fiber	Multi-Material Laminate	Gable-top Cartons	Gable-Top Cartons
24_PF10P	Paper and Fiber	Paperboard	All Forms w/ plastic component	Paperboard
24_PF7P	Paper and Fiber	Multi-Material Laminate	Other Forms w/ plastic component	Other Lined Paper
24_PF9P	Paper and Fiber	OCC	Cardboard w/ plastic component	OCC
24_PF8P	Paper and Fiber	OCC	Waxed Cardboard w/ plastic component	Waxed OCC
24_PF12P	Paper and Fiber	Other/Mixed Paper	All Forms w/ plastic component	Mixed Papers
24_PF11P	Paper and Fiber	White Paper	All Forms w/ plastic component	Mixed Papers
24_WO3P	Wood and Other Organic Materials	Other/Mixed Organic	Textiles w/ plastic component	All Other Textiles

B. Consolidation of Relevant Current State Data

The contractor consolidated data from the Current State of End Markets Report. Data relevant from the surveys and interviews carried out as part of the current state report were used, including information related to current capacities and tonnage recycled; future capacities and infrastructure upgrades that could be implemented if investments were made, investment amounts needed to make improvements, contamination in material grades, CMC conversion rates, and the quantity of material accepted into end markets. These current state figures were compared against the future needs to estimate the actions and investments.

C. Primary and Secondary Research

1. Literature and Secondary Research

The contractor reviewed academic papers, industry reports, and publicly available online sources to identify data relevant the modeling. Specifically, the contractor looked at:

- Historical price comparisons between virgin and recycled plastic materials.
- Technology requirements to reduce contamination and improve recycling performance.
- Permitting and regulatory requirements for establishing new recycling facilities in California.

Generally, data on cost information was limited. Most cost-related information, particularly unit costs for recycling different material grades, is considered commercially sensitive and not publicly disclosed. The lack of published material reflects the confidential nature of these business operations.

2. Interested Party Engagement and Interviews

To supplement gaps in secondary data, the contractor conducted interviews with a range of industry experts, including:

- Representatives from material trade associations.
- Current and former employees of plastic recycling facilities.
- Manufacturers using recycled content in their products.
- Policy professionals involved in recycling initiatives.

These interviews provided insights into market behavior, infrastructure needs, and cost structures. They also helped validate and refine the assumptions used in the analysis.

3. Policy Review and Market Implications

The contractor examined California's recycled content mandates to understand how policy is shaping demand for recycled materials. This helped to assess the viability of end markets and the potential investment required to meet future regulatory standards.

4. Cost Estimation Methodology

Due to the lack of detailed cost data in the literature, the contractor relied on expert consultants to estimate unit costs for recycling processes, excluding feedstock and resin values. These estimates were then checked through stakeholder interviews to ensure credibility and alignment with industry realities.

D. Model Development

The contractor used the data gathered to assess costs, incomes and quantity of covered materials flowing through the end markets. However, because end markets facilities do not characterize materials in terms of covered materials, the contractor developed material grades that were mapped to CMC end market groups as summarized in Table A-52.

For each material grade, one or more end uses were determined based on discussions with end markets and industry experts. These recycling processes have different costs associated with them based on the specifications needed for their end use.

Table A-52: Material Grades and End Use(s)

Material Grade	End Use	CMC End Market Group Included in Material Grade
Plastic #1 PET Bottles B Grade[1]	Pellet for food grade bottle	Plastic #1 - PET Clear Bottles, Jugs, Jars - Non CRV
Plastic #1 PET Bottles B Grade (colored)[1]	Colored flake for either textiles or thermoforms	Plastic #1 - PET Pigmented Bottles, Jugs, Jars - Non CRV
Plastic #1 PET Thermoforms[1]	Flake for Pet Thermoforms (any colors going to textiles)	Plastic #1 - Other PET Rigid
Plastic #1 PET Thermoforms	Flake for Polyester Textiles	Plastic #1 - Other PET Rigid
Plastic #2 HDPE Rigid Natural[1]	Pellet for packaging	Plastic #2 - HDPE (pigmented and natural) Bottles, Jugs, Jars - Non CRV
Plastic #2 HDPE Rigid Colored[1]	Pellet for non-pressure pipes	Plastic #2 - HDPE (pigmented and natural) Bottles, Jugs, Jars - Non CRV Plastic #2 - HDPE Pails and Buckets Plastic #2 - Other HDPE Rigid
Plastic #4 LDPE Rigid	Pellet for pipes (combined in low proportions with HDPE)	Plastic #4 – LDPE Bottles and Jugs Plastic #4 – Other LDPE Rigid

Material Grade	End Use	CMC End Market Group Included in Material Grade
Plastic #4 LDPE Flexibles (including HDPE)[1]	Pellet for non-packaging flexibles - bin bags, agricultural films, construction films	Plastic #2 - HDPE Flexibles and Films Plastic #4 - Mono LDPE Flexibles and Films
Plastic #4 LDPE Flexibles (including HDPE)[1]	Timber substitute	Plastic #2 - HDPE Flexibles and Films Plastic #4 - Mono LDPE Flexibles and Films
Plastic #5 PP Rigid[1]	Pellet for consumer durable goods	Plastic #5 - PP Rigid Items Plastic #5 - Other PP
Plastic #5 PP Flexibles	Pellet for consumer durable goods	Plastic #5 - Mono PP Flexibles and Films
Plastic #5 PP Flexibles	Timber substitute	Plastic #5 - Mono PP Flexibles and Films
Multi Material Multi-Layer Flexibles	Timber substitute/other construction materials	Other Lined Paper Aseptic Cartons Gable top Cartons
OCC[1]	Pulp	OCC
Mixed Paper[1]	Pulp	Mixed Paper
Post-Consumer Aluminum Can Stock[1]	Aluminum can sheet for packaging	Other Aluminum
Post-Consumer Aluminum Foil[1]	Aluminum De-ox	Other Aluminum
MRF-derived 3-Color Mixed Container Glass (MRF Glass)[1]	Glass cullet for packaging, and fiberglass applications crush glass for construction materials	All Glass CMCs
Unprocessed Container Glass Cullet[1]	Glass cullet for packaging, and fiberglass applications, crushed glass for construction materials	All Glass CMCs

[1] Existing ReMA's ISRI Specification[39]

1. Mass Flow Analysis and Optimum Performance Calculation

The contractor estimated a proxy recycling rate for different CMC end market groups based on the overall tons collected, tons accepted by end markets, and the end markets CMC conversion rate. For example, if 100,000 tons of a CMC end market group is collected in 2032 and the end market can achieve an 85% CMC conversion rate, then 76,500 tons of the material needs to be accepted into end markets to reach the 65% proxy recycling rate. This expressed as an equation would be: (weight of covered material group accepted into end market * covered material category conversion rate) / weight of covered material group collected = proxy recycling rate.

For each CMC end market group included in the modeling, the contractor evaluated whether there is available capacity in California and nearby states to manage additional material needed to meet recycling rate targets, or if new infrastructure is required.

2. Funding Gap Calculation

Once the weight of each CMC end market group that needs to be accepted into end markets was determined, the contractor estimated the cost of recycling each material using data gathered through the research phase. For each of the material grades the following costs were estimated:

- **Feedstock costs:** RecyclingMarkets.net[40] was the source of feedstock costs.
- **Operating cost and annualized capital cost per ton managed:** This was determined using information gathered through interviews with industry experts for each material grade.
- **Revenue per ton of recycled resin:** This was estimated based on publicly available data from the Bureau of International Recycling[41] and using information gathered through interviews with industry experts for each material grade.
- **Profit margin:** This was included as the contractor assumed it is necessary for continued healthy business operation and was determined using information gathered through interviews with industry experts for each material grade. This profit margin was set at 15% for the low-cost scenario and 20% for the high-cost scenario.

For each cost (feedstock, operating, annual capital, and profit margin) and revenue category (recycled product sales) a low and high estimate was provided. These low and

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[39] ISRI SPECS. "ReMA's ISRI SPECIFICATIONS." *Isrispecs.org*, www.isrispecs.org.

[40] RecyclingMarkets.net. "Secondary Materials Pricing (SMP)." *RecyclingMarkets.net*, recyclingmarkets.net/secondarymaterials/index.html.

[41] Bureau of International Recycling (BIR). "USA Plastics Quarterly Report." May 2022.

high estimates were based on the range of estimates gathered from research and interviews. If the costs were higher than the revenue plus profit, the difference is estimated to be the funding needs for the covered material to be recycled. If the revenue for the material is higher than the costs, the funding needs were estimated to be $0. The positive revenue was not assumed to be revenue to the system as this profit would likely be kept by the facility and not further distributed to the system. The costs outlined in Section 2.4.2.1 are calculated based on the assumption that the end markets would be in California. Section 2.4.2.1 considers how these costs might differ in neighboring states and costs to manage material outside of the U.S. were not considered.

The funding needs (costs per ton) were then multiplied by the weight of each CMC that needs to be accepted into end markets for each of the target years to estimate the total estimated improvements needed.

E. Limitations and Barriers

1. Analysis Limitations

End market operations can change over time due to market conditions, equipment upgrades, or shifts in material demand. As a result, factors such as throughput and acceptable contamination levels can vary. Because these conditions change, any estimate of current or future end market capacity should be viewed as approximate.

2. Data Limitations

End markets are typically privately owned companies and therefore a lot of the data required for this analysis is confidential. Although end markets were able to provide data on throughput, contamination levels, and outputs, information on processing costs at end markets is more confidential and the contractor had to rely on assumptions from industry experts rather than end market facilities in California for cost calculations in this report.

There is also limited data on whether or not a CMC has a plastic component for the CMCs not in the plastic material class. The analysis on these CMCs is based on estimates for the weight of material which has a plastic component.

3. International Exports

The contractor did not evaluate end market facilities for consideration as a responsible end market. Whether any end market will be considered a responsible end market is only established when an approved producer responsibility plan identifies it as such. For the purposes of this report, the contractor assumed that international end markets would not be considered responsible end markets and that domestic end markets were assumed to be responsible. As a result of this, the contractor has assumed that covered materials that were exported in 2024 would shift to domestic markets in milestone years and are included in capacity requirements and cost calculations throughout the end markets section of this report.

5. Design Improvements for Covered Materials

As presented in CalRecycle's December 31, 2024 CMC List,[42] not all CMCs were deemed recyclable or compostable. Moreover, as discussed in the Current State of Processing Report, many covered materials are not currently recovered at processing facilities and thus are not available for end markets. Similarly in the Current State of End Markets Report, many covered materials do not have or are estimated to not have available or accessible end markets. The processing challenges and end market barriers identified in the two reports respectively are likely to affect compliance with the Act's recycling rate, recyclability, and compostability requirements. Therefore, to be able to assess design improvements, the contractor first identified which covered material categories face either significant or costly barriers to achieving recyclability or compostability requirements. The contractor also modeled potential alternative CMCs for certain CMCs with current identified barriers.

If the contractor found that processing and end market barriers were unlikely to be operationally, realistically, or cost-effectively addressed, then that CMC was modeled to be replaced with an alternative CMC. This assumes that the composition of materials collected through onsite curbside collection programs would be strategically transformed over time thereby increasing the capture of recyclable/compostable covered materials and improving the recycling rate.

Appendix A., Section 2.F.2 identifies these design improvements as CMC-level interventions and describes the process of incorporating these changes into the tonnage flow model. Table A-17 indicates the intended starting years for each alternative CMC. More detailed information can be found in Section 2.1, Design Improvements for Covered Materials.

[42] CalRecycle. SB 54 Plastic Pollution Prevention and Packaging Producer Responsibility Act: Covered Material Category (CMC) List. 1 Jan. 2025.

Appendix B: Covered Material Categories

The following Table B-1 represents the list of CMCs evaluated in this report, including whether the material is currently considered recyclable or compostable (according to CalRecycle's CMC update from January 2025) and whether the CMC is included in the recycling rate evaluation for plastic covered material.

Table B-1: List of CMCs, Recyclability/Compostability, and Whether Included in Recycling Rate Evaluation

CMC ID	Material Type	Material Form	Currently Recyclable or Compostable?	Included in Targeted Recycling Rate?
24_G1N	Glass	Bottles and Jars w/o plastic component	Yes	No
24_G1P	Glass	Bottle and Jars w/ plastic component	Yes	Yes
24_G2N	Glass	Other Forms w/o plastic component	No	No
24_G2P	Glass	Other Forms w/ plastic component	No	Yes
24_G3N	Glass	Small – Two or more sides measuring 2" or less w/o plastic component Y	Yes	No
24_G3P	Glass	Small – Two or more sides measuring 2" or less w/ plastic component Y	Yes	Yes
24_C1N	Ceramic	All Forms w/o plastic component	No	No
24_C1P	Ceramic	All Forms w/ plastic component	No	Yes
24_C2N	Ceramic	Small – Two or more sides measuring 2" or less w/o plastic component	No	No
24_C2P	Ceramic	Small – Two or more sides measuring 2" or less w/ plastic component	No	Yes
24_M1N	Aluminum	Non-aerosol container w/o plastic component	Yes	No

CMC ID	Material Type	Material Form	Currently Recyclable or Compostable?	Included in Targeted Recycling Rate?
24_M1P	Aluminum	Non-aerosol container w/ plastic component	Yes	Yes
24_M2N	Aluminum	Foil sheets w/o a plastic component	Yes	No
24_M2P	Aluminum	Foil sheets w/ a plastic component	Yes	Yes
24_M3N	Aluminum	Foil Molded Containers w/o plastic component	Yes	No
24_M3P	Aluminum	Foil Molded Containers w/ plastic component	Yes	Yes
24_M4P	Aluminum	Aerosol can w/ plastic component	Yes	Yes
24_M5N	Aluminum	Other Forms w/o plastic component	Yes	No
24_M5P	Aluminum	Other Forms w/ plastic component	Yes	Yes
24_M6N	Tin/Steel/Bimetal	Non-aerosol container w/o plastic component	Yes	No
24_M6P	Tin/Steel/Bimetal	Non-aerosol container w/ plastic component	Yes	Yes
24_M7P	Tin/Steel/Bimetal	Aerosol can w/ plastic component	Yes	Yes
24_M8N	Tin/Steel/Bimetal	Other Forms w/o plastic component	Yes	No
24_M8P	Tin/Steel/Bimetal	Other Forms w/ plastic component	Yes	Yes
24_M9N	Other Nonferrous	All Forms w/o plastic component	Yes	No
24_M9P	Other Nonferrous	All Forms w/ plastic component	Yes	Yes
24_M10N	Other Ferrous	All Forms w/o plastic component	Yes	No
24_M10P	Other Ferrous	All Forms w/ plastic component	Yes	Yes

CMC ID	Material Type	Material Form	Currently Recyclable or Compostable?	Included in Targeted Recycling Rate?
24_M12N	Metal	Small – Two or more sides measuring 2" or less w/o plastic component	Yes	No
24_M12P	Metal	Small – Two or more sides measuring 2" or less w/ plastic component	No	Yes
24_PF1N	Kraft Paper	All Forms w/o plastic component	Yes	No
24_PF1P	Kraft Paper	All Forms w/ plastic component	Yes	Yes
24_PF14P	Molded Fiber	All Forms w/ plastic component	No	Yes
24_PF14N	Molded Fiber	All Forms w/o plastic component	Yes	No
24_PF15P	Multi-Material Laminate	Aseptic Cartons	No	Yes
24_PF5P	Multi-Material Laminate	Gable-top Cartons	No	Yes
24_PF7P	Multi-Material Laminate	Other Forms w/ plastic component	No	Yes
24_PF8N	OCC	Waxed Cardboard w/o plastic component	No	No
24_PF8P	OCC	Waxed Cardboard w/ plastic component	No	Yes
24_PF9N	OCC	Cardboard w/o plastic component	Yes	No
24_PF9P	OCC	Cardboard w/ plastic component	Yes	Yes
24_PF10N	Paperboard	All Forms w/o plastic component	Yes	No
24_PF10P	Paperboard	All Forms w/ plastic component	Yes	Yes
24_PF11N	White Paper	All Forms w/o plastic component	Yes	No

CMC ID	Material Type	Material Form	Currently Recyclable or Compostable?	Included in Targeted Recycling Rate?
24_PF11P	White Paper	All Forms w/ plastic component	Yes	Yes
24_PF12N	Other/Mixed Paper	All Forms w/o plastic component	Yes	No
24_PF12P	Other/Mixed Paper	All Forms w/ plastic component	Yes	Yes
24_PF16N	Paper and Fiber	Small – Two or more sides measuring 2" or less w/o plastic component	No	No
24_PF16P	Paper and Fiber	Small – Two or more sides measuring 2" or less w/ plastic component	No	Yes
24_P1P	PET (#1)	Bottles, Jugs, and Jars (Clear/Natural)	Yes	Yes
24_P2P	PET (#1)	Bottles, Jugs, and Jars (Pigmented/Color)	Yes	Yes
24_P38P	PET (#1)	Other Rigid Containers, Cups, Lids, Plates, Trays, Tubs	Yes	Yes
24_P39P	PET (#1)	Other Rigid Items	Yes	Yes
24_P6P	HDPE (#2)	Bottles, Jugs and Jars (Clear/Natural)	Yes	Yes
24_P7P	HDPE (#2)	Bottles, Jugs and Jars (Pigmented/Color)	Yes	Yes
24_P8P	HDPE (#2)	Pails & Buckets	Yes	Yes
24_P40P	HDPE (#2)	Other Rigid Items	Yes	Yes
24_P11P	PVC (#3)	Rigid Items	No	Yes
24_P13P	LDPE (#4)	Bottles, Jugs and Jars	No	Yes
24_P14P	LDPE (#4)	Other Rigid Items	No	Yes

CMC ID	Material Type	Material Form	Currently Recyclable or Compostable?	Included in Targeted Recycling Rate?
24_P17P	PP (#5)	Bottles, Jugs and Jars	Yes	Yes
24_P41P	PP (#5)	Other Rigid Containers, Cups, Lids, Plates, Trays, Tubs	Yes	Yes
24_P19P	PP (#5)	Utensils	No	Yes
24_P20P	PP (#5)	Other Rigid Items	Yes	Yes
24_P23P	PS (#6)	Expanded/Foamed Hinged Containers, Plates, Cups, Tubs, Trays, and Other Foamed Containers	No	Yes
24_P42P	PS (#6)	Other Expanded/Foamed Forms	No	Yes
24_P27P	PS (#6)	Utensils	No	Yes
24_P43P	PS (#6)	Solid Hinged Containers, Plates, Cups, Tubs, Trays, and Other Solid Forms	No	Yes
24_P44P	Plastics and Polymers Designed for Compostability	Rigid Items	No	Yes
24_P5P	PET (#1)	Flexible and Film Items	No	Yes
24_P10P	HDPE (#2)	Flexible and Film Items	No	Yes
24_P12P	PVC (#3)	Flexible and Film Items	No	Yes
24_P15P	LDPE (#4)	Clear Non-Bag Film	No	Yes
24_P16P	LDPE (#4)	Other Flexible and Film Items	No	Yes

CMC ID	Material Type	Material Form	Currently Recyclable or Compostable?	Included in Targeted Recycling Rate?
24_P21P	PP (#5)	Clear Non-Bag Film	No	Yes
24_P22P	PP (#5)	Other Flexible and Film Items	No	Yes
24_P29P	PS (#6)	Flexible and Film Items	No	Yes
24_P45P	Plastics and Polymers Designed for Compostability	Flexible and Film Items	No	Yes
24_P36P	Other/Mixed Plastics	Flexible and Film Items	No	Yes
24_P46P	Multi-Material Laminate	Pouches and Envelopes	No	Yes
24_P33P	Multi-Material Laminate	Other Forms	No	Yes
24_P34P	Other/Mixed Plastics	Textiles	No	Yes
24_P35P	Other/Mixed Plastics	Rigid Items	No	Yes
24_P47P	Plastic	Small – Two or more sides measuring 2" or less	No	Yes
24_WO1N	Wood	All Untreated Forms w/o plastic component	Yes	No
24_WO1P	Wood	All Untreated Forms w/ plastic component	No	Yes
24_WO2N	Wood	All Treated or Painted Forms w/o plastic component	No	No
24_WO2P	Wood	All Treated or Painted Forms w/ plastic component	No	Yes
24_WO3N	Other/Mixed Organic	Textiles w/o plastic component	No	No
24_WO3P	Other/Mixed Organic	Textiles w/ plastic component	No	Yes

CMC ID	Material Type	Material Form	Currently Recyclable or Compostable?	Included in Targeted Recycling Rate?
24_WO4N	Other/Mixed Organic	Other Forms w/o plastic component	No	No
24_WO4P	Other/Mixed Organic	Other Forms w/ plastic component	No	Yes
24_WO6N	Wood and Other Organic Materials	Small – Two or more sides measuring 2" or less w/o plastic component	Yes	No
24_WO6P	Wood and Other Organic Materials	Small – Two or more sides measuring 2" or less w/ plastic component	No	Yes

Appendix C: Collection Survey

1. Collection Survey Development and Deployment

The contractor developed a Collection Survey to collect data for the report from local jurisdictions, which may have required them to obtain additional information from their recycling service providers. This Collection Survey gathered information pertaining to the current state of collection programs, as they relate to the Act, and future considerations needed for the Act's successful implementation.

The contractor released the Collection Survey on June 12, 2025, with responses initially requested by July 3, 2025. In response to feedback from local jurisdictions to allow for more time to complete the survey and to encourage more participation, the contractor accepted survey responses received by August 8, 2025, for analysis in the study. The full Collection Survey was 71 questions, but the survey did not require participants to answer all 71 questions.

Each local jurisdiction was notified about the Collection Survey through the following methods:

- Direct emails to local jurisdictions (either to existing direct contacts or to the email addresses listed for the agency's EAR submittal).
- Follow-up phone calls and emails.
- Email distribution to the contractor's interested parties list.
- Email blast from CalRecycle to relevant Listservs.
- Presentations at industry meetings and events.

The contractor sent at least two direct communications regarding the Collection Survey to each local jurisdiction, with some local jurisdictions receiving up to five follow-up communications. The contractor also created supplementary resources for the Collection Survey, such as an informational webinar, a frequently asked questions document, non-disclosure agreements, and an editable Word version of the Collection Survey to facilitate internal collaboration. Additionally, the contractor set up a dedicated email inbox to address Collection Survey related questions and support respondents as needed.

2. Collection Survey Response Rate

The response rate for the Collection Survey, by region, is summarized in Table C-1. Some regional agency representatives completed a single Collection Survey that represented multiple local jurisdictions. Table C-1 reports the number of collection survey responses, the total number of local jurisdictions represented, and the total population represented (using the DOF E-5 Report).

Table C-1: Collection Survey Regional Response Rate – Local Jurisdictions and Population Represented

Metric	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Total number of local jurisdictions	128	71	48	238	132	617
Number of survey responses	40	13	2	40	11	106
Number of local jurisdictions represented by responses	60	24	3	40	16	143
Percent of local jurisdictions represented	47%	34%	6%	17%	12%	23%
Total population of region	7,656,691	1,813,274	597,801	22,100,945	7,360,390	39,529,101
Population represented	4,723,049	1,079,918	113,680	8,008,198	1,452,100	15,376,945
Percent of population represented	62%	60%	19%	36%	20%	39%

The number of local jurisdictions represented in the Collection Survey responses collectively constitute 23% of the total number of local jurisdictions statewide and 39% of the State's total population. Representation from local jurisdictions varied across regions, with the Mountain region having the lowest number of local jurisdiction and population representation. Conversely, the Bay Area and Coastal regions have the most local jurisdiction representation, with 47% and 34% respectively, each with 60% of their region's population represented. This correlates with the high number of agencies who submitted a single Collection Survey response that represented multiple local jurisdictions in the Bay Area and Coastal regions.

3. Responses to Collection Survey Questions

A. Improving Participation in Collection Programs for Materials That May Be Covered Materials

Table C-2 aggregates the total number of full-time equivalent staffing for jurisdictions by region based on responses to the Collection Survey.

Table C-2: Total Full Time Equivalent (FTE) Staffing Level for Technical Assistance (Collection Survey Respondents by Region Out of 87 Total Responses)

Responses	Bay Area (34)	Coastal (11)	Mountain (1)	Southern (35)	Valley (6)	Statewide (87)
Total FTE	191.56	21.55	3	120.38	18.5	354.99

B. Environmental and Public Health Impacts of Collection Programs

Table C-3 shows the most effective strategies for reducing potential negative impacts of collection as identified by Collection Survey respondents.

Table C-3: Most Effective Strategies for Reducing Potential Negative Impacts of Collection (Percent of Local Jurisdiction Respondents out of 85 Responses)

Responses	Bay Area (27)	Coastal (12)	Mountain (1)	Southern (38)	Valley (7)	Statewide (85)
Increased public education on how to use recyclable materials/organic materials programs to benefit public health, communities, and the environment	88.9%	83.3%	100.0%	89.5%	100.0%	89.4%
More efficient collection routes to minimize traffic	48.1%	41.7%	100.0%	57.9%	57.1%	52.9%
Use of electric vehicles to reduce emissions	55.6%	33.3%	100.0%	42.1%	28.6%	44.7%

Responses	Bay Area (27)	Coastal (12)	Mountain (1)	Southern (38)	Valley (7)	Statewide (85)
Specific operating hours to avoid traffic congestion and improve pedestrian safety	22.2%	25.0%	0.0%	18.4%	14.3%	20.0%
Improved bike lanes and sidewalks	25.9%	25.0%	0.0%	10.5%	14.3%	17.6%
Increased buffers between roads and housing/businesses (e.g. greenways, more trees)	25.9%	25.0%	0.0%	13.2%	0.0%	17.6%
Other	3.7%	16.7%	0.0%	5.3%	0.0%	5.9%

Table C-4: Percentage of Local Jurisdictions that have Met with Their RSP to Discuss PHEC Impacts (Percent of Local Jurisdiction Respondents out of 101 Responses)

Response	Bay Area (39)	Coastal (12)	Mountain (2)	Southern (40)	Valley (8)	Statewide (101)
Yes	66.7%	83.3%	50.0%	55.0%	37.5%	61.4%
No	5.1%	0.0%	0.0%	5.0%	25.0%	5.9%
Other	28.2%	16.7%	50.0%	40.0%	37.5%	32.7%

Appendix D: Community Recycling and Composting Survey

1. Community Recycling and Composting Survey Development and Deployment

The contractor developed a Community Recycling and Composting Survey for CBOs, EJ groups, and Tribes to collect data on priority populations' experiences and expertise regarding past, current, and future recycling collection services and processing infrastructure. The Community Recycling and Composting Survey contained 46 questions on the following topics:

- Respondent contact information
- Community information
- General awareness of collection programs for recycling
- Access and equity
- Environmental and public health impacts from collection, processing, and end market operations
- Material sorting and contamination
- Recycling information and education
- Demographic information

The contractor used Jotform, an online survey platform tool, to administer the Community Recycling and Composting Survey and collect responses. The contractor provided options for survey respondents to complete the survey in English, Spanish, and simplified Chinese, but all participants of the study chose to complete the survey in English. The contractor also created an adaptation of the English version of the survey that was tailored for Tribal community members by removing three questions, amending the language and framing of some questions, and modifying the introduction. The full Community Recycling and Composting Survey can be found in the Current State of Processing Report.

The contractor distributed the Community Recycling and Composting Survey to participants during virtual introduction meetings and listening sessions, where participants were encouraged to provide expertise relevant to the study in discussion format.

In collaboration with CalRecycle, the contractor identified a total of 43 CBOs and EJ groups and 20 Tribes to contact for their participation in the study. More information on the selection and outreach to CBOs, EJ groups, and Tribes can be found in the Current State of Processing Report.

While the Community Recycling and Composting Survey responses, introductory meetings, and listening sessions provided the contractor with key information on current perspectives, impacts, and barriers for communities with respect to waste management, supplemental information was needed to fill data gaps that arose specifically related to identifying recommendations to improve outcomes and mitigate impacts on priority populations, along with the timelines and costs for these initiatives. The contractor analyzed the public health impacts of processing and end markets through a combination of online research and GIS mapping of a representative sample of facilities to help understand and illustrate which communities potentially experience disproportionate impacts from facilities and vehicle traffic.

2. Community Recycling and Composting Survey Response Rate

The contractor contacted 43 CBOs and EJ groups, 16 of which participated in engagement activities and 14 of which completed surveys. CBO and EJ group engagement resulted in 324 total combined CBO and EJ group responses to the survey. Three Tribes participated in engagement activities, resulting in eight total survey responses from Tribes. In total, the contractor received a total of 332 individual responses. Due to the limited responses received from Tribes, the contractor recognizes that the results described in table D-1 may not accurately reflect opinions of all Tribal communities statewide.

Table D-1 shows the number of Community Recycling and Composting Survey responses from each adaptation of the survey and from each region.

Table D-1: Community Recycling and Composting Survey Response Rate by Region

Survey	Total Number of Surveys Completed	Number of Surveys Completed in Spanish	Number of Surveys Completed in Chinese	Regions Represented
CBO and EJ Group Survey	324	0	0	Valley (87) Coastal (46) Southern (108) Mountain (80) Bay Area (3)
Tribal Communities Survey	8	N/A	N/A	Mountain (5) Southern (3)

3. Responses to Community Recycling and Composting Survey Questions – CBO and EJ Groups

The Community Recycling and Composting Survey asked participants to identify methods to ease participation in onsite curbside collection programs. Over half of respondents (53%) stated that additional or clearer information on what to recycle and compost would increase participation. The second and third most popular response, particularly from respondents in the Mountain region, which has large proportions of the population without access, was new curbside collection programs and having more containers or more convenient access to containers. The full results are shown in Table D-2.

Table D-2: Methods to Ease Participation in Onsite Curbside Collection Programs for Recycling and Organics Recycling (Percent of CBO and EJ Group Respondents Out of 324 Total Responses)

Responses	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Additional or clearer information on what to recycle and compost	33%	54%	43%	58%	55%	53%
New curbside collection programs made available in my area	0%	28%	66%	44%	46%	47%
Having more containers or more convenient access to containers	0%	41%	44%	48%	46%	45%
Additional materials accepted by the programs available in my area, if any	100%	48%	53%	36%	37%	43%
Verification that my items are being recycled/composted	67%	48%	39%	38%	39%	40%
Clearer labels on packaging	33%	41%	23%	45%	33%	36%
Reduced cost	0%	13%	34%	32%	49%	34%
Clearer labels on collection containers	0%	39%	19%	37%	43%	34%
Trainings conducted by local jurisdictions, service providers, or other entities	67%	22%	23%	31%	33%	28%
None of the above	0%	2%	6%	6%	7%	6%

The Community Recycling and Composting Survey asked participants to identify where recycling and composting containers were most easily accessible. While the majority of respondents reported that they had access to both recycling and composting containers at home, respondents reported more access to recycling containers than composting containers at home, work/school, and in public. Only five% of respondents reported no access to recycling containers, whereas 30% reported no access to composting containers. The full results are shown in Table D-3.

Table D-3: Location Where Recycling and Composting Containers are Most Easily Accessible (Percent of CBO and EJ Group Respondents Out of 324 Total Responses)

Responses	Recycling	Composting
At home	81%	59%
At work/school	35%	15%
In public	35%	15%
Not accessible	5%	30%

The Community Recycling and Composting Survey asked participants to select the most effective strategy to reduce any potential negative impacts that may be caused by implementing expanded collection programs in their community. The majority of respondents stated that increased public education on the use and benefits of expanded collection programs, as well as the use of electric collection vehicles, could be effective strategies. The full results are shown in Table D-4.

Table D-4: Most Effective Strategies to Reduce the Potential Negative Impacts of Expanded Recycling and Organics Recycling Material Collection (Percent of CBO and EJ Group Respondents Out of 324 Total Responses)

Responses	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Increased public education on how to use recycling and composting programs to benefit public health, communities, and the environment	100%	67%	74%	63%	70%	69%
Use of electric collection vehicles to reduce emissions and noise	100%	72%	38%	56%	49%	52%
Improved bike lanes and sidewalks	33%	37%	29%	31%	44%	35%

Responses	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
More efficient collection routes	33%	15%	26%	37%	47%	34%
Limiting operating hours to avoid traffic congestion and improve pedestrian safety	0%	9%	14%	21%	38%	22%
None	0%	9%	13%	1%	5%	6%
Other	0%	4%	0%	2%	0%	1%

The Community Recycling and Composting Survey gathered data on how generators sort materials when generators are confused and how they manage plastic materials. Most survey respondents were confused by packaging that is made from multiple material types. When sorting plastic materials, survey respondents tend to rely on personal experience and knowledge. Table D-5 and Table D-6 show the full survey results.

Table D-5: Most Confusing Scenarios When Sorting Materials (Percent of CBO and EJ Group Respondents Out of 324 Total Responses)

Responses	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
When packaging is made of mixed materials (e.g., plastic yogurt cup with aluminum foil lid, clear plastic shell glued to cardboard backing)	100%	74%	43%	56%	51%	54%
When plastics do not have a recycling number on them (such as ♳)	100%	74%	40%	44%	38%	46%
When items are recyclable but have not been cleaned or might be too dirty	0%	50%	21%	49%	39%	39%
When plastic pieces are very small (such as bottle caps)	67%	43%	34%	40%	29%	36%

Responses	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
When plastic packaging or plastic bags say “recyclable in certain areas” or similar	67%	46%	36%	36%	26%	35%
When parts of a package need to be separated for recycling	67%	33%	26%	41%	34%	35%
When single-use food containers and utensils appear recyclable or compostable	67%	59%	29%	33%	25%	34%
When food scraps contain ingredients that seem like they might not be compostable (such as meat and bones)	0%	28%	18%	28%	37%	27%
Where to sort common items like coffee cups, wine corks, waxed paper, etc.	100%	52%	20%	26%	14%	26%
Not applicable – no separate recycling container provided in my area or I don’t subscribe for this service	0%	0%	39%	6%	23%	18%

Table D-6: How to Decide Whether to Put Plastic Items in the Trash or Recycling Container (Percent of CBO and EJ Group Respondents Out of 324 Total Responses)

Responses	Bay Area	Coastal	Mountain	Southern	Valley	Statewide
Separate plastic items between trash, recycling, and containers based on personal knowledge and experience	67%	54%	44%	47%	39%	45%
Look for the recycling symbol (♲) on the item to decide whether to put items in the recycling containers	0%	50%	26%	34%	29%	33%
Look at the number in the recycling symbol (♲) labeled on the item to decide whether to put it in the recycling container	67%	46%	30%	26%	20%	28%
Put all plastic items in the recycling container	0%	26%	13%	21%	33%	23%
Not applicable – no separate recycling container provided in my area or I don't subscribe for this service	0%	0%	33%	5%	20%	15%
Put all plastic items in the trash	0%	0%	4%	8%	8%	6%
Other	33%	4%	1%	3%	1%	2%

The Community Recycling and Composting Survey asked participants to select the most effective strategy to reduce any potential negative impacts that may be caused by implementing expanded collection programs in their community. Respondents in the Sacramento region, an area that experiences disproportionate public health and environmental impacts, as identified in the Current State of Collection report, identified increased public education on the use and benefits of expanded collection programs and more efficient collection routes and improved bike lanes and sidewalks as the most effective strategies. The full results are shown in Table D-7.

Table D-7: Most Effective Strategies to Reduce the Potential Negative Impacts of Expanded Recycling and Organics Recycling Material Collection (Percent of CBO and EJ Group Respondents from Sacramento Region, Out of 19 Total Responses)

Responses	Percent
Increased public education on how to use recycling and composting programs to benefit public health, communities, and the environment	84%
More efficient collection routes	74%
Improved bike lanes and sidewalks	68%
Use of electric collection vehicles to reduce emissions and noise	63%
Limiting operating hours to avoid traffic congestion and improve pedestrian safety	58%

4. Responses to Community Recycling and Composting Survey Questions – Tribal Communities

The Community Recycling and Composting Survey asked Tribal community members to identify methods to ease participation in onsite curbside collection programs. Tribal community respondents overwhelmingly selected new curbside collection programs in their area as a way to increase participation (63%). The full results are shown in Table D-8.

Table D-8: Methods to Ease Participation in Onsite Curbside Collection Programs for Recycling and Organics Recycling (Percent of Tribal Respondents Out of 8 Total Responses)

Responses	Percent
New curbside collection programs in my area	63%
Additional/clearer info on what to recycle/compost	50%
More containers or more convenient access to containers	50%
Verification that items are being recycled/composted	50%
Reduced cost	38%
Trainings conducted by local jurisdictions, services providers, or others	25%
Clearer labels on containers	25%
Clearer labels on packaging	25%
Additional materials accepted	13%
None of the above	13%

The Community Recycling and Composting Survey asked Tribal communities to identify where recycling and composting containers were most easily accessible. The majority of respondents reported that they had access to recycling and composting containers at work/school. Overall, access to composting containers was reported less frequently than recycling containers. The full results are shown in Table D-9.

Table D-9: Location Where Recycling and Composting Containers are Most Easily Accessible (Percent of Tribal Respondents Out of 8 Total Responses)

Responses	Recycling	Composting
School/Work	75%	63%
Home	50%	38%
Public	38%	25%
Not accessible	0%	25%

The Community Recycling and Composting Survey asked respondents from Tribes to select the most effective strategy to reduce any potential negative impacts that may be caused by implementing expanded collection programs in their community. The majority of respondents stated that increased public education on the use and benefits of expanded collection programs and more efficient collection routes could help reduce negative PEHC impacts. The full results are shown in Table D-10.

Table D-10: Most Effective Strategies to Reduce the Potential Negative Impacts of Expanded Recycling and Compostable Materials Collection (Percent of Tribal Respondents Out of 8 Total Responses)

Responses	Percent
Increased public education on how to use recycling and composting programs to benefit public health, communities, and the environment	75%
More efficient collection routes	38%
Improved bike lanes and sidewalks	38%
Use of electric collection vehicles to reduce emissions and noise	25%
Limiting operating hours to avoid traffic congestion and improve pedestrian safety	25%
None	25%

The Community Recycling and Composting Survey gathered data on how generators sort materials when they are confused and how they manage plastic materials. Tribal communities reported being confused by packaging that is made from multiple material types. When sorting plastic materials, Tribal communities tend to rely on personal experience and knowledge. Table D-11 and Table D-12 show the full survey results.

Table D-11: Most Confusing Scenarios When Sorting Materials (Percent of Tribal Respondents Out of 8 Total Responses)

Responses	Percent
When parts of a package need to be separated for recycling	50%
When plastics do not have a recycling number on them (such as ♲)	38%
When plastic packaging or plastic bags say “recyclable in certain areas” or similar	38%
When items are recyclable but have not been cleaned or might be too dirty	38%
When packaging is made of mixed materials (e.g. plastic yogurt cup with aluminum foil lid, clear plastic shell glued to cardboard backing)	25%
When plastic pieces are very small (such as bottle caps)	25%
Where to sort common items like coffee cups, wine corks, waxed paper, etc.	25%
When food scraps contain ingredients that seem like they might not be compostable (such as meat and bones)	13%
When single-use food containers and utensils appear recyclable or compostable	13%
Not applicable – no separate recycling container provided in my area or I don’t subscribe for this service.	13%

Table D-12: How to Decide Whether to Put Plastic Items in the Trash or Recycling Container (Percent of Community Recycling and Composting Respondents Out of 8 Total Responses)

Responses	Percent
Look for the recycling symbol (♲) on the item to decide whether to put items in the recycling containers	63%
Look at the number in the recycling symbol (♲) labeled on the item to decide whether to put it in the recycling container	50%
Separate plastic items between trash, recycling, and containers based on personal knowledge and experience	38%
Put all plastic items in the recycling container	13%
Not applicable – no separate recycling container provided in my area or I don’t subscribe for this service	13%
Put all plastic items in the trash	0%
Other	0%

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