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Study Results
Processor Commodity Risk Fee
Contamination Management Fee

March 7, 2024
Final Report

Table of Contents

Executive Summary

This Final Report of the Processor Commodity Risk Fee (PCRF) and Contamination Management Fee (CMF) Study Results provides Crowe's calculations of the components of the PCRF and CMF and recommended cost per ton values for the fees to be paid to commingled recyclable processing facilities (CRPFs). These results represent a compilation and analysis of thousands of data points drawn from interviews, research, and dozens of documents provided by facilities. We created models and templates that enabled refinement and sensitivity analyses, the results of which are represented in this final report. Following this Executive Summary, the report is divided into six sections and two appendices, as follows:

1. *Introduction to PCRF and CMF Study*
2. *Methodology*
3. *Fee Study Cost Results*
4. *Current Processing Cost Components and Calculation of the PCRF*
5. *Anticipated Program Costs*
6. *Average Market Pricing Data and Methodology*

Appendix A: Recycling Modernization Act

Appendix B: Anticipated Program Costs.

A. Study and Methodology Overview

Crowe was contracted by the Oregon Department of Environmental Quality (DEQ) in November 2022 to conduct this PCRF and CMF fee study. Between November and May, Crowe developed a study design that documented the data gathering and cost calculation process. The study design was updated based on feedback and recommendations provided by DEQ and the Commingled Recycling Processing Facilities Technical Workgroup. Crowe conducted initial information calls with facilities during Spring 2023, developed Excel cost model templates, and conducted facility site visits in June and early July. Between June and August, Crowe continued discussions with CRPFs and received financial, labor, depreciation, operations, and benefit program data. In October and November, Crowe obtained additional data from DEQ and the technical workgroup to complete this report. The data gathering, analysis, and review process was extensive, culminating in the results within this report. Crowe solicited feedback of earlier versions of this report with the technical workgroup.

B. Results

This section provides an overview of study results. **Exhibit 1** provides the summary of annual base costs, that is, the 2022 costs of the CRPFs. **Exhibit 2** provides the summary of anticipated program costs[1], which are anticipated costs necessary for facilities to meet the requirements of the RMA such as meeting initial performance standards starting July 2025, living wage and supportive benefits requirements starting January 2027, and higher performance standards starting January 2028. **Exhibit 3** provides the summary of base costs with anticipated program costs. "Total" refers to the totals across the participating facilities.[2] The eligible annual processing base cost for purposes of determining the PCRF is $34,494,494, or $123 per ton for the estimate of 280,632 tons of total annual eligible processing of commingled recyclables and non-covered product contamination removed and disposed in 2022. The annual base cost of covered product contamination removal and disposal for purposes of determining the CMF is $4,309,352, or $210 per ton based on an estimate of 20,485 tons of covered product contaminants in 2022. The anticipated program costs are grouped into three implementation periods: July 2025, January 2027, and January 2028, summarized below (note that all costs shown are on an annual basis):

July 1, 2025

- **PCRF Costs:** The total anticipated program costs for purposes of determining the PCRF is $14,840,133, or $53 per ton. The total annual eligible processing of commingled recyclables base cost with anticipated program costs for purposes of determining the PCRF is $49,334,627, or $176 per ton.
- **CMF Costs:** The total anticipated program costs for purposes of determining the CMF is $1,821,318, or $89 per ton. The total annual covered product contaminant removal and disposal base costs with anticipated program costs for purposes of determining the CMF is $6,130,670, or $299 per ton.

January 1, 2027

- **PCRF Costs:** The total anticipated program costs for purposes of determining the PCRF is $35,972,731, or $128 per ton. The total annual eligible processing of commingled recyclables base cost with anticipated program costs for purposes of determining the PCRF is $70,467,225, or $251 per ton.
- **CMF Costs:** The total annual covered product contaminant removal and disposal anticipated program costs for purposes of determining the CMF is $3,454,115, or $169 per ton. The total annual covered product contaminant removal and disposal base costs with anticipated program costs for purposes of determining the CMF is $7,763,467, or $379 per ton.

January 1, 2028

- **PCRF Costs:** The total anticipated program costs for purposes of determining the PCRF is $25,897,238, or $92 per ton. The total annual eligible processing of commingled recyclables base cost with anticipated program costs for purposes of determining the PCRF is $60,391,731, or $215 per ton.
- **CMF Costs:** The total annual covered product contaminant removal and disposal anticipated program costs for purposes of determining the CMF is $3,195,941, or $156 per ton. The total annual covered product contaminant removal and disposal base costs with anticipated program costs for purposes of determining the CMF is $7,505,294, or $366 per ton.

[1] Anticipated program costs include consumer price index (CPI) adjustments.

[2] ORS 459A.923(4) states that a commingled recycling facility must participate in the study in order to be eligible for the PCRF.

Exhibit 1
Summary of Base Costs

Category	Tons	2022 Base Costs	2022 Base Cost per Ton
Total Annual Eligible Processing of Commingled Recyclables Base Costs	280,632	$34,494,494	**$123**
Total Covered Product Contaminant Removal and Disposal Base Costs	20,485	$4,309,352	**$210**
Total Oregon Commingled Recyclable Processing Base Costs[3]	301,117	$38,803,846	$129

Exhibit 2
Summary of Anticipated Program Costs

Category	Tons	2025 APCs	2025 APC per Ton	2027 APCs	2027 APC per Ton	2028 APCs	2028 APC per Ton
Total Commingled Recyclables Anticipated Program Costs	280,632	$14,840,133	**$53**	$35,972,731	**$128**	$25,897,238	**$92**
Total Covered Product Contaminant Removal and Disposal Anticipated Program Costs	20,485	$1,821,318	**$89**	$3,454,115	**$169**	$3,195,941	**$156**
Total Oregon Commingled Recyclable Processing Anticipated Program Costs	301,117	$16,661,451	$55	$39,426,846	$131	$29,093,179	$97

Exhibit 3
Summary of Base Costs with Anticipated Program Costs

Category	Tons	2025 Total Costs	2025 Total Cost per Ton	2027 Total Costs	2027 Total Cost per Ton	2028 Total Costs	2028 Total Cost per Ton
Total Eligible Processing Costs of Commingled Recyclables with Anticipated Program Costs	280,632	$49,334,627	**$176**	$70,467,225	**$251**	$60,391,731	**$215**
Total Covered Product Contaminant Removal and Disposal Base Costs with Anticipated Program Costs	20,485	$6,130,670	**$299**	$7,763,467	**$379**	$7,505,294	**$366**
Total Oregon Commingled Recyclable Processing Base Costs with Anticipated Program Costs	301,117	$55,465,297	$184	$78,230,692	$260	$67,897,025	$225

[3] These totals represent total Oregon-specific commingled recyclable processing costs and tons, including total covered product contaminant removal and disposal and total eligible processing of commingled recyclables marketed and shipped.

C. Example Calculation of the PCRF

The PCRF calculation is comprised of the sum of total eligible annual processing costs of recycling Oregon commingled recycles along with anticipated program costs to meet RMA requirements. The starting point of the PCRF calculation is the total eligible annual processing cost of recycling Oregon commingled recyclables, $34,494,494, or $123 per ton based on 2022 cost and tonnage data. The PCRF is a sum of eligible processing costs (which are fixed in rule) less average commodity value (which is variable and changes month-to-month), and that the "eligible processing costs" in turn are composed of three elements: base (2022) costs, anticipated program costs, and a reasonable financial return.

As described in Section 4, Crowe recommends a profit / financial return of 14% on an earnings-before-tax basis. In the example calculations we apply the 14% to both the current annual eligible processing costs and the anticipated program processing costs. With profit, the annual eligible processing cost is $39,323,723, or $140 per ton of eligible processed commingled recyclables marketed and shipped.

To complete the calculation, we add anticipated program costs of $53 per ton, or $14,840,133. Applying a 14% profit results in an anticipated program cost of $60 per ton. The sum of annual eligible processing costs with profit and anticipated program costs with profit is $56,241,474, equal to $200.41 per ton. Subtracting the calculation of the Oregon average commodity value, described in Section 6, of $52.94 results in a PCRF of $147.47 per ton. The PCRF is very sensitive to market prices.[4] For example, if we increase the base OCC market price to $106 per ton, equal to the average price from September 2021 to August 2022, the Oregon average market price increases to $92.04 per ton and the PCRF decreases to $108.37 per ton. **Exhibit 4** illustrates the complete calculation for a hypothetical August 2023 PCRF. The PCRF will be calculated monthly starting in July 2025.

Exhibit 4
Example Calculation of PCRF

Category	Amount	Result
Total Eligible Annual Processing Cost	$34,494,494	
Financial Return (Profit) on Processing Costs	× 14%	= $39,323,723
Total Anticipated Program Cost	$52.881113 per ton × 280,632 tons	= $14,840,133
Financial Return (Profit) on Anticipated Program Costs	× 14%	= $16,917,751
Sum of Processing Costs, Anticipated Program Costs and Financial Return	$39,323,723 + $16,917,751	= $56,241,474
Total Processed Tons*	280,632 tons	= $200.41 per ton
Oregon Average Commodity Value		– 52.94 per ton
Example Processor Commodity Risk Fee (PCRF)		**$147.47 per ton**

**less covered products removed as contaminants*

[4] The law requires that DEQ periodically updates, but not more frequently than once per month, the average commodity value per ton of commingled materials collected in Oregon.

D. Average Market Pricing Data and Methodology

Crowe researched published scrap market pricing data and obtained 2022 price data from Oregon CRPFs to utilize in determining the average market pricing data methodology and to calculate pricing results. As described in Section 6, there are challenges inherent in determining average commodity values due to the inherent volatility of scrap pricing and variability among facilities. However, the approach outlined in this report provides a viable mechanism for DEQ to determine ACV on a monthly basis.

E. Anticipated Program Costs

Crowe conducted extensive research and iterative interviews to determine anticipated program costs. Much of the information required to calculate anticipated program costs had not been determined at the time of the facility site visits in June and permit requirements were still in the process of being finalized. Because many of the program requirements were still not defined, Crowe used the facility site visit as an opportunity to discuss anticipated program costs in general terms, to inform facilities about potential contamination rates and requirements, and to obtain facility's initial plans regarding changes to support program requirements.

Crowe conducted the second round of facility interviews in late October and early November 2023. In these interviews we discussed in detail each facility's specific plans to meet the July 1, 2025, and January 1, 2028, capture rates and contamination rates. Crowe also obtained documentation and copies of bids for equipment purchases, where applicable.

The anticipated program costs presented in this report represent a comprehensive research and modeling exercise. However, this far in advance of implementation, there are inherent uncertainties in determining potential future investments and costs for the RMA. In addition, these costs represent a compilation of the participating CRPF's planned investments and do not incorporate potential investments or the system-wide impacts of new facilities that may enter the Oregon market. It will be critical for DEQ to monitor and evaluate the systemwide and facility-specific impacts to facilities during the early implementation of the RMA.

1. Introduction to PCRF and CMF Study

The State of Oregon enacted the Recycling Modernization Act (RMA), Senate Bill 582, in 2021. The RMA defines a set of covered products (packaging, printing and writing paper, and food serviceware) and establishes a shared producer responsibility system for responsible recycling of these and other materials. Among its many other requirements, the RMA requires local governments to direct, or cause to be directed, commingled recyclables to processing facilities that are permitted or meet similar standards. These standards will require effective contamination removal (outbound bale quality), material capture rate, and transparency and responsibility in disposition. In addition, the RMA requires DEQ, through the Environmental Quality Commission, to adopt two fees:

- Contamination Management Fee (ORS 459A.920) – to be paid by producer responsibility organizations (PROs) to compensate facilities for the costs of removing and disposing of covered products that are contaminants (e.g., that are not identified as accepted in commingled programs for recycling purposes).
- Processor Commodity Risk Fee (ORS 459A.923) – to be paid by PROs to commingled recycling processing facilities to ensure that producers share in the costs of fully processing commingled recyclables that are covered products and to allow local governments to reduce the financial impacts on rate payers.

The CMF and PCRF are intended to shift the cost of processing commingled recyclables, and the separation and disposing of covered products that are contaminants, from rate payers to PROs. **Appendix A** provides text of Sections 24 (ORS 459A.920) and 25 (ORS 459A.923) of the RMA that define the CMF and PCRF.

Crowe prepared a study design to describe the methodology and approach for determining the CMF and PCRF. This report provides results for both fees. The fees were further refined prior to the presentation to DEQ's Rule Making Advisory Committee in January 2024. Below we describe the information and results that are provided in this report.

Information and Calculations Included in this Report:

- Calculation of processing costs eligible for the PCRF and CMF
- Calculation of rate of financial return/profit for PCRF and CMF
- Market pricing methodology and calculation
- Calculation of anticipated program costs related to living wage and supportive benefits beginning January 2027
- Calculation of anticipated program costs related to additional labor and equipment needs to meet performance standards in July 2025 and January 2028
- Calculation of anticipated program costs related to cost of living increases for other costs
- Overview of current and anticipated CRPF technologies
- Calculations of category and material-specific annual eligible processing costs
- Sensitivity analyses of PCRF and CMF based on varying fee assumptions of the components of each fee

2. Methodology

Crowe utilized the study design as a guide in determining the PCRF and CMF. This methodology section provides an additional level of detail on Crowe's modelling methodology and tasks conducted between March 2023 and December 2023. Our approach is summarized below:

- Conducting initial preparation and developing Excel models
- Conducting field work, follow-up discussions, and iterative data gathering
- Compiling data and modeling.

A. Preparation and Model Development

While Crowe was developing the study design, we were also researching CRPFs and beginning to develop the Excel cost model for the study.

1. Initial Facility Interviews

Prior to conducting field work and during the months of February, March, and April 2023, Crowe conducted a series of one-on-one Teams calls with CRPFs. The purpose of these calls was to obtain an initial understanding of the facility operations, flow of materials, employees, and financial data. Crowe followed a structured process for each interview. First, we provided an overview of the study and our approach leveraging the Study Design. Next, we walked through a series of questions covering topics such as:

- Facility location and hours
- Materials handled
- Sources of material
- Operational processes
- Equipment
- Residual levels
- End-markets
- Employees and temporary labor
- Financial document
- Questions or concerns.

Through these interviews, Crowe gained an understanding of the range of operations and confirmed the general study approach as described in this document. Crowe utilized this information in finalizing the study design and in planning for the on-site visits.

2. Data Requests and Sources

Following the initial interviews, Crowe sent a data request to each facility. In addition, we established a ShareFile account for each processing facility to allow them to securely upload information. For those facilities that did provide information to Crowe prior to our site visits, we stored the files on a secure SharePoint site accessible only to Crowe project team members, reviewed the data, and began to compile the data.

Several CRPFs did not have the data Crowe required at the time of the site visit. During the site visits we met with facility operators and reviewed available information, and afterwards sent follow-up data requests to each facility to identify additional information required to meet the needs of the fee study. Crowe worked with each facility to obtain the required information to calculate their case costs, some of which was received in late August and early September. In October, Crowe conducted meetings with several material recovery equipment manufacturers to obtain equipment pricing information. In November, Crowe conducted follow-up meetings and additional data gathering with each facility focused on meeting performance standards, which informed the calculation of anticipated program costs.

3. Model Development

Crowe utilized our Labor Allocation Cost Model as a foundation for developing the Oregon CRPF Cost Model template. This model includes over a dozen worksheets to input, calculate, summarize, and QC numerous data elements. We added Oregon-specific worksheets for CRPF tonnage data, depreciation schedules, and a living wage differential calculator. From the base template for each facility, we created a PCRF model and a CMF model in order to appropriately allocate costs between processing and covered product contamination removal and disposal. Each facility-specific model is set up to allocate costs based on labor (sort line activities) and associated combinations of tonnage where directly assigning costs to specific activities or materials was not possible.

Exhibit 5 provides a high-level approach to calculate the PCRF cost per ton. **Exhibit 6** provides a high-level approach to calculate the CMF cost per ton. The PCRF and CMF models are directly linked to an aggregation model that combines tonnage and base costs with anticipated program costs. This model calculates the base cost per ton, anticipated program cost per ton, and a combined cost per ton representing base costs and anticipated program costs to calculate the Total Annual Eligible Processing of Commingled Recyclables and Total Covered Product Contaminant Removal and Disposal costs.

Exhibit 5
PCRF Cost per Ton Calculation and Modeling

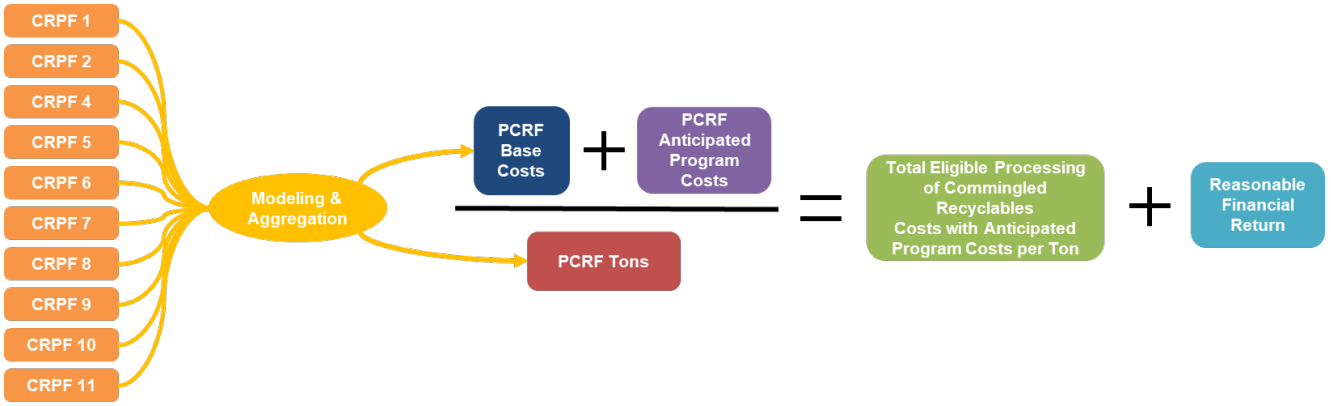
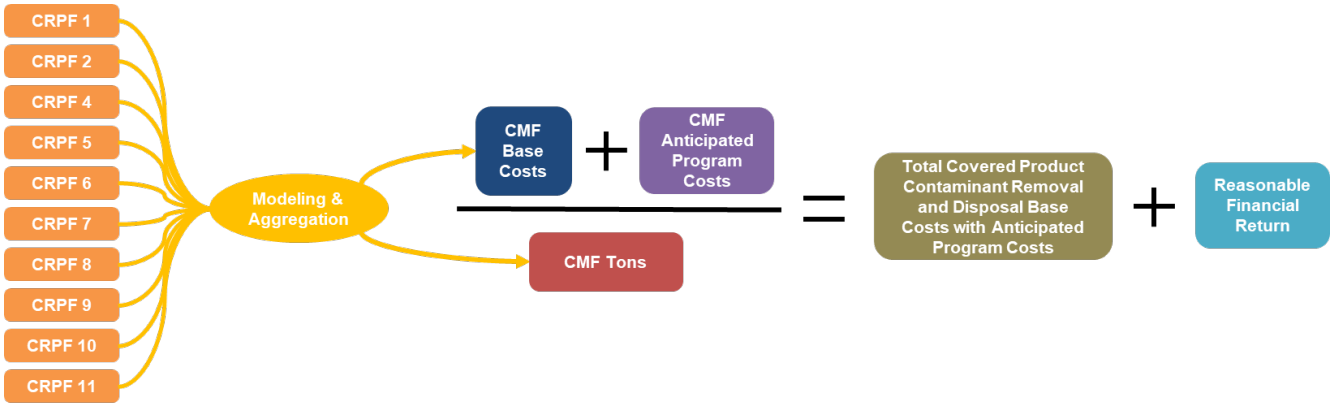


Exhibit 6
CMF Cost per Ton Calculation and Modeling



B. Field Work, Follow-up Discussions, and Data Gathering

The Crowe team conducted on-site visits to 12 CRPF facilities during June and July 2023. **Exhibit 7** identifies the facilities and site visit dates. The team conducted initial interviews by phone and then spent between two and eight hours touring each facility and meeting with site management, operations, and financial team members.

As we received the data from each facility, Crowe conducted follow-up interviews to discuss the data and clarify any remaining questions. These meetings were typically held virtually. The data gathering effort was iterative, with multiple communications as we worked through our data needs and clarified each facility's data.

Exhibit 7
Commingled Recycling Processing Facility Site Visits

Company Name	City, State	Site Visit Date
1. EFI Recycling	Portland (North), OR	June 26
2. EcoSort (Waste Connections Inc.)	Eugene, OR	June 28
3. Far West Recycling	Portland (Northeast), OR	June 30
4. Far West Recycling	Hillsboro, OR	June 29
5. Garten Services Recycling	Salem, OR	June 6
6. International Paper	Springfield, OR	June 28
7. Kahut Waste Services/K.B. Recycling (Waste Connections Inc.)	Clackamas, OR	June 8
8. Pioneer Recycling Services	Clackamas, OR	June 5
9. REACH[a]	Klamath Falls, OR	July 12
10. Recology Eel River	Samoa, CA	July 14
11. West Vancouver Materials Recovery Center (Waste Connections Inc.)	Vancouver, WA	June 7
12. WestRock Recycling Facility	Portland (Southeast), OR	June 27

[a] REACH provided initial financial data and participated in discussions but did not process commingled recyclables during the study period (2022) and was not included in the analyses. REACH may be eligible for future PCRF/CMF funding if the facility is permitted and choses to receive and process commingled USCL material under the RMA.

C. Data Compilation and Modeling

Crowe prepared an Excel model for each facility, incorporating applicable data, calculations, and allocations. In this section, we describe the flow of data and allocation approaches we applied at the various steps of the process. We customized the allocations and calculations for each facility based on the materials handled, equipment utilized, employees, and extent of other business, non-Oregon, and/or source segregated materials.

1. Overview of Allocation Methods

Crowe utilized several different allocation methods, selecting the approach that best reflected a facility's operations. In many cases, we utilized several layers of allocations to remove costs that were not components of annual eligible processing costs. As data from the DEQ's 2023 Inbound and Outbound Commingled Recycling studies and other sources became available, we incorporated additional allocation methods and/or updated existing allocations.

- **Direct costs** – Where facilities identified line-item costs specific to source segregated material, other business, commingled sort line, and/or specific material types, we allocated those costs directly to the appropriate category. For example, we allocated depreciation of an OCC optical sorter to OCC, and we allocated landfill disposal fees to contamination management.
- **Labor hours/employee based** – Crowe's Excel Labor Allocation Cost Model utilizes employee labor hours to allocate employee time to source segregated material, other business activities, commingled sort line, and/or specific material types. We also utilized labor hours to allocate indirect costs that couldn't be more accurately allocated by other methods.
- **Tonnage** – Crowe utilized facility-specific relative tonnage data to allocate several categories of costs. For example, we allocated the cost of baling wire based on the percentage of outbound tons of all baled material (essentially everything but glass and scrap metal). We also utilized the relative tons of non-Oregon and source segregated recyclables to allocate material away from the cost of processing commingled recyclables.
- **2023 Inbound and Outbound Commingled Recycling studies** – We utilized the percentage of covered product contaminants from the inbound and outbound study to separate costs of covered and non-covered contaminants (46.72% of contaminants are covered products based on preliminary data). We further refined sort-line labor allocations using covered versus non-covered breakouts of specific material types from the study.
- **Contamination rates** – Where applicable, we utilized Oregon-specific contamination rates to identify residual tonnage specific to Oregon.

To determine annual eligible processing costs, Crowe classified and removed costs that were not associated with processing commingled recyclables. In addition, we allocated costs to identify material specific costs, where possible. Crowe allocated the following categories of costs, as applicable for each facility:

- **Other business activities (in financials)** – We typically utilized direct costs and labor allocation to separate other business activity costs.
- **Non-Oregon activities** – We typically utilized relative tonnage data to separate costs associated with non-Oregon recyclables.
- **Source segregated activities** – We typically utilized relative tonnage data to separate costs associated with source segregated materials; we also utilized labor allocations depending on whether source segregated material was run through the commingled sort line.

- **Labor** – We allocated labor based on specific work activities (for example, working on the paper sort line); for non-sort line workers we generally allocated labor based on relative tonnage data. We also interviewed facilities regarding labor associated with contaminant removal to determine appropriate labor allocations related to covered and non-covered product contaminants.
- **Material specific costs** – We utilized a combination of labor allocations for sort line workers, direct costing of specific line items, and tonnage data to identify material specific costs. We incorporated allocations based on the inbound and outbound studies, as appropriate, as more data is available.
- **Covered vs. non-covered contaminants** – We utilized the inbound study results for inbound contamination to separate residual tonnage between covered and non-covered contaminants.

2. Overview of Models, Cost Calculations, and Allocations for PCRF and CMF

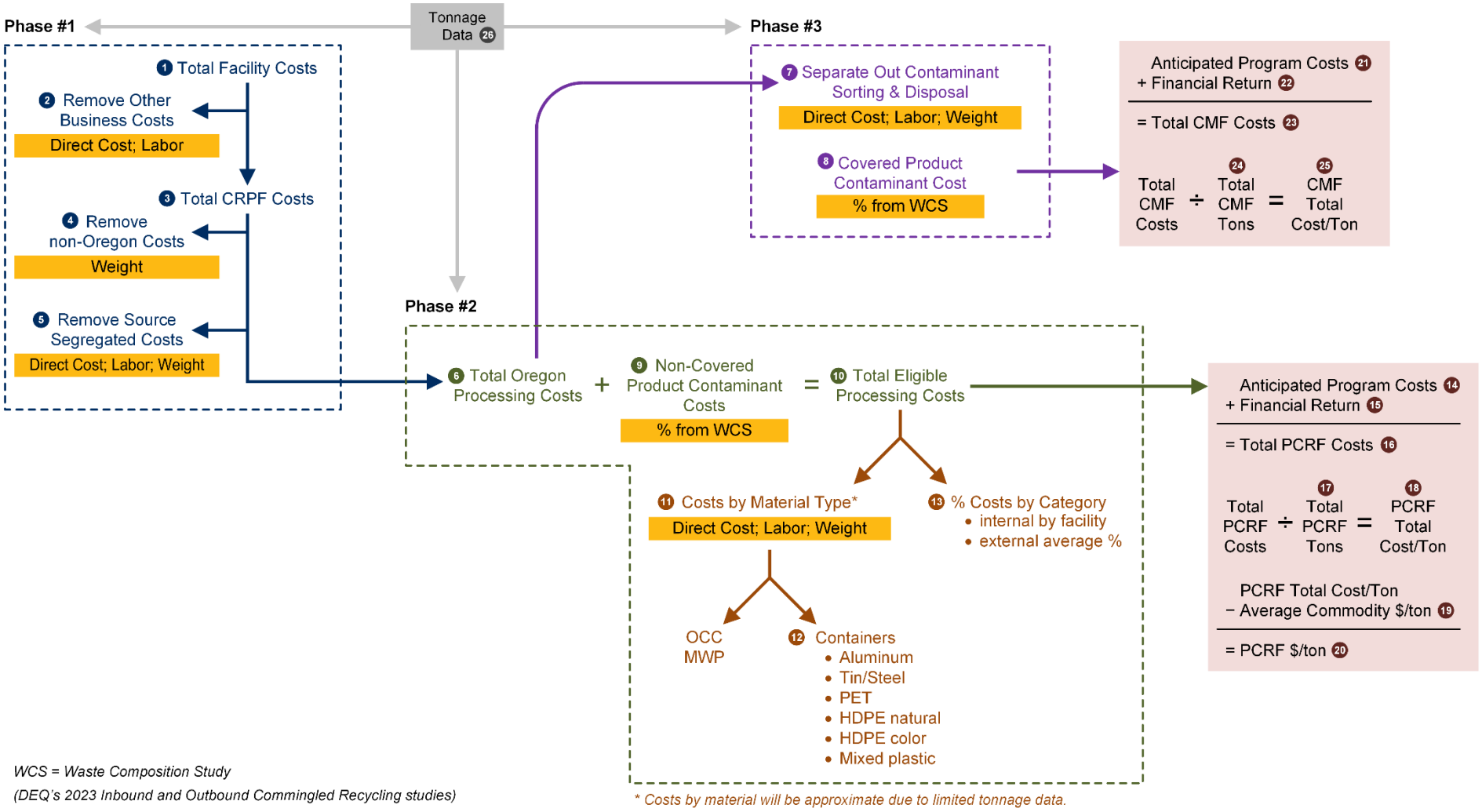
Within each facility's cost model, and through the data compilation process, determining the PCRF, CMF, and more detailed results requires multiple layers of allocations and calculations. **Exhibit 8** provides an overview of the steps Crowe utilized to determine the two fees and additional cost category and material specific cost estimates. Our methodology essentially consists of peeling away layers of costs that are not part of processing commingled recyclables, aggregating costs across all facilities, and then, to the extent possible, splitting apart the total costs of commingled recyclables into smaller components.

For purposes of illustration, we divide the calculations into three phases, described below and illustrated by the dotted lines. Crowe utilized a customized Excel model for each facility. We followed a consistent methodology for each facility, preparing the model and allocating as applicable to each site. We then aggregated the data across the facilities to determine total costs associated with each phase and step.

The process starts with Phase #1, the purpose of which is to remove any facility costs not associated with processing Oregon commingled recyclables. Once we split away the other business, non-Oregon, and source segregated material costs, we utilize the remaining total Oregon Commingled Processing Costs in Phase #2. Crowe utilized Phase #2 to determine the total and component annual eligible processing costs for purposes of determining the PCRF, which includes the costs of contamination removal and disposal of non-covered products. In Phase #3 we determine the costs of contamination removal and disposal and to split contamination costs between covered and non-covered products in order to determine the CMF.

Throughout the exhibit we identify allocation methods for each calculation in the gold boxes. Following the exhibit, we provide a step-by-step description of the steps depicted by the circled numerals.

Exhibit 8
Overview of Models and Cost Calculations



WCS = Waste Composition Study
(DEQ's 2023 Inbound and Outbound Commingled Recycling studies)

** Costs by material will be approximate due to limited tonnage data.*

1. **Total Facility Costs:** Total facility costs reflect the full set of costs in the financials provided by each CRPF. Depending on the facility, this could include costs associated with other business units as well as processing costs of non-Oregon and/or non-commingled recyclables.

2. Crowe removed "other business" costs using a mix of direct costing and labor allocations. For example, costs associated with equipment used in other business activities was direct costed to other business. If employees associated with the other business operations were included in the financial and labor data, Crowe categorized the labor hours and wages as other business and our labor allocation methodology separated out the associated wages and benefits plus allocated the relevant percentage of indirect costs to other business.

3. **Total CRPF Costs:** After removal of other business costs, the remaining costs reflect total CRPF costs. These include costs of processing both Oregon and non-Oregon materials and costs associated with recycling source segregated materials.

4. Crowe removed non-Oregon costs from total CRPF costs based on the percentages of inbound Oregon and non-Oregon recyclables at each facility in 2022. For example, if 85% of a facility's incoming material is from Oregon and 15% is from other states, we multiplied total CRPF costs by 85% to determine the portion of CRPF costs associated with Oregon recyclables tonnage.

5. Crowe removed the costs associated with recycling source segregated material utilizing a combination of up to three allocation approaches: direct costs, weight (inbound tonnage), and/or labor hours allocation. We determined the appropriate allocation(s) based on how each facility handled source segregated material. For example, some facilities ran their source segregated material (primarily OCC) through the commingled sort line. For these facilities, we allocated a portion of OCC-specific sort line labor to source segregated material. In addition, we utilized the percentage of source segregated tonnage as compared to total Oregon processing tonnage to allocate a portion of indirect costs. If the facility incurred direct costs associated with source segregated material, such as a baler used only for this material, we split these costs away from the remaining costs of processing Oregon commingled materials.

6. **Total Oregon Processing Costs:** Once Crowe removed the three "buckets" of costs not related to processing Oregon commingled materials (other business, non-Oregon recyclables, and source segregated recyclables), the costs remaining in Phase #2 reflect the total cost of processing commingled recyclables from Oregon, including costs of contamination removal and disposal.

7. Crowe separated the cost of contamination removal and disposal from total Oregon processing costs using a combination of direct cost and labor allocations. We utilized direct cost allocations to capture transportation of residuals to landfill and landfill tip fees. These costs are specifically associated with residual from processing Oregon recyclables. Crowe utilized a labor allocation approach to identify direct labor costs and a relevant portion of indirect costs associated with contamination removal. We captured indirect costs such as rent using our labor allocation methodology. For example, if 10% of labor hours were associated with contaminant removal, then the model allocated 10% of rent costs to contaminant removal. We allocated 100% of labor associated with pre-sort to contaminant removal as these workers are primarily removing non-recyclables such as film from the sort line. In addition, we utilized a weight-based allocation (% of residuals as compared to total inbound Oregon recyclables in the sort line) to allocate a portion of workers on the OCC QC station because these workers are often removing additional film and contaminants that pass through the OCC screen. We assume that by the time recyclables have reached the paper line workers are primarily sorting out containers and by the time recyclables reach the container line, the majority of non-recyclable residuals have been removed and the sorters are primarily positive sorting the appropriate container types.

8. Once we determined the cost of contamination removal and disposal in Phase #3, we split total costs of contamination between covered and non-covered products. Crowe utilized the percentage of inbound covered product contaminants as determined by DEQ's Inbound Commingled Recycling to identify the covered product component of contamination removal. Preliminary study results as of October 2023 identified that 46.72% of commingled contamination is covered product. We utilized this percentage to determine the cost of covered product contamination and the tons of covered product contamination for each facility that reported residuals. Where applicable, for facilities handling Oregon and non-Oregon material, we applied Oregon-specific residual rates.

9. Crowe determined the remaining cost of non-covered product contamination removal and disposal by multiplying the total cost of contamination removal and disposal by the percentage of non-covered product contaminants (100% minus 46.72% = 53.28%). This cost is included in total annual eligible processing costs.

10. To determine the total annual eligible processing costs, we took the total Oregon Processing costs minus the cost of covered product contaminant removal and disposal. The resulting figure reflects the total eligible costs of processing Oregon commingled recyclables based on 2022 facility data.

11. As a subset of Phase #2, we estimated, to the extent possible, material-specific processing costs per ton. We allocated total processing costs by utilizing direct costs (for example, depreciation of optical sorters used for a specific material), labor allocations (based on materials handled at sort line positions), and weight (based on weight of outbound materials).

12. At this point the material specific costs per ton should be viewed as best estimates. Crowe split costs first between fiber and containers. We split fiber costs between OCC and mixed paper. Not all facilities produce similar paper grades, so these two categories reflected the broader categories, understanding that not all OCC or mixed paper is the same. We split container costs into up to six categories: aluminum, tin and steel, PET, HDPE natural, HDPE color, and mixed plastic. In 2022, containers represented only 9% of total commingled recyclables. As the quantity of material decreases, it is more challenging to accurately determine costs. In addition, tonnage data reported by DEQ and the facilities do not necessarily align with sort line operations. For example, DEQ reports Other Plastic and Rigid Plastic Containers while facilities are sorting PET, HDPE natural, HDPE colored, and potentially a mixed plastic consistent of #3 to #7 plastic.

13. As a second subset of Phase #2, we calculated the percent of total annual eligible processing costs by our fifteen cost categories identified in the Study Design. In collaboration with the facilities, Crowe assigned cost categories to each line item on facility financials. We summed these across facilities to determine total and percent of total costs by category.

14. We added anticipated program costs to total annual eligible processing costs. We describe anticipated program costs further in Section 5.

15. Crowe identified a financial return percent as described in Section 4. In this step we multiplied sum of #10 (Total Annual Eligible Processing Costs) and #14 (Anticipated Program Costs) by the financial return percentage of 14%.

16. The resulting value, Total PCRF Costs, reflects Oregon systemwide commingled recyclable processing costs, summing current (2022 costs), anticipated program costs, and incorporating a financial return.

17. To determine cost per ton, divide Total PCRF costs by total outbound tons of Oregon systemwide commingled recyclables plus tons of non-covered product contaminants.[5] We utilized 2022 tonnage data for this calculation.

18. The result is the PCRF Total Cost per Ton.

19. To determine PCRF payments to CRPFs, we must subtract the average commodity value per ton. This value, described in Section 6, reflects a weighted average value per ton, by end-market material type, and current market prices. DEQ will update the average commodity value monthly to determine the PCRF.

20. The PCRF, in dollars per ton, reflects the difference between the PCRF total cost per ton and the average commodity value, per ton. This is the payment CRPFs will receive, per ton, for the first tons of inbound commingled recyclables, less any tonnage used to invoice for the CMF.

21. We added anticipated program costs to total annual cost of covered product contaminant removal and disposal. We describe anticipated program costs further in Section 5.

22. Crowe identified a financial return percent as described in Section 4. In this step we multiplied sum of #8 (Covered Product Contaminant Cost) and #21 (Anticipated Program Costs) by the financial return percentage of 14%.

23. The resulting value, Total CMF Costs, reflects Oregon systemwide cost of covered product contaminant removal and disposal, summing current (2022 costs), anticipated program costs, and incorporating a financial return.

24. To determine cost per ton, we divide Total CMF Costs by total outbound tons of Oregon systemwide commingled recyclables that are covered product contaminants.[6] We utilized 2022 tonnage data for this calculation.

25. The result is the CMF Total Cost per Ton.

26. This item reflects tonnage data, which informs all three models and various calculations. Crowe compared 2022 tonnage data as reported by CRPFs to DEQ and tonnage data within facility internal reports. Internal facility data generally was more detailed. We reconciled the two data sources and utilized facility data in most cases.

[5] PCRF contaminants excludes tons of covered glass and plastic film. A total of 4,242 tons (2,399 tons of covered glass, and 1,843 tons of covered plastic film) were shifted from PCRF tons to the CMF tons to align with the invoicing approach for CMF. This results in 280,632 tons commingled recyclables and non-covered residuals for purposes of determining the PCRF base per ton.

[6] CMF contaminants include tons of covered glass and plastic film. A total of 4,242 tons (2,399 tons of covered glass, and 1,843 tons of covered plastic film) were shifted from PCRF tons to the CMF tons to align with the invoicing approach for CMF. This results in 20,485 tons covered product residuals (including non-USCL recyclable covered product glass and film) for purposes of determining the CMF base per ton.

3. Fee Study Cost Results

This section of the report provides costs associated with processing commingled recyclables in Oregon. Costs are based on facility data for 2022 and aggregated across the 11 participating facilities that processed volumes in 2022. Tons are based on DEQ and facility data for 2022 and aggregated across the 11 facilities participating in the study. Tons partially processed in one facility and then shipped to a second facility for subsequent processing are only counted once in the overall system tonnage.

A. Total Processing and Contamination Management Costs

This section provides an overview of study results. **Exhibit 9** provides the summary of annual base costs, that is, the 2022 costs of the CRPFs. **Exhibit 10** provides the summary of anticipated program costs. **Exhibit 11** provides the summary of base costs with anticipated program costs.[7] "Total" refers to the totals across the participating facilities.[8] The eligible annual processing base cost for purposes of determining the PCRF is $34,494,494, or $123 per ton for the estimate of 280,632 tons of total annual eligible processing of commingled recyclables and non-covered product contamination removed and disposed in 2022. The annual base cost of covered product contamination removal and disposal for purposes of determining the CMF is $4,309,352, or $210 per ton based on an estimate of 20,485 tons of covered product contaminants in 2022. The anticipated program costs are grouped into three implementation periods: July 2025, January 2027, and January 2028, summarized below (note that all costs shown are on an annual basis):

July 1, 2025

- **PCRF Costs:** The total anticipated program costs for purposes of determining the PCRF is $14,840,133, or $53 per ton. The total annual eligible processing of commingled recyclables base cost with anticipated program costs for purposes of determining the PCRF is $49,334,627, or $176 per ton.
- **CMF Costs:** The total anticipated program costs for purposes of determining the CMF is $1,821,318, or $89 per ton. The total annual covered product contaminant removal and disposal base costs with anticipated program costs for purposes of determining the CMF is $6,130,670, or $299 per ton.

January 1, 2027

- **PCRF Costs:** The total anticipated program costs for purposes of determining the PCRF is $35,972,731, or $128 per ton. The total annual eligible processing of commingled recyclables base cost with anticipated program costs for purposes of determining the PCRF is $70,467,225, or $251 per ton.
- **CMF Costs:** The total annual covered product contaminant removal and disposal anticipated program costs for purposes of determining the CMF is $3,454,115, or $169 per ton. The total annual covered product contaminant removal and disposal base costs with anticipated program costs for purposes of determining the CMF is $7,763,467, or $379 per ton.

January 1, 2028

- **PCRF Costs:** The total anticipated program costs for purposes of determining the PCRF is $25,897,238, or $92 per ton. The total annual eligible processing of commingled recyclables base cost with anticipated program costs for purposes of determining the PCRF is $60,391,731, or $215 per ton.
- **CMF Costs:** The total annual covered product contaminant removal and disposal anticipated program costs for purposes of determining the CMF is $3,195,941, or $156 per ton. The total annual covered product contaminant removal and disposal base costs with anticipated program costs for purposes of determining the CMF is $7,505,294, or $366 per ton.

[7] Anticipated program costs include consumer price index (CPI) adjustments.

[8] ORS 459A.923(4) states that a commingled recycling facility must participate in the study in order to be eligible for the PCRF.

Exhibit 9
Summary of Base Costs Results

Category	Total Tons	Base Costs	Base Cost per Ton
Total Oregon Recyclable Processing[9]	580,348	$75,455,599	$130
Total Source Segregated and non-Oregon Costs	279,231	$36,651,753	$131
Total Oregon Commingled Recyclable Processing[10]	301,117	$38,803,846	$129
Total Contaminant Removal and Disposal	34,766	$9,046,292	$260
Total Non-Covered Product Contaminant Removal and Disposal	14,281	$4,736,940	$332
Total Annual Eligible Processing of Commingled Recyclables	280,632	$34,494,494	**$123**
Total Covered Product Contaminant Removal and Disposal	20,485	$4,309,352	**$210**

Exhibit 10
Summary of Anticipated Program Costs

Category	Tons	2025 APCs	2025 APC per Ton	2027 APCs	2027 APC per Ton	2028 APCs	2028 APC per Ton
Total Commingled Recyclables Anticipated Program Costs	280,632	$14,840,133	**$53**	$35,972,731	**$128**	$25,897,238	**$92**
Total Covered Product Contaminant Removal and Disposal Anticipated Program Costs	20,485	$1,821,318	**$89**	$3,454,115	**$169**	$3,195,941	**$156**
Total Oregon Commingled Recyclable Processing Anticipated Program Costs	301,117	$16,661,451	$55	$39,426,846	$131	$29,093,179	$97

Exhibit 11
Summary of Base Costs with Anticipated Program Costs

Category	Tons	2025 Total Costs	2025 Total Cost per Ton	2027 Total Costs	2027 Total Cost per Ton	2028 Total Costs	2028 Total Cost per Ton
Total Annual Eligible Processing Costs of Commingled Recyclables with Anticipated Program Costs	280,632	$49,334,627	**$176**	$70,467,225	**$251**	$60,391,731	**$215**
Total Covered Product Contaminant Removal and Disposal Base Costs with Anticipated Program Costs	20,485	$6,130,670	**$299**	$7,763,467	**$379**	$7,505,294	**$366**
Total Oregon Commingled Recyclable Processing Base Costs with Anticipated Program Costs	301,117	$55,465,297	$184	$78,230,692	$260	$67,897,025	$225

[9] These totals represent total CRPF costs and outbound tons, including Oregon-specific commingled recyclable processing, source segregated recyclable processing, and non-Oregon recyclable processing.
[10] These totals represent total Oregon-specific commingled recyclable processing costs and tons, including total covered product contaminant removal and disposal and total eligible processing of commingled recyclables marketed and shipped.

4. Current Processing Cost Components and Calculation of the PCRF

In this section, we provide a build-up of the PCRF.

A. Profit / Reasonable Financial Return

ORS 459A.923(1)(c)(A) of the RMA indicates that profit is an annual eligible processing cost. This section presents Crowe's assessment of a reasonable profit level for a commingled processing facility sorting materials from Oregon. As part of this analysis, we obtained and analyzed the following sources of comparable profitability data:

- Recent profit levels of publicly-traded companies providing service in the waste management/ recycling industry
- Recent profit levels of small, medium, and large privately-held companies providing service in the waste management/recycling industry
- Recent returns of a large group of environmental/waste services companies
- Actual profitability data from commingled recycling processing facilities we surveyed for this study.[11]

Analysis

Recent profit levels of publicly-traded companies providing service in the waste management/ recycling industry

Over the past three years, the three largest publicly-traded waste management/recycling companies included WM (formerly Waste Management), Republic Services, and Waste Connections. On a combined weighted average basis, these companies had profit levels equal to 15.5% on an earnings before tax basis and 19.7% on an earnings before interest and tax basis.[12] These companies are engaged in a variety of waste management activities, including collection, transportation, facility development/management, and disposal.

Recent profit levels of small, medium, and large privately-held companies providing service in the waste management/recycling industry

Over the past three years, the Risk Management Association (RMA) reported the financial returns of between 150 and 158 waste management companies engaged in Administration & Waste Management Services - Solid Waste Collection (NAICS code 562111). On a combined weighted average basis, these companies had profit levels of 8.0% on an earnings before tax basis and 9.7% on an earnings before interest and tax basis. These companies are engaged in collection of refuse, recycling and organics materials.

[11] Note that there is not an available source of published financial return data for commingled processing facilities. As such, we relied on a variety of similar sources of financial return data for companies operating in the waste management/recycling industry that face similar risks to MRFs in the State of Oregon.

[12] Source: Published financial statements and 10-Ks.

Other Environmental/Waste Services Companies

A survey of between 62 and 91 environmental and waste services company returns developed by Damodaran Online (managed by a New York University, Stern School of Business professor) showed an earnings before interest, taxes, depreciation, and amortization (EBITDA) of between 18.5 and 20.0 percent between 2018 and 2022.

Actual profitability data from commingled recycling processing facilities we surveyed for this study

Average financial returns, for those commingled recycling processing companies that were the subject of this study and provided data to determine their financial returns for 2022, were approximately 14.5% on an earnings before interest and tax basis.

Recommendations

We recommend that, for the purposes of setting the PCRF, DEQ uses a reasonable financial return level equal to 14% on an earnings before tax (EBT) basis.[13] This financial return is essentially reflective of a middle point of the range of financial returns from the sources identified above and aligns closely with the financial returns reported by waste management/recycling companies with similar risk profiles. Coupled with provisions for anticipated program costs, this return level also should be sufficient to encourage Oregon MRFs participating in the RMA program to make investments in capital and equipment needed to meet program requirements.

We recommend that the DEQ allow for reasonable annual adjustments to the PCRF and CMF such that this financial return level is not eroded over time. We also recommend that the DEQ revisit this financial return level within 5 years to determine that it continues to reflect a reasonable level commensurate with those experienced in the industry.[14]

[13] There is no guarantee that a CRPF will earn a financial return in any given year.

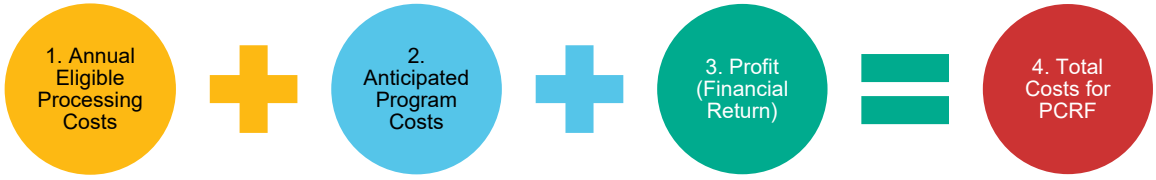
[14] Per ORS 459A.920(5) and .923(6), DEQ reviews fees at least every five years but not more than annually. An exception exists for the PCRF: if a study shows a more than 10% change in average per-ton processing cost since its last establishment, a revision is mandated.

C. Example Calculation of the PCRF

The PCRF calculation is comprised of the sum of total eligible annual processing costs of recycling Oregon commingled recycles along with anticipated program costs to meet RMA requirements. The starting point of the PCRF calculation is the total eligible annual processing cost of recycling Oregon commingled recyclables, $34,494,494, or $123 per ton based on 2022 cost and tonnage data. The PCRF is a sum of eligible processing costs (which are fixed in rule) less average commodity value (which is variable and changes month-to-month), and that the "eligible processing costs" in turn are composed of three elements: base (2022) costs, anticipated program costs, and a reasonable financial return.

As described in Section 4, Crowe recommends a profit / financial return of 14% on an earnings-before-tax basis. In the example calculations we apply the 14% to both the current annual eligible processing costs and the anticipated program processing costs. With profit, the annual eligible processing cost is $39,323,723, or $140 per ton of eligible processed commingled recyclables marketed and shipped.

Exhibit 12
Example Calculation of PCRF Total Costs



To complete the calculation, we add anticipated program costs of $53 per ton, or $14,840,133. Applying a 14% profit results in an anticipated program cost of $60 per ton. The sum of annual eligible processing costs with profit and anticipated program costs with profit is $56,241,474, equal to $200.41 per ton. Subtracting the calculation of the Oregon average commodity value, described in Section 6, of $52.94 results in a PCRF of $147.47 per ton. The PCRF is very sensitive to market prices.[15] For example, if we increase the base OCC market price to $106 per ton, equal to the average price from September 2021 to August 2022, the Oregon average market price increases to $92.04 per ton and the PCRF decreases to $108.37 per ton. **Exhibit 13** illustrates the complete calculation for a hypothetical August 2023 PCRF. The PCRF will be calculated monthly starting in July 2025.

Exhibit 13
Example Calculation of PCRF

Category	Amount	Result
Total Eligible Annual Processing Cost	$34,494,494	
Financial Return (Profit) on Processing Costs	× 14%	= $39,323,723
Total Anticipated Program Cost	$52.881113 per ton × 280,632 tons	= $14,840,133
Financial Return (Profit) on Anticipated Program Costs	× 14%	= $16,917,751
Sum of Processing Costs, Anticipated Program Costs and Financial Return	$39,323,723 + $16,917,751	= $56,241,474
Total Processed Tons*	280,632 tons	= $200.41 per ton
Oregon Average Commodity Value		– 52.94 per ton
Example Processor Commodity Risk Fee (PCRF)		**$147.47 per ton**

**less covered products removed as contaminants*

[15] The law requires that DEQ periodically updates, but not more frequently than once per month, the average commodity value per ton of commingled materials collected in Oregon.

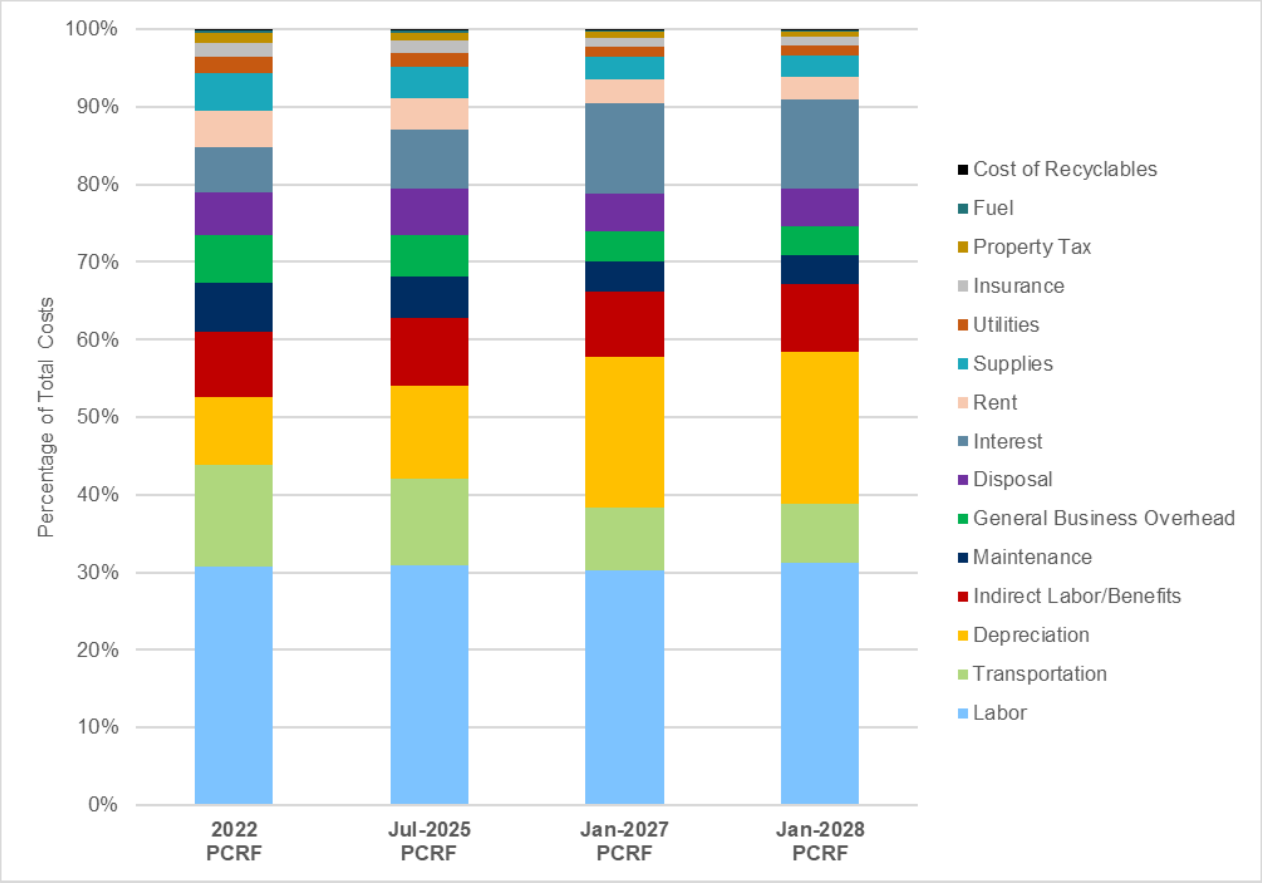
D. Costs by Category

Crowe calculated the percent of total costs for each of the 15 cost categories we utilize in the cost model. These percent of costs incorporate differences between facilities based on operational practices. The number of additional staff and level of investment in equipment are reflective within the percentages. As illustrated in **Exhibit 14,** below are the anticipated cost category trends between 2022 and January 2028 for processing costs:

- **Labor** is consistently the largest cost category, ranging from 30% to 31% of total costs.
- **Indirect Labor** ranged from 8% to 9% of total costs.
- **Depreciation** increases most significantly, from 9% in 2022 to 20% of total costs in 2028.
- **Interest** also increases significantly, from 6% in 2022 to 12% of total costs in 2028.
- **Other Categories** were generally not impacted by operational, and equipment changes and increased only based on the CPI adjustment, thus they decreased in proportion to labor, indirect labor, depreciation, and interest. For example, transportation decreased from 13% to 8%.

The changing proportions of processing costs demonstrate a significant shift of the share of costs to depreciation and interest making up a combined 32% of total costs in 2028, up from 15%. This increase is due to the anticipated equipment-related costs needed to meet performance standards. Once most of the equipment is paid off and fully depreciated, future proportions may be similar to 2022 levels.

Exhibit 14
Percent of Total Eligible PCRF Costs by Category
2022 Baseline, Program Plan Years Beginning July 2025, January 2027, and January 2028

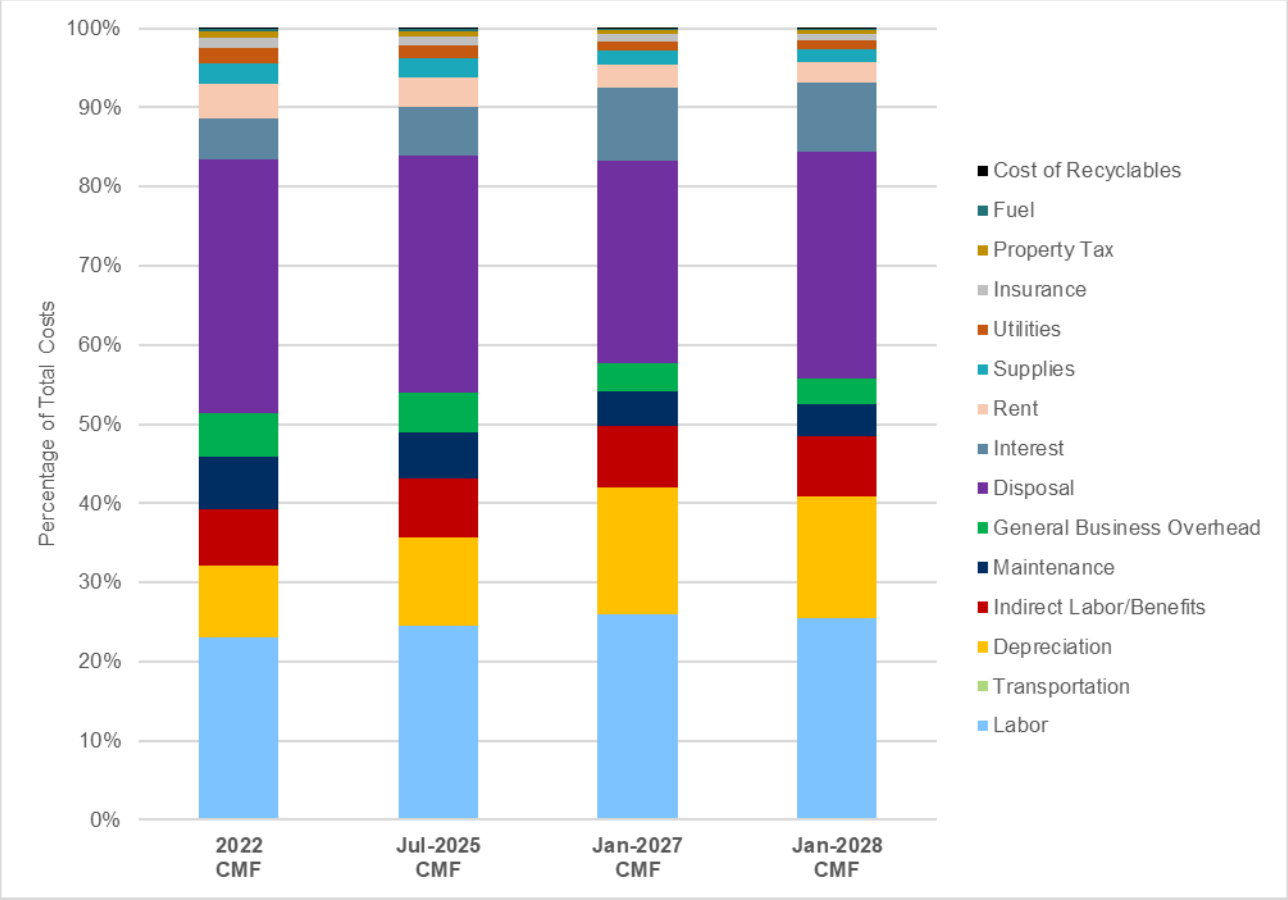


As illustrated in **Exhibit 15,** below are the anticipated cost category trends between 2022 and January 2028 for covered product contamination removal and disposal costs:

- **Disposal** remains the largest cost category throughout the years, ranging from 26% to 32%.
- **Labor** remains the second the largest cost category throughout the years, ranging from 23% to 26% of total costs.
- **Indirect Labor** also remained consistent, ranging from 7% to 8% of total costs.
- **Depreciation** increases most significantly, from 9% in 2022 to 15% of total costs in 2028.
- **Interest** also increases significantly, from 5% in 2022 to 9% of total costs in 2028.
- **Other Categories** were generally not impacted by operational, and equipment changes and increased only based on the CPI adjustment, thus they decreased in proportion to labor, depreciation, and interest.

Similar, but to a lesser extent than processing costs, the changing proportions of contamination removal and disposal costs demonstrate a shift of the share costs to depreciation and interest, representing a combined 24% of total costs in 2028, up from 14% in 2022.

Exhibit 15
Percent of Total Eligible CMF Costs by Category
Baseline, Program Plan Years Beginning July 2025, January 2027, and January 2028



E. Material-Specific Costs

Crowe calculated material-specific costs as part of the labor and cost allocation process. The material types used are consistent with the material types that the facilities report to DEQ on an annual basis. We then grouped the material types under three buckets: "Residual," "Paper," and "Containers." For purposes of modeling, "residual" refers to materials that are generally not processed on the sort line but may not technically be residuals going to landfill (e.g., compacted recyclable material small enough to fall through paper screens into the residual stream). **Exhibit 16** provides material-specific base costs, outbound tons, and cost per ton. These results combine both PCRF and CMF costs and outbound tons together to calculate a combined cost per ton by material type. The variability in cost per ton is driven by the combination of labor/indirect allocations and direct allocations as a result of our interview process with each facility. The variability within each material bucket is generally similar; "Residual" materials have higher costs, followed by "Containers," then "Paper," have the lowest costs.

For consistency with DEQ's proposed CMF invoicing approach, tons of covered glass and film plastic (2,399 tons and 1,843 tons, respectively) are included in the CMF tons for purposes of calculating the fee.

Exhibit 16
Oregon Commingled Recyclables Annual Eligible Processing Base Cost per Ton by Material

Material	Base Costs	Outbound Tons	Base Cost per Ton
"Residual"[16]			
Landfill (Residual)	$8,149,288	34,766	$234
Glass (GL)	$957,387	3,199	$299
Scrap Metal (SCM)	$658,834	2,734	$241
Plastic Film (PF)	$443,454	1,843	$241
"Paper"			
Cardboard (OCC)	$15,464,378	140,319	$110
Paper Fiber (FIB)	$8,855,617	92,645	$96
"Containers"			
Tin and Steel Cans (TC)	$788,297	4,051	$195
Aluminum (AL)	$402,245	2,310	$174
Rigid Plastic Container (RPC)	$1,474,128	9,627	$153
OP (Other Plastic)	$1,610,217	9,623	$167
Total	**$38,803,846**	**301,117**	**$129**

[16] Glass and plastic film are not promoted for acceptance in any commingled collection programs in Oregon, but scrap metal is promoted for acceptance in some areas.

5. Anticipated Program Costs

Crowe conducted extensive research and iterative interviews to determine anticipated program costs. Much of the information required to calculate anticipated program costs had not been determined at the time of the facility site visits in June and permit requirements were still in the process of being finalized. Because many of the program requirements were still not defined, Crowe used the facility site visits as an opportunity to discuss anticipated program costs in general terms, to inform facilities about potential contamination rates and requirements, and to obtain facility's initial plans regarding changes to support program requirements.

Crowe conducted the second round of facility interviews in late October and early November. In these interviews we discussed in detail each facility's specific plans to meet the July 1, 2025, and January 1, 2028, capture rates and contamination rates. Crowe also obtained documentation and copies of bids for equipment purchases, where applicable. In addition, Crowe interviewed six MRF equipment manufacturers including Bulk Handling Systems, Machinex, Van Dyk Recycling Solutions, Everest Labs, Glacier, and AMP Robotics. Manufacturers provided information related to equipment performance, prices, a range of installation requirements, timing, and costs based on varying scenarios. We discussed factors that impact useful life of equipment components. We also discussed example 10, 20, 30, and 40 tons per hour full systems and expected performance levels based various inbound contamination assumptions, as well as a range of estimated installation times for a full system installation.

The anticipated program costs presented below represent a comprehensive research and modeling exercise. However, this far in advance of implementation there are inherent uncertainties in determining potential future investments and costs for the RMA. In addition, these costs represent a compilation of the participating CRPF's planned investments and do not incorporate potential future investments that are not currently planned or the system-wide impacts of new facilities that may enter the Oregon market. It will be critical for DEQ to monitor and evaluate the systemwide and facility-specific impacts during the early implementation of the RMA to determine whether another PCRF and CMF study is warranted. If a subsequent study is conducted and the average per ton eligible processing cost has changed by than 10%, then the PCRF shall be revised.

Appendix B provides a description of Crowe's Anticipated Program Cost methodology as presented in the study design.

A. Overview

Crowe identified and included the following categories of costs, as part of determining anticipated program costs. We discuss each of these in more detail in the remainder of this section.

- **Administrative and Reporting:** We obtained detailed information where available on meeting permit administrative and reporting requirements, including additional staffing, software systems, and approaches to measuring capture and contamination rates and reporting on responsible end markets. We also incorporated the permit and certification fees associated with operating as a CPRF. Examples include:
  - Monthly tonnage reports to DEQ and invoicing to the PROs
  - Assessments and reporting related to customer-facing contamination
  - Potential reporting related to scrap pricing
  - Assessments and reporting related to verifying capture rates and contamination rates
  - Reporting associated with responsible end market requirements
  - Reporting associated with living wage and supportive benefits requirements

- **Accepting and Sorting New Materials:** Crowe identified facility plans regarding sorting new materials such as cartons and various plastic containers in cases where they are not currently being sorted. Approaches included adding sort line employees, adding storage bunkers, adding equipment, and/or transporting material to other CRPFs. Examples include:
  - Facility upgrades to sort cartons
  - Facility upgrades to sort additional PET, HDPE and PP bottles and containers

- **Operational Changes and Meeting Performance Standards:** Crowe identified facility plans regarding the need for additional equipment such as robots and optical sorters, in order to meet capture and contamination rates as of July 1, 2025, and January 1, 2028. Quality enhancements necessary to comply with permit requirements included costs associated with:
  - Re-running material through the sort line
  - Adding employees (or reducing employees)
  - Adding and/or upgrading equipment
  - Capacity expansions

- **Potential Changes to Material Disposition:** Crowe evaluated changes such as eschewing existing end markets that may not meet future standards for “responsible end markets” and/or sending partially processed materials on to another commingled recycling processing facility (or other entity) for secondary processing.

- **Living Wage and Supportive Benefits Requirements:** Crowe determined costs associated with:
  - Increases in wages based on current employee counts
  - Increases in wages based on potential future employee counts (reflecting increases and/or decreases from the current state)
  - Increases in benefits as compared to current levels (particularly for contract sort line workers)
  - Consideration of wage compression issues (although not incorporated into anticipated program costs).

Exhibit 17 provides a summary of the PCRF base annual eligible processing costs, anticipated program costs, reasonable financial return, as well as a cumulative cost per ton totals for program plan years beginning July 2025, January 2027, and January 2028. **Exhibit 18** provides a summary of the CMF base costs, anticipated program costs, reasonable financial return, as well as a cumulative cost per ton totals for program plan years beginning July 2025, January 2027, and January 2028.

Crowe calculated anticipated program costs for the CMF as well as the PCRF. These two fees are interrelated, and associated costs of the CMF are impacted by operational, administrative, equipment, and living wages, like the PCRF. **Exhibit 19** provides a summary of the breakdown between the cost of contamination removal and the cost of contamination disposal for program plan years beginning July 2025, January 2027, and January 2028. **Exhibit 20** provides a summary of the inputs and assumptions that were used to calculate anticipated program costs. **Exhibit 21** and **Exhibit 22** provide a graphical representation of the cost of components of anticipated program costs for the PCRF and CMF for program plan years beginning July 2025, January 2027, and January 2028. **Exhibit 23** and **Exhibit 24** provide a graphical representation of the share of components of anticipated program costs for the PCRF and CMF for program plan years beginning July 2025, January 2027, and January 2028.

Exhibit 17
PCRF Costs with Anticipated Program Costs

Material	July 2025 PCRF Costs	January 2027 PCRF Costs	January 2028 PCRF Costs
Base Costs			
Base Costs (2022)	$34,494,494	$34,494,494	$34,494,494
Base Tons (2022)	280,632	280,632	280,632
Base PCRF Cost per Ton	**$122.92**	**$122.92**	**$122.92**
Anticipated Program Costs			
Living Wage Costs	$0	$3,852,284	$4,082,822
Supportive Benefits Costs	$0	$1,030,232	$1,093,256
Additional Labor Costs	$2,480,305	$2,648,288	$4,192,815
Equipment Related Costs	$10,045,019	$25,332,335	$12,601,602
General Costs	$2,314,809	$3,109,592	$3,926,743
Total Anticipated Program Costs[17]	$14,840,133	$35,972,731	$25,897,238
Anticipated Program Cost per Ton	**$52.88**	**$128.18**	**$92.28**
Total PCRF Costs	$49,334,627	$70,467,225	$60,391,731
Total PCRF Cost per Ton	**$175.80**	**$251.10**	**$215.20**
Reasonable Financial Return			
Reasonable Financial Return (14%)	$6,906,848	$9,865,412	$8,454,842
Total PCRF Costs with Return	$56,241,475	$80,332,637	$68,846,573
Return per Ton	**$24.61**	**$35.15**	**$30.13**
Total PCRF Cost per Ton with Return	**$200.41**	**$286.26**	**$245.33**

[17] Anticipated program costs include consumer price index (CPI) adjustments.

Exhibit 18
CMF Costs with Anticipated Program Costs

Material	July 2025 CMF Costs	January 2027 CMF Costs	January 2028 CMF Costs
Base Costs			
Base Costs (2022)	$4,309,352	$4,309,352	$4,309,352
Base Tons (2022)	20,485	20,485	20,485
Base CMF Cost per Ton	**$210.37**	**$210.37**	**$210.37**
Anticipated Program Costs			
Living Wage Costs	$0	$491,358	$517,975
Supportive Benefits Costs	$0	$133,418	$140,876
Additional Labor Costs	$294,397	$267,662	$410,721
Equipment Costs	$920,252	$1,753,160	$1,105,366
General Costs	$606,670	$808,516	$1,021,004
Total Anticipated Program Costs[18]	$1,821,318	$3,454,115	$3,195,941
Anticipated Program Cost per Ton	**$88.91**	**$168.62**	**$156.01**
Total CMF Costs	$6,130,670	$7,763,467	$7,505,294
Total CMF Cost per Ton	**$299.28**	**$378.98**	**$366.38**
Reasonable Financial Return			
Reasonable Financial Return (14%)	$858,294	$1,086,885	$1,050,741
Total CMF Costs with Return	$6,988,964	$8,850,352	$8,556,035
Return per Ton	**$41.90**	**$53.06**	**$51.29**
Total CMF Cost per Ton with Return	**$341.17**	**$432.04**	**$417.67**

Exhibit 19
Cost of Removal and Disposal with Anticipated Program Costs

CMF Component	July 2025 CMF	January 2027 CMF	January 2028 CMF
Cost of Removal	$4,294,142	$5,777,358	$5,362,338
Cost of Disposal	$1,836,528	$1,986,108	$2,142,956
Total CMF Base Costs with Anticipated Program Costs	$6,130,670	$7,763,467	$7,505,294
Cost per Ton of Removal	$209.62	$282.03	$261.77
Cost per Ton of Disposal	$89.65	$96.95	$104.61
Total CMF Cost per Ton	**$299.28**	**$378.98**	**$366.38**
Cost of Removal (%)	70%	74%	71%
Cost of Disposal (%)	30%	26%	29%

[18] Anticipated program costs include consumer price index (CPI) adjustments.

Exhibit 20
Anticipated Program Costs Inputs and Assumptions

<table>
<tr><th>Input</th><th>Descriptions and Assumptions</th></tr>
<tr><td>1. Tonnage and Composition</td><td>Crowe kept tonnage and composition constant for July 2025, January 2027, and January 2028, which is summarized below:

<table><tr><th>Material</th><th>Tonnage</th></tr><tr><td>PCRF Tons</td><td>280,632</td></tr><tr><td>CMF Tons</td><td>20,485</td></tr><tr><td>Total Oregon Commingled Tons</td><td>301,117</td></tr></table>
Note: To limit the number of indefinite variables, we used the same tonnage for all years. How tonnage will change in the coming years is uncertain. There are potential upward and downward influences on tonnage. There may be slightly more tonnage due to the addition of new material to the USCL, population increases, and reduced contamination. There may be slightly less tonnage as mixed paper continues to decline. In addition, tons may shift from PCRF to CMF and vice versa as materials are added to the USCL, generator facing contamination decreases, and CRPFs' ability to remove contaminants improves. Currently there is lack of information to adequately base future tonnage assumptions. Tonnage will be updated during the next study.</td></tr>
<tr><td>2. Performance Standards</td><td>Crowe used the following performance standards as a basis to calculate anticipated program costs related to meeting performance standards:

• Program plan year beginning July 2025 = 5% contamination
• Program plan year beginning January 2028 = Increasing OCC capture rates from 96% (July 2025) to 97% (Jan 2028).

Each facility provided information related to staffing, equipment needs, and operational changes in order to meet the two performance standard targets above. DEQ provided each facility with their preliminary contamination rates as part of the outbound study in early November. Crowe evaluated each facility's contamination rate by material type, which refined specific needs of each facility.

Note: At the time of this report, facility-specific capture rates are not yet available.</td></tr>
<tr><td>3. Living Wage</td><td>Oregon DEQ provided the following living wage rates beginning January 2027. Crowe escalated these rates by 3.1% for January 2028. Crowe adjusted hourly rates to meet living wage rates for staff with hourly rates below the January 2027 and January 2028 living wage rates. See Section E for more detail.

<table><tr><th>County</th><th>January 2027 Hourly Rate</th></tr><tr><td>Washington</td><td>$29.54</td></tr><tr><td>Multnomah</td><td>$29.54</td></tr><tr><td>Clackamas</td><td>$29.54</td></tr><tr><td>Marion</td><td>$25.40</td></tr><tr><td>Lane</td><td>$26.16</td></tr><tr><td>Klamath</td><td>$24.16</td></tr><tr><td>Humboldt</td><td>$25.64</td></tr><tr><td>Clark</td><td>$28.35</td></tr></table>
Note: A wage compression adjustment was not made due to the uncertainty of the impact of the living wage rates on other staff that currently make at or above the living wage.</td></tr>
</table>

Input	Descriptions and Assumptions
4. Supportive Benefits	In 2022, benefits as a proportion of labor costs average roughly 27% (benefits rate). As labor costs are anticipated to increase, benefits are anticipated to increase proportionally using this 27% benefits rate. As the living wage requirement starts in January 2027, benefits increase proportionally. *Note: At the time of this report, the specific approach to quantify supportive benefits is not determined. Crowe determined that the percentage-based approach provided a reasonable estimation of the anticipated program costs of supportive benefits.*
5. Additional Labor Costs	The salary/wages and benefits for anticipated FTEs represent the average of each facility for the specific role: administrative, sort, and maintenance. A 3.1% annual CPI adjustment was applied for 2025, 2027, and 2028. a. **Administrative staff** – Starting July 2025, Crowe allocated an additional 0.75 FTE administrative staff to each facility to manage future RMA-related administrative and reporting requirements. This was a result of discussing existing time spent on generating monthly and annual reports to Oregon DEQ and Metro (if applicable), which averaged roughly 0.25 FTE. An additional 0.75 FTE for each facility would dedicate a total of 1.0 FTE admin staff to manage administrative and reporting requirements. This assumes a 4x administrative staffing requirement to comply with new reporting requirements. *Note: At the time of this report, the specific reporting requirements is not determined.* b. **Sort staff** – To meet performance standards in July 2025 and then higher standards starting January 2028, each facility provided a number of additional sort staff that they anticipated needing to meet the initial and future performance standards. Most of the facilities anticipate additional sort staff will be needed, averaging 4 to 6 additional sort FTEs for those facilities, depending on the year. *Note: At the time of this report, facility-specific capture rates are not yet available.* c. **Inbound Contamination Staff** – Starting July 2025, Crowe allocated an additional 0.5 FTE to each facility to evaluate and describe levels of inbound contamination consistent with ORS 459A.959. *Note: At the time of this report, specific forms and procedures per ORS 459A.959 has not been established.* d. **Maintenance staff** – To meet performance standards in July 2025 and then higher standards starting January 2028, each facility provided a number of additional maintenance staff that they anticipated needing to meet the initial and future performance standards. A few facilities provided a number of additional maintenance staff required to optimize existing equipment and/or to help maintain the anticipated new equipment. Some facilities do not currently have adequate maintenance staff to upkeep equipment according to manufacturer recommendations. The additional maintenance staff includes both mechanical and technical maintenance staff. Of the few facilities that anticipate needing additional maintenance staff, they anticipate an average of 1 to 2 additional maintenance staff, depending on the year. *Note: At the time of this report, facility-specific capture rates are not yet available.*

<table>
<tr><th>Input</th><th>Descriptions and Assumptions</th></tr>
<tr><td>6. Equipment Costs</td><td>
Crowe applied a 3.1% annual CPI adjustment to equipment purchase costs based on the anticipated timing of the purchase. Crowe used equipment prices primarily associated with late 2023, which were escalated using 3.1% per year to either 2025 or 2027, depending on the anticipated installation period of new equipment.

a. Downtime – Crowe calculated anticipated program costs associated with production downtime for facilities that require equipment upgrades. The more equipment being replaced/upgraded at once, the longer the downtime. We reduced variable costs such as labor-related, utilities, and transportation costs during the downtime. We determined downtime estimates using a combination of information provided by facilities and equipment manufacturers, in relation to overall system needs. The number of days of downtime ranged from 7 to 150 days. Unless otherwise supported by a facility, we used 150 days for a full system replacement. Equipment manufacturers provided a range of 120 days (4 months) to 180 days (6 months).

Note: Every facility will require different installation times depending on a multitude of factors such as the extent of the equipment upgrades, supporting structures for those upgrades, available space, and whether the line can be replaced one component at a time.

b. Interest – In total, Crowe incorporated a total of $75 million in anticipated equipment purchases to achieve the initial and future performance standards. Anticipated equipment includes components such as, but limited to, optical sorters, robots, and screens for some to full system upgrades for others. Crowe used an annual interest rate of 7% on the entire value of the equipment. We leveraged historical 30-year fixed loan rates to determine a reasonable annual interest rate[19] in conjunction with rates indicated by equipment manufacturers and facilities who have been actively pursuing financing options. The interest rates at the end October 2023 mark the highest point since November 2000. We analyzed the impacts of interest rates between a historical average of 4% to the recent 8% rate. As rates are slightly tapering starting in November, Crowe used a 7% interest rate. This 7% considers the current high-interest environment.

Note: At the time of this report, interest rates remain high, but are beginning to taper.

c. Depreciation – Crowe surveyed equipment manufacturers to provide a range of expected useful life for the following equipment components. The useful life represents an average among the manufacturers. Although a facility can depreciate equipment at various rates, we assume that facilities will depreciate equipment according to this table.

<table>
<tr><th>Component</th><th>Average Useful Life</th></tr>
<tr><td>Screen</td><td>12</td></tr>
<tr><td>Ballistics Separator</td><td>10</td></tr>
<tr><td>Conveyor</td><td>7</td></tr>
<tr><td>Optical Sorter</td><td>10</td></tr>
<tr><td>Robot</td><td>9</td></tr>
<tr><td>Magnet</td><td>8</td></tr>
<tr><td>Eddy Current</td><td>10</td></tr>
<tr><td>Baler</td><td>8</td></tr>
<tr><td>Other*</td><td>9</td></tr>
</table>
*Average of all other components

Note: Depreciation costs include equipment software and maintenance needs, and although some facilities are opting into a subscription-based robotics option rather than purchasing equipment, annual cost differences are minimal.

d. Belt speed reduction – Crowe incorporated a belt speed reduction factor for some facilities, which impacts costs in July 2025. To meet July 2025 performance standards and prior to making major equipment upgrades, some facilities are anticipating the need to slow down sort lines. Slower lines equate to a reduction of throughput, and effectively reduces annual processed commingled tonnage. Unlike equipment downtime, Crowe maintained variable costs during the period of slower lines.
</td></tr>
</table>

Input	Descriptions and Assumptions
7. General Costs	a. **Disposal costs** – Crowe calculated annual increases to per ton tipping fees based on either proposed increases or using a 3.1% CPI adjustment. We tied most of the facilities to Metro stations. For Metro rates, we used the proposed percent increases presented as part of *Scenario 2: Fee Predictability.*[20] Due to the actual tipping fees in FY23 and FY24 being slightly different compared to when the proposal was issued, we used the percentage increases of 7% to 11% per year to adjust tipping fees in subsequent years.

Component	FY23 Actual	FY24 Actual	FY25 Anticipated	FY26 Anticipated	FY27 Anticipated
% Increase	7.2%	11.2%	7.9%	7.1%	7.1%
Total Tip Fee at Metro stations	123.45	$137.30	$148.15	$158.67	$169.93
Annual Differential (per ton)	$8.30	$13.85	$10.85	$10.52	$11.27

Note: Actual changes in landfill tip fees may vary compared to anticipated rates. For example, FY24 was initially estimated to increase by 7.8%, but increased by 11.2%.

b. **Permit and Registration Fees** – Crowe applied a one-time $500 per facility for July 2025. We then applied annual permit and registration compliance fees of $500 per year starting July 2025. Applied to each facility: July 2025 = $1,000, January 2027 = $500, January 2028 = $500.

c. **Other costs** – Crowe used a 3.1% annual CPI adjustment factor for all other costs not already adjusted. These represent all other costs not listed in this table such as labor costs not adjusted by living wage, general business operations, transportation, rent, property tax, insurance, and utilities.

Year	Annual Index	%Δ
2013	235.824	
2014	240.215	1.9%
2015	243.015	1.2%
2016	247.705	1.9%
2017	254.738	2.8%
2018	263.263	3.3%
2019	270.350	2.7%
2020	275.057	1.7%
2021	287.494	4.5%
2022	310.509	8.0%
Average		**3.1%**

U.S. Bureau of Labor Statistics
Series ID – CUUR0400SA0

[19] Source: 30-Year Fixed Rate Mortgage Average in the U.S. St. Louis Fed. https://fred.stlouisfed.org/series/MORTGAGE30US. Accessed 12/1/2023.

[20] Source: Metro Solid Waste Fee Setting Update #2. Portland Metro, Department of Transportation and Development. Published April 5, 2022.

Exhibit 21
PCRF Anticipated Program Costs
Program Plan Years Beginning July 2025, January 2027, and January 2028

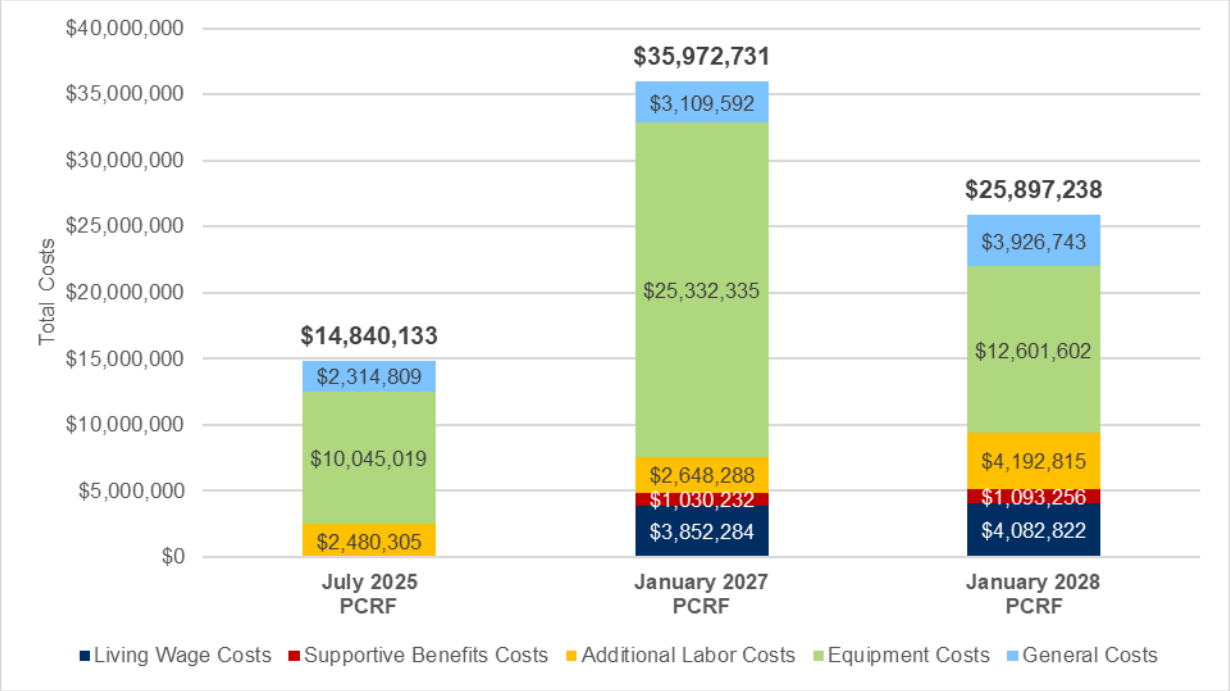


Exhibit 22
CMF Anticipated Program Costs
Program Plan Years Beginning July 2025, January 2027, and January 2028

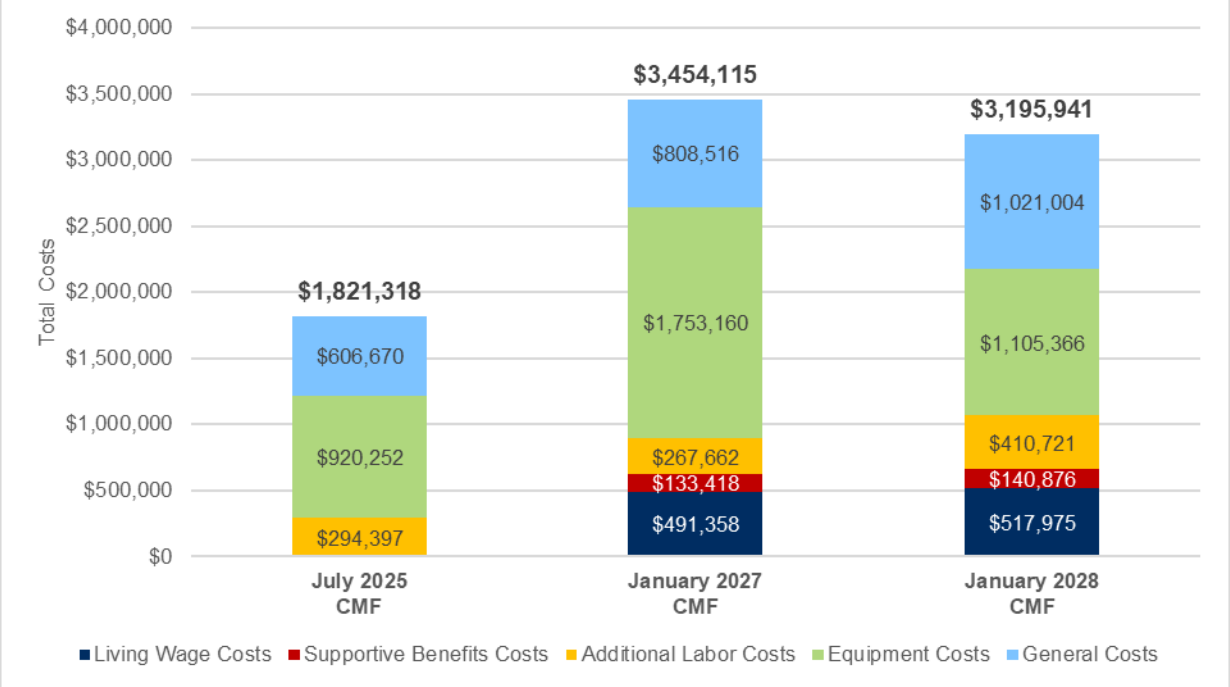


Exhibit 23
PCRF Share of Anticipated Program Costs
Program Plan Years Beginning July 2025, January 2027, and January 2028

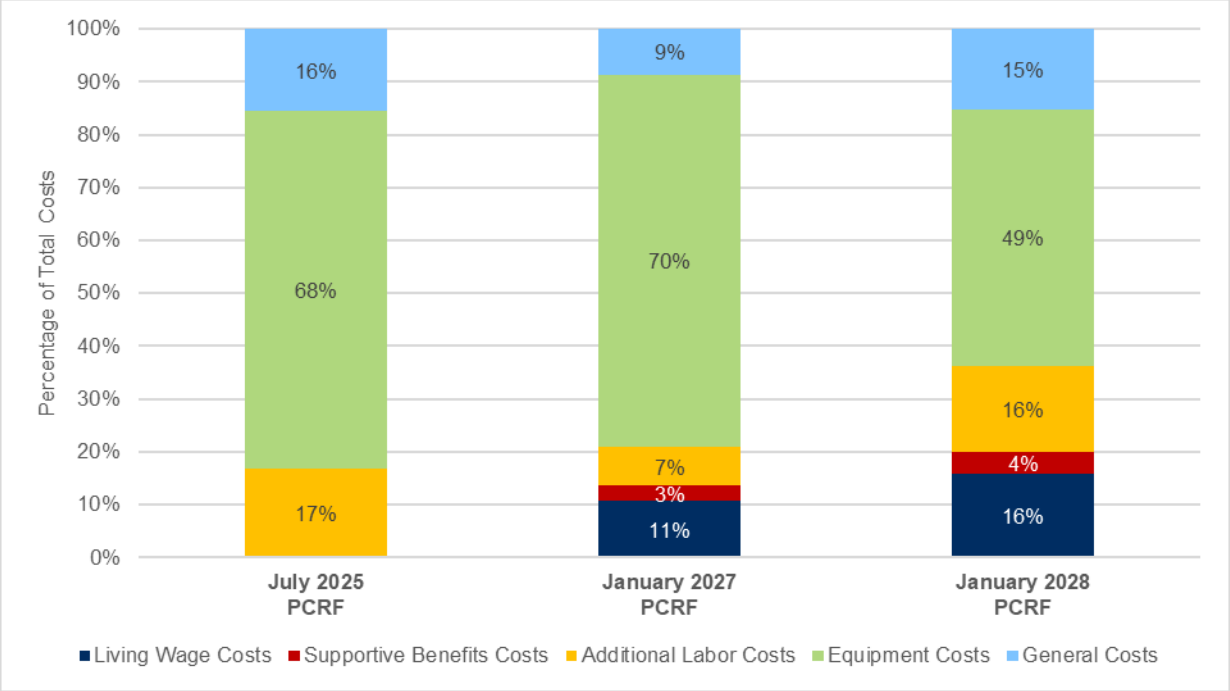
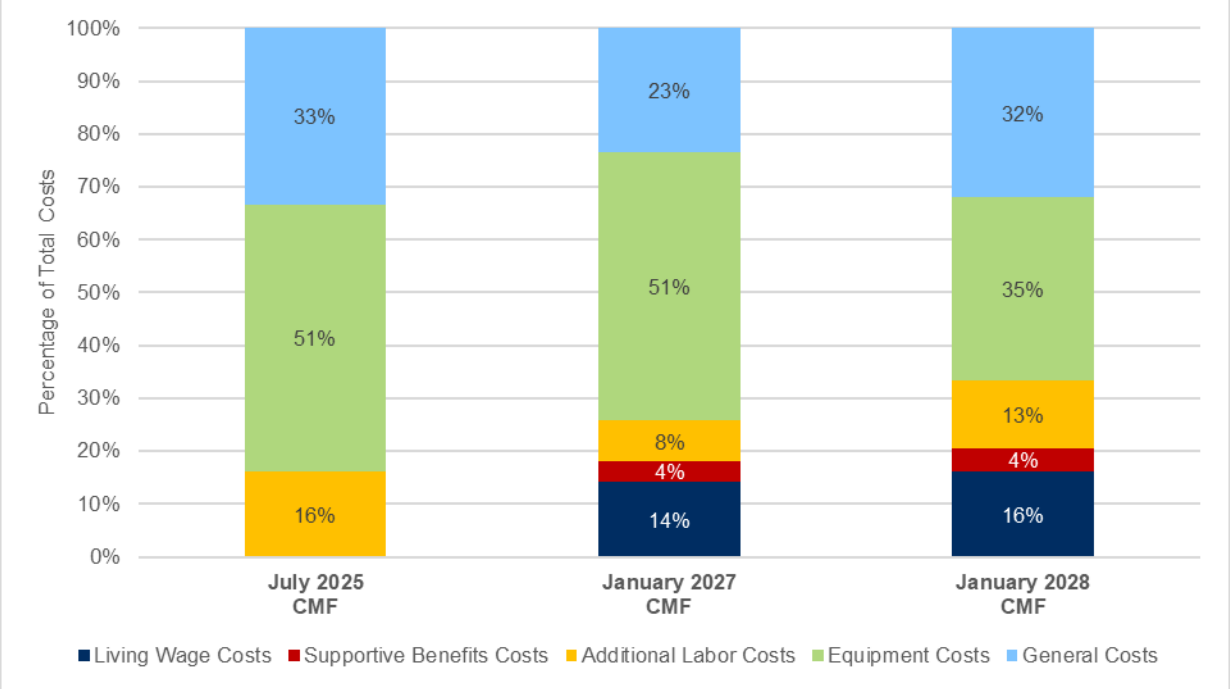


Exhibit 24
CMF Share of Anticipated Program Costs
Program Plan Years Beginning July 2025, January 2027, and January 2028



B. Summary of Initial Considerations Cited by CRPF Representatives

Below we provide a summary of CRPF's initial considerations, identified during facility visits in June, as related to anticipated program costs. Facilities reiterated these considerations in our subsequent interviews.

1. **Contamination and Material Sorting Concerns:**
   - Concern that a lower contamination rate, such as 2%, would require re-running material, adding labor, and/or slowing down the sort line (leading to reduced capacity).
   - Perspective that cartons are better collected at depots because they often end up on the container line; the additional cost of sorting cartons would be higher relative to the currently small volume of these containers.
   - An opinion that receiving partially sorted material loose rather than baled would reduce contamination, as flattened containers are more likely to end up in paper bales.

2. **Equipment and Technology:**
   - Perspective that while robots and optical equipment can replace sorters, facilities do not envision a complete elimination of people on the sort line. There will always be a need for roles such as presort, loading the metering bin, OCC post-sort, emptying bins, mechanics, equipment operators, etc.
   - Perspective that one robot/optical sorter can replace at least two people, with a primary driver of the shift to optical sorters and robots being staffing challenges.
   - Concern about the need for stronger magnets to capture metal cans.

3. **Labor and Wage Concerns:**
   - Significant concerns regarding wage compression. When sorter wages are increased, positions requiring more responsibility, experience, skill, and/or risk will demand wage increases as well.
   - Concerns about the ability to fill vacant positions currently and anticipated challenges in filling certain positions in the future.
   - Concern that wage compression impacts are potentially greater for facilities with multiple business units (where workers in other areas may demand raises for parity) and CRPFs with operations in other nearby states.

4. **Reporting and Compliance:**
   - Concern about the cost of measuring and tracking data to document compliance with capture and contamination rates.
   - Perspective that monthly reporting could add an FTE (Full-Time Equivalent) and the likely need for an FTE person specifically for RMA-related reporting.

5. **Specific Material Concerns:**
   - Concern about molded pulp packaging due to its low value.
   - Concern about scrap metal due to problems it creates on the sorting line.

C. Administrative Costs

Anticipated program costs associated with administrative requirements will be linked to the permit requirements and associated reporting. In our follow-up interviews with CRPFs, Crowe addressed items including but not limited to those listed below. As described in Exhibit 20, Crowe assumed an additional 0.75 FTE at each facility will be required to support various administrative requirements of the RMA. New administrative requirements include:

- **Fees and Permits:**
  - Paying permit fees associated with the new permit for Oregon CRPFs
  - Paying certification fees associated with out-of-state CRPF certification
- **Compliance and Inspections:**
  - Participating in inspections, assessments, and demonstrating compliance with capture rates and outbound contamination rate performance standards
  - Demonstrating compliance with responsible end market requirements, including accurately reporting the final end market of materials
  - Evaluating and reporting on inbound material quality and contamination
- **Reporting Requirements:**
  - Preparing and submitting monthly tonnage reports to DEQ and PROs
  - Reporting associated with living wage and supportive benefit requirements.

D. Equipment and Capital Investment Costs

In our research and discussions with CRPFs, Crowe evaluated individual and overall system requirements and facility upgrade options as they relate to equipment and capital investment costs to meet anticipated program requirements. Our focus was on additional investments required to meet the proposed capture and contamination rates and possible use of AI for assessment and automation purposes. Crowe considered several scenarios and evaluated facility plans as well as overall system needs while excluding costs of facility upgrades that are expected as part of regular equipment lifecycles. We also considered the related impact to living wage and supportive benefit requirements that will result from replacing sort line workers with automated equipment.

Within our analysis we incorporated facility plans to include both low-tech (adding fewer/to no pieces of new equipment but adding more sort line workers) and a high-tech (adding more new equipment and reducing or adding fewer sort line workers) alternatives. We made the most appropriate assumptions about the mix of technology and labor that are planned at each facility based on interviews, existing/planned modifications, and projected overall system needs. While we recognize that there is ongoing discussion regarding build out of one or more new state-of-the-art CRPFs in the state, our anticipated program cost analysis will not consider the costs of a new facility. Our approach is generally to take a conservative perspective on the minimum that will be required by existing facilities to meet capacity needs, capture rates, and contamination requirements for the materials currently on the USCL, including materials not currently being sorted or sorted in limited quantities such as cartons.

The numbered sections below provide insights on current systemwide equipment and staffing, and a discussion of Oregon commingled recycles material flow.

1. Overview of Current Systemwide Equipment and Staffing

Exhibit 25 provides a summary of sort line equipment across 11 facilities currently recycling Oregon commingled recyclables.[21] We utilized this list as a starting point for considering the addition of sort line equipment to the overall system. This overview excludes rolling stock such as forklifts, loaders, bobcats, which are utilized across all facilities.

Exhibit 26 provides a summary of existing staffing across the 11 CRPFs including in our cost analyses and a calculated tons processed per FTE. The exhibit summarizes total employees, by type, handling Oregon commingled recyclables. Overall, sort line workers are roughly 70% employees and 30% contract staff. Equipment operators, maintenance staff, and office workers are generally employees. The overall mix of staffing, particularly sort line workers, will vary in the low-tech and high-tech scenarios, as workers are added to increase sorting capacity or replaced by optical sorters and robots. We expect that a higher tech CRPF would be more efficient than a lower tech CRPF.

Exhibit 25
Summary of Total CRPF Sort Line Equipment in All Facilities
Handling Oregon Commingled Recyclables

Equipment	Number in Operation	Notes
AI Vision System	*	Potential for additional systems to increase quality and automating assessment. *Multiple facilities are in the process of obtaining an AI system.
OCC Screen	9	Existing in most facilities
Paper Screens / Polishing Screens	18	Existing in all facilities; more screens could be added
Glass Screen/Nihot	3	Limited use in Oregon
Unders Recovery System	1	Potential for additional systems to increase capture rates
OCC and Paper Optical Sorters	4	Potential for additional systems to increase quality
Paper Robots	6	Potential for additional systems to increase quality and capture rates
Magnet	7	Potential for additional and/or stronger magnets
Eddy Current	5	Potential for additional if more container lines are added
Container Optical Sorters	3	Potential for additional systems to increase quality and capture rates and to sort additional plastics
Container Robots	5	Potential for additional systems to increase quality and capture rates and to sort additional plastics
Baler	16	Existing in all facilities; several have been upgraded in recent years

Exhibit 26
Summary of Total Employees by Category in All CRPFs
Handling Oregon Commingled Recyclables

General Labor Categories	2022 Number of FTEs	Jul 2025 Number of FTEs	Jan 2027 Number of FTEs	Jan 2028 Number of FTEs
Sort Line	106.0	134.5	123.5	142.0
Equip Operator, Maintenance	83.2	89.2	89.2	90.2
Office	61.3	75.1	75.1	75.1
Total CRPF Staffing	**250.5**	**298.8**	**287.8**	**307.3**
Sorted Commingled Tons	**301,117**	**301,117**	**301,117**	**301,117**
Tons Processed per FTE	**1,202**	**1,008**	**1,046**	**980**

[21] Crowe visited 12 facilities, however, 11 facilities processed commingled recyclables during the study period (2022).

2. Discussion of Oregon Commingled Recyclables Material Flow

Understanding the existing flow of materials and status of facilities in Oregon helped to inform the future scenarios and calculation of anticipated program costs. Within the current system for processing Oregon commingled recyclables there is a mix of facilities conducting full and partial sorts. Full sorts refer to facilities that are sorting and removing fiber (OCC and paper fiber) and containers (aluminum, tin/steel, PET, HDPE natural, HDPE colored, other plastics). For purposes of this study, partial sorts refer to facilities that are accepting commingled recyclables and removing OCC and/or paper fiber, then transporting the remaining commingled recyclables to a full sort facility to remove any remaining fiber and containers.[22] Some partial sort facilities also remove bulky plastics and some trash while others only remove fiber. Currently, about 10% of Oregon commingled recyclables are processed and marketed from partial sort facilities and 90% are processed and marketed from full sort facilities. Roughly 25% of overall commingled tonnage is transported from partial to full sort facilities for additional processing.

Another way to evaluate current Oregon system capacity is through the low-tech/high-tech lens. Here, as a generalization, we consider facilities that are not utilizing optical sorters and/or robots as low-tech and those that have one or more optical sorters and robots as high-tech. Currently, approximately 40% of Oregon commingled recyclables are processed and marketed from a low-tech facility and the remaining 60% are processed and marketed from a high-tech facility. The low-tech and high-tech classification is not consistently aligned with the partial and full sort classifications. There are full sort facilities that do not utilize optical sorters or robots and partial sort facilities that do.

In our follow-up interviews with facilities, a key focus was the additional staffing and equipment needs to meet capture and contamination rates as required under DEQ's new CRPF permitting system. Outgoing bale contamination rates are currently proposed at 5% as of July 1, 2025, and does not change in January 2028. Capture rates are identified in **Exhibit 27.**

Exhibit 27
CRPF Capture Rates

Material	Initial (July 1, 2025)[23]	Future (January 1, 2028)[24]
OCC (includes Kraft paper)	96%	97%
Printing and writing paper (includes ONP, magazines, etc.)	96%	97%
Cartons	78%	88%
Polycoated cups	78%	88%
PET bottles and containers (up to 2 gallons)	85%	93%
HDPE bottles and containers (up to 2 gallons)	88%	95%
HDPE and PP tubs & pails (2 to 5 gallons) and PP bottles and containers (up to 2 gallons)	83%	93%
HDPE and PP flower pots (4 inches to 2 gallons)	70%	89%
HDPE and PP flower pots (>2 gallons)	85%	92%
Accepted aluminum (beverage and food)	88%	96%
Deposit and other steel cans accepted at curb	93%	98%
Other scrap metal (non-ferrous + mixed metal) accepted at curb	88%	98%

[22] DEQ is currently considering rule language related to limited sort facilities, definitions of CRPFs, and commingled recycling reload facilities.

[23] As of the September 25, 2023, Technical Work Group Meeting.

[24] As of the June 13, 2023, Technical Work Group Meeting. Subject to change.

E. Living Wage and Supportive Benefits Costs

Starting January 1, 2027, ORS 459A.905(2)(c) prohibits local governments from sending their commingled recyclables to processing facilities unless the "processor provides workers at the facility with a living wage and supportive benefits, as defined by the rule by the Environmental Quality Commission." On June 29, 2023, Oregon DEQ published a draft initial rule concept that proposes definitions for the terms "workers at the facility", "living wage" and "supportive benefits" and proposes what data sources or other supporting information will be used to determine the parameters of these terms. The rule concept was revised and republished on July 13, 2023.

In this section, we provide our results of the impacts of living wage component of ORS 459A.905(2)(c). For living wage, Oregon DEQ proposed to use the MIT Living Wage Calculator[25] based on each facility's county. The calculator is based on December 2022 dollars. We used a 3.1% annual CPI[26] adjustment to calculate an estimated living wage rate as of January 2027. The rates vary throughout the state and include two counties outside of Oregon to incorporate those facilities processing Oregon materials. **Exhibit 28** provides the proposed living wage levels as of January 2027 using a combination of 1 working adult and 0 dependents (1/0) and 2 working adults and 2 dependents (2/2). Specifically, the living wage is weighted by summing the living wages using 35% of 1 working adult and 0 dependents and 65% of 2 working adults and 2 dependents. Below is a sample calculation using Multnomah County:

	1 Working Adult, 0 Dependents at 35%		2 Working Adults, 2 Dependents at 65%		Combined Wage
Living Wage (Jan 2027) =	(35% × $24.91)	+	(65% × $32.03)	=	$29.54

Crowe calculated an estimated PCRF costs to incorporate the January 2027 living wage rates. Our general methodology identifies all positions at a facility being paid lower than the estimated January 2027 living wage rates and increases the rates for those positions to match the requirement.

Exhibit 28
Estimated Living Wage Rates as of January 2027

			1 Working Adult, 0 Dependents at 35%		2 Working Adults, 2 Dependents at 65%		Combined Wage	
#	State	County	Dec 2022	Jan 2027	Dec 2022	Jan 2027	Dec 2022	Jan 2027
1	Oregon	Washington	$21.85	$24.91	$28.09	$32.03	$25.91	**$29.54**
2	Oregon	Multnomah	21.85	24.91	28.09	32.03	25.91	**29.54**
3	Oregon	Clackamas	21.85	24.91	28.09	32.03	25.91	**29.54**
4	Oregon	Marion	17.56	20.02	24.82	28.30	22.28	**25.40**
5	Oregon	Lane	17.46	19.91	25.89	29.52	22.94	**26.16**
6	Oregon	Klamath	15.75	17.96	24.12	27.50	21.19	**24.16**
7	California	Humboldt	16.41	18.71	25.76	29.37	22.49	**25.64**
8	Washington	Clark	20.94	23.88	26.98	30.76	24.87	**28.35**

[25] Living Wage Calculator. Massachusetts Institute of Technology. https://livingwage.mit.edu/. June 2023.

[26] CPI-U. All items in West urban, all urban consumers, not seasonally adjusted. Based on an average annual change in the index from 2013-2022.

Although calculations for this analysis are related to the PCRF, the percent increase to the cost per ton would be the same or similar for the CMF. This impact would be more significant for a facility with a higher portion of labor as a percent of total costs and lower hourly rates (i.e., facilities that have higher hourly rates are less impacted than the facilities with lower hourly rates). **Exhibit 29** provides the PCRF costs per ton with the estimated living wage adjustment that includes additional compensation of higher-paid workers. **Exhibit 30** provides the same comparison related to CMF costs. These adjustments increase the labor category that represents 31% of total costs in 2022.

We understand that every facility is managed and operated differently. Some facilities have additional lines of business that are co-located with the CRPF operations or have other operations with similarly skilled workers. Although we did not attempt to a calculate potential 'ripple effect' beyond the CRPF operations, a required increase to living wage and supportive benefits to one subset of entry-level workers has the potential to disrupt pay equity throughout a company's operations in Oregon.

Exhibit 29
PCRF Costs per Ton with January 2027 Living Wage Adjustment and Supportive Benefits

	PCRF Costs	PCRF Tons	PCRF Cost per Ton
PCRF Base Costs	$34,494,494	280,632	$123 per ton
PCRF Base Costs with Living Wage Adjustment	$38,346,778	280,632	$137 per ton
Difference	$3,852,284		$14 per ton
% Difference – Living Wage			**11% increase**
PCRF Base Costs with Living Wage Adjustment and Supportive Benefits	$39,377,010	280,632	$140 per ton
Difference	$4,882,516		$17 per ton
% Difference – Living Wage and Supportive Benefits			**14% increase**

Exhibit 30
CMF Costs per Ton with January 2027 Living Wage Adjustment and Supportive Benefits

	CMF Costs	CMF Tons	CMF Cost per Ton
CMF Base Costs	$4,309,352	20,485	$210 per ton
CMF Base Costs with Living Wage Adjustment	$4,800,710	20,485	$234 per ton
Difference	$491,358		$24 per ton
% Difference – Living Wage			**11% per ton**
CMF Base Costs with Living Wage Adjustment and Supportive Benefits	$4,934,128	20,485	$241 per ton
Difference	$624,776		$30 per ton
% Difference – Living Wage and Supportive Benefits			**14% increase**

F. Wage Compression Considerations

As described above, facilities voiced significant concerns about the likelihood that the living wage requirement will lead to wage compression. Wage compression occurs when the pay for less experienced or skilled employees is increased, while the pay for more experienced, or qualified employees is not increased proportionally. This effect causes a compression of the wage scale. In the wage compression examples we identified through research, employers identified a range of impacts including poor morale with more skilled staff, difficulty in retaining more skilled employees, and loss of higher-level positions.

The RMA living wage requirement is different from these examples in that the wage increases apply to only a small subset of workers in the broader Oregon economy. Thus, while there is a possibility that wage compression could impact CRPFs after the living wage component of the RMA goes into effect in January 2027, there is currently not adequate data or information to quantify the impact of wage compression, if any, on CRPF operating costs. Per ORS 459A.923(6), it states that DEQ shall conduct the study at least once every 5 years (and no more frequently than once a year) and if such a study shows that per-ton cost has changed by more than 10 percent, then the commission shall by rule revise the PCRF. Wage compression impacts will be evaluated during the next study and will be incorporated as actual costs, should they occur. Below, we summarize several anecdotal examples and one research study where wage compression was identified or evaluated.

- A 2012 article in the Journal of Labor Policy evaluated wage compression and found that living wage laws reduce employment among the least skilled workers.[27]
- In the academic setting, wage compression affects morale and “some of the best, most accomplished people leave.”[28] To address the issue, the University of Wisconsin Oshkosh implemented several innovative salary equity plans to boost salaries of experienced professors.
- The recent wage increases at Toyota, Honda, and Hyundai plants in response to the UAW’s agreements increasing wages 25% at U.S. auto manufacturers.[29]

[27] Neumark, David, Matthew Thompson, and Leslie Koyle. The effects of living wage laws on low-wage workers and low-income families: What do we know now? Journal of Labor Policy 2012, 1:11, http:/wwwizajolp.com/content/1/1/11.

[28] https://www.insidehighered.com/news/2013/02/11/university-tries-deal-salary-compression-among-faculty-members

[29] https://www.cbsnews.com/news/hyundai-honda-toyota-worker-wage-increase-uaw/
https://www.automotivedive.com/news/honda-raises-us-production-worker-wages-11-percent-UAW/699580/

G. PCRF and CMF Phase-in Period

Oregon DEQ plans to phase the PCRF and CMF between July 1, 2025, and January 1, 2028. The initial PCRF and CMF will be effective starting July 1, 2025, which is when CRPFs are required to meet the initial performance standards such as capture rates and combination rates. Starting January 1, 2027, the living wage and supportive benefits requirement comes into effect, which adds a new component to the fees set on July 1, 2025. Additionally, 2027 is when we are expecting facilities to perform the bulk of their anticipated equipment upgrades in preparation for the higher performance standards starting January 1, 2028. **Exhibit 31** provides a summary of the how the costs change over time and the relative anticipated program cost levels. The key anticipated program costs are listed in the order of impact. It's important to note that although costs may increase over time, it may not necessarily increase the PCRF and CMF due to fluctuating market conditions.

Exhibit 31
PCRF and CMF Costs
July 2025, January 2027, January 2028

Effective Date Range	CRPF Requirement	Key PCRF Anticipated Program Costs	Anticipated PCRF Costs	Key CMF Anticipated Program Costs	Anticipated CMF Costs
July 1, 2025, to December 31, 2026	Initial performance standards	• Belt speed reduction • Additional labor • Depreciation/Interest • Downtime	$	• Belt speed reduction • Disposal • Additional labor • Depreciation/Interest	$
January 1, 2027, to December 31, 2027	Initial performance standards + Living Wage and Supportive Benefits	• Downtime • Depreciation/Interest • Living wage/ Supportive benefits • Additional labor	$$$	• Downtime • Depreciation/Interest • Disposal • Living wage/ Supportive benefits	$$$
January 1, 2028, and on	Higher performance standards + Living Wage and Supportive Benefits	• Depreciation/Interest • Living wage/ Supportive benefits • Additional labor	$$	• Depreciation/Interest • Disposal • Living wage/ Supportive benefits • Additional labor	$$

6. Average Market Pricing Data and Methodology

Statute requires the processor commodity risk fee to be based on the annual eligible processing costs of facilities less the average commodity value (ACV) of recyclable materials processed by CRPFs. DEQ is required to establish methods to determine and periodically update the average commodity value.[30] As required by ORS 459A.923(2)(h) of the RMA, the methods to calculate average commodity value must include:

- The average composition of materials by percentage in each mix, multiplied by published market values
- The sources of the published market values used
- Any adjustments to published market values for each commodity to reflect conditions in Oregon.

The overall composition of materials by percentage in each mix was being determined by DEQ's 2023 Inbound and Outbound Commingled Recycling studies, material-specific facility outbound tonnage data as reported annually to DEQ, and through internal data gathered from each CRPF. For the initial calculations we utilize the tonnage data from 2022 facility reports submitted to DEQ.[31]

A. Overview

Crowe provides a description of the methodology and results in this section. In developing the methodology and initial calculations, as discussed below we made a number of assumptions and also identified several challenges related to the ACV. These challenges are inherent in the volatility of scrap markets:

- Initial 2022 tonnage data is based on DEQ reports of Oregon commingled recyclables from each CRPF and 2022 tonnage data as reported to Crowe by CRPFs. The DEQ and facility tonnage generally matched; when it did not, Crowe worked with the facility representatives to understand the differences and to determine the most accurate data. Crowe validated tonnage data in this final report.
- There was no clear or consistent use of Other Plastic and Rigid Plastic Containers in the DEQ data. Some facilities reported under both categories, some reported under one or the other. Therefore, to determine plastic resin tonnage for purposes of the commodity pricing model, Crowe utilized the combined tonnage of both categories. We then further split apart the combined plastic total into PET, HDPE natural, HDPE color, and mixed plastic based on average splits across these resin types calculated using available facility data.
- This final report reflects updated and refined tonnage data from the Inbound and Outbound Commingled Recycling study results.
- CRPFs provided monthly material pricing reports for outbound bales of OCC, mixed paper (various grades), PET, HDPE natural, HDPE color, mixed plastic (of various types), tin or steel cans, and aluminum. These data reflected a wide range of prices within commodity types for several reasons:
  - Differences in quality and grade
  - Differences in timing (invoice date versus ship date)
  - Differences in end-markets (domestic versus export)
  - Differences in quantity of material shipped
  - Business relationships between facilities and buyers

[30] Per ORS 459A.923(2)(h), separate average commodity values are to be calculated for commingled materials collected from single-family residences in Oregon and from all other sources. Data is available but DEQ is recommending (based on consultation with TWG) to treat the ACV calculation the same, therefore eliminating the added complication of differentiating between sources.

[31] We obtained internal facility reports and, in some instances, tonnage data from internal records do not match what is reported to DEQ or a portion of the reported commingled tons were actually partially processed and sent to another facility for processing. In these instances, Crowe used internal facility reports as the most appropriate tonnage data for the study.

- Crowe utilized two different market pricing data sources, as described below. For this report we incorporated a number of refinements including:
  - Obtaining more detailed information on percentages of mixed paper grades from facilities
  - Clarifying and updating information on mixed paper pricing and export OCC from facilities
  - Revising the market data to reflect 78% mixed paper (from Recyclingmarkets.net PS54 and Waste Composite Mixed Baled Waste Paper) and 22% sorted residential papers (from Recyclingmarkets.net PS56)
- Even with these refinements, for some commodities, the average Oregon price is significantly different than the published market prices and the magnitude of these differences can be highly variable month-to-month. On an annual average basis, only paper fiber, tin and steel cans, and HDPE Natural had Oregon-specific prices within 5% of published market prices. The most significant difference is in mixed plastic, which represents less than 1% of outbound material, thus the impact is negligible.

Even with these challenges, the methodology, as described below, represents a viable approach to determining average commodity value for purposes of the PCRF.

B. Scrap Price Data Sources

Crowe researched several recycled material scrap market indices in addition to obtaining market pricing data from the CRPFs. We recommend using blended market pricing data for both OCC and mixed paper, which represent the largest share of tonnage and sales revenue. In reviewing market pricing data, we considered factors such as frequency of publication, availability of region-specific data, availability of multiple materials and grades of material, consistency with material types and grades produced by Oregon CRPFs, data sources (if available), whether a subscription is required, and price. Below, we provide an overview of the two selected sources and several others that we evaluated.

- **RecyclingMarkets.net, Secondary Materials Pricing (SMP)** – This data source has been tracking commodity pricing for over 35 years and providing secondary material pricing information online since 2002. Buyers, end-users, recycling centers, and waste haulers confidentially provide pricing data to SMP and data is published weekly on Fridays. SMP reviews and analyzes weekly price reports, which are also weighted by volume. SMP aligns material grades with the Association of Plastic Recyclers (APR), Institute of Scrap Recycling Industries (ISRI), and National Association for PET Container Resources (NAPCOR). RecyclingMarkets.net is subscription based for historical data. Another advantage of SMP is that it summarizes data regionally and nationally. The Pacific Northwest region (Region 4) includes Oregon, Washington, Idaho, British Columbia, and the Yukon. Crowe has a subscription that covers both fiber and container pricing which currently costs $465 per year. https://www.recyclingmarkets.net/secondarymaterials/prices.html?cid=3&city=Pacific+Northwest#prices.
- **Waste Paper Composite Index (part of Secondary Commodity Composite Index)** – The index tracks paper recycling and recovered paper fiber markets, providing an overall index and baled price data for hard white, kraft, mixed, OCC, ONP, and SOP (sorted office paper). The index is derived from current spot market prices originating from the Inter-Continental Paper Exchange (IPE), a proprietary data source that “may not reflect external market trends”. Crowe purchased a one-month subscription to evaluate this index. It appears to be closer to Oregon pricing for OCC, although pricing diverted in the latter half of the year. The waste paper subscription is $35 per month or $350 for a year.

Alternative Scrap Pricing Sources

In the event that one or both of the scrap pricing indices becomes unavailable, DEQ will utilize secondary sources to index the last published date of unavailable index, as follows:

- For OCC and Paper Fiber, utilize the FRED Producer Price Index by Commodity: Pulp, Paper, and Allied Products: Recyclable Paper to determine the percent change by month (https://fred.stlouisfed.org/series/WPU0912).
- For PET, utilize PlasticsNews.com North America recycled plastic resin price for clear post-consumer flake to determine the percent change by month (https://www.plasticsnews.com/resin-prices/north-america#recycled-plastics).
- For HDPE natural, utilize PlasticsNews.com North America recycled plastic resin price for natural, post-consumer flake to determine the percent change by month (https://www.plasticsnews.com/resin-prices/north-america#recycled-plastics).
- For HDPE color, utilize PlasticsNews.com North America recycled plastic resin price for mixed colors post-consumer flake to determine the percent change by month (https://www.plasticsnews.com/resin-prices/north-america#recycled-plastics).
- For aluminum, utilize ScrapIndex.org baled UBC monthly price to determine the percent change by month (https://www.scrapindex.org).
- For tin/steel can, utilize ScrapIndex.org mixed scrap iron & steel to determine the percent change by month (https://www.scrapindex.org).
- Should any of these alternative sources become unavailable, adjust the market price for the commodity by the percent change in Consumer Price Index for all Urban Consumers (CPI-U) as published by the US Bureau of Labor Statistics for the most recently published month.

Other Scrap Pricing Indices Evaluated

In addition to the above recommended indices, Crowe researched several other market indices. We opted against recommending the following companies due to issues such as high prices, a global market focus without attention to Northwest/Oregon specifics, and a lack of detailed pricing insights for plastics. Concerns also include potential redundancy with existing SMP and a perceived lack of thoroughness compared to original SMP. Furthermore, the need to purchase individual materials, pricing for virgin instead of recycled, a focus on pellets and flakes rather than bales, and a lengthy subscription commitment factored into our decision. As well, a lack of established reliability, being relatively new entrants to the industry raises concerns about ability to consistently meet our expectations.

- **Fastmarkets** provides pricing data for agriculture, metals and mining, energy, and forest products including a wide range of recovered paper grades and scrap ferrous and non-ferrous grades. Fastmarkets does not offer any pricing data on recycled plastic commodities, however. Fastmarkets is a large, global company that has acquired a number of smaller, independent pricing data suppliers over the years, including Pulp and Paper Week, formerly affiliated with RISI, which is the source of recovered fiber data. They offer limited pricing for the US Pacific region but nothing specific to Oregon or the Northwest. Fastmarkets prefers to work with large organizations with high-volume data needs and was reticent to provide a quote for limited data sets, and without knowing the exact number of users and ultimate customer. Crowe was given a quote of $5,000 per sequence on a conditional basis, with limited users and time duration. For four separate commodities, for example, the price would be $20,000 for the limited access. A few facility representatives noted that they have historically reviewed the Pulp and Paper International (PPI) as a reference to track trends (not specific prices), which we believe was historically part of Pulp and Paper Week's pricing newsletter. https://www.fastmarkets.com/forest-products/recovered-paper.

- **ScrapIndex.com** is a service of recycle.net. Data is generated from internal proprietary data from The Recycler's Exchange and Recycling Offset Credits (ROCs) reports. ScrapIndex.com includes prices for a broader range of recyclables including automobiles, batteries, iron and steel, exotic metals, rubber, and textiles in addition to wastepaper, plastics, and glass. Subscriptions must be purchased for single materials, for example PET, for $25 per month or $250 per year.
- **Secondary Commodity Composite Index** (https://www.secondarycommodity.com/) tracks changing market prices across eleven sectors including scrap metals, exotic and precious scrap, waste paper (see above), plastic electronics, curbside recycling, and others. Data is derived from current spot market prices from a network of on-line exchanges. The web page notes that the source of data is proprietary in nature and may not reflect external market trends. The index does include a curbside recycling composite index which is a weighted basket of nine benchmark grades of scrap curbside materials (HDPE, OCC, ONP, PET, scrap glass, single stream minus glass, single stream plus glass, steel cans, and UBC). The curbside composite index provides a blended index and individual commodity process for loose material, which is not consistent with CRPF operations. The curbside composite subscription is $35 per month or $350 for a year. The recycled plastics subscription is $125 per month or $1,250 per year. The scrap metals subscription is $200 per month or $2,000 per year.
- **Resource Recycling** provides monthly pricing information in their free email and print publications. The data is summarized by RecyclingMarkets.net staff, thus is duplicative and less thorough than the original SMP data. https://resource-recycling.com/recycling/2023/07/10/prices-drop-40-for-two-key-recycled-plastic-grades/.
- **Plastics News** provides recycled plastics pricing as part of their annual subscription ($169 per year). However, pricing data is for flakes and pellets rather than baled recyclables. https://www.plasticsnews.com/resin-prices/north-america#recycled-plastics.
- **Petrochemicals Market Outlook** offers petrochemical historical (2018-2023) and forecast trend (2024-2032) data for both global and USA region specific. This includes but is not limited to information about key indicators for demand and key indicators for price. There are three one-time purchasing options: single user license, five user license, and corporate license. Crowe received a custom-fit subscription quote. The single user license costs $3999 and includes the entire report with one print allowed. The five user license costs $4999 and the corporate license costs $5999. They provided a sample report including only the USA and specific historical and forecast trend information regarding the Northwest. Payment must be 100% paid in advance and deliverables can be given 7 business days from the project kick-off date. https://www.expertmarketresearch.com/reports/petrochemicals-market.
- **ICIS Petrochemical Index (IPEX)** offers a capacity-weighted measure of the average change in global or regional petrochemical prices over time. Dating back to 1 January 2000, historical ICIS prices for a basket of 12 essential petrochemical products in the US, western European and Asian markets are weighted by regional nameplate capacity to generate a monthly index value. IPEX values are calculated in a live environment and where the price of a commodity is not available, the latest available price is used to calculate the index. The IPEX is only available to subscribers. The US Gulf region includes all facilities in each component grade in the US. Their subscription is on an annual basis that is custom-tailored based on client needs. For a subscription package of only HDPE and PET based in North America, their sales team estimated an $8,000 to $12,000 annual cost. Factors such number of users, locations needed, etc. all effect the price. They offer a sample subscription example before committing. https://ICIS.com.

- **Argus** supplies access to market analysis and pricing of recycled plastic, specifically in relation to PET, natural and colored HDPE. They offer two means of purchase for their product. They offer a subscription directly for clients which includes a bi-weekly polymer price update for the West and Northwest United States of America. For a 5-user agreement, the subscription is a one-year commitment for about $14,000. The representative from the company informed Crowe that their recycled plastics index just launched July of 2022 and only provides 3 months of pricing history. Argus also offers a one-time purchase option, but this price is set by their consulting section and varies by project scope. https://www.argusmedia.com/.
- **Petrochemicals Price Assessments** publishes over 12,000 prices daily, including spot and forward price assessments for Oil, Natural Gas, Electric Power, Coal, Petrochemicals, Metals, Energy Transition, and Agriculture markets. They have assessments regarding US Recycled High-Density Polyethylene (HDPE) and US Recycled PET with options for west coast specific data for PET. They differentiate pricing for various grades of PET and PET clear flakes. Most of their markets, including the above, are assessed daily in cents/lb. for spot material loading 0-7 days forward from the day of publication for bottle bales and for spot material loading 3-30 days forward for clear flakes. Their assessments are based on market information, including, but not limited to, firm bids and offers, and trades reported to the editor up to the close of business (4:00 pm Central Standard Time). Platts market data gives access to all pricing across the world and cannot downsize the package. A minimum two-year subscription is required which generally starts in the five-figure range. The sales representative said the subscription is usually around $20,000 to $50,000 per year depending on the client's needs. https://www.spglobal.com/commodityinsights/PlattsContent/_assets/_files/en/our-methodology/methodology-specifications/americas-petrochemicals.pdf.
- **PetroChem Wire Recycled Plastics Weekly** tracks more than 40 weekly assessments for pellet (repro), flake (regrind) and scrap bales, plus assessments and market news on post-consumer resin (PCR), including HDPE and PP. The index is derived from actual spot market transactional prices for US commodities such as ethylene, propylene, and resins. They get a daily inflow of prices and transactions from active traders every day, who in turn benchmark off their numbers. Crowe inquired about pricing for a subscription, but Opis responded that they are unable to provide information to our company since they do not work with consulting firms. They did inform us that there is a minimum subscription payment upwards of $50,000 to $70,000. https://OpisNet.com.
- **Financial Times** monitors daily pricing information in their free *SET PETROCHEMICALS & CHEMICALS INDEX.* The data is for all petrochemicals; thus, it is broad and less thorough than product specific pricing. https://markets.ft.com/data/indices/tearsheet/summary?s=SPET:SET
- **PolymerTrack** provides access to weekly polymer price data for America as part of their £150 per month or £545 per year subscription. As well, they provide weekly industry news bulletins and historical price assessments for HDPE, LDPE, LLDPE, Polypropylene, PVC, PS, ABS, and PET contract prices. https://www.polymertrack.com/.

C. Average Commodity Value Methodology

The calculation of average commodity value (ACV) involves two components: (1) an initial calculation to determine the percent differential between published market data and Oregon-specific data and (2) the monthly calculation to determine the average commodity value for purposes of the PCRF.

Calculation of Oregon Specific Average Commodity Value Differential

As illustrated in **Exhibit 32,** the initial determination of the average commodity value methodology was a multi-step process. DEQ will utilize the resulting historic differential, 7.19%, for purposes of adjusting future published data to calculate the monthly average commodity value. DEQ will apply this percentage to market average commodity values in determining the monthly PCRF payments. This percentage may need to be adjusted in the future if there are significant changes in share of outbound commodities. **Exhibit 33** provides additional descriptions for each of the 13 steps. **Exhibit 34** provides an example of the calculation of the Oregon price adjustment. **Exhibit 35** illustrates the calculation of the Oregon price adjustment 7.19%.

Monthly Calculation of Oregon Specific Average Commodity Value

On a monthly basis, DEQ will utilize the sources identified to determine the published average commodity value. This calculation, illustrated in **Exhibit 36,** determines the ACV to be used in determining the monthly PCRF payments. DEQ will identify market prices and multiply the weighted average per ton market commodity price by the Oregon-specific differential of 7.19% (107.19%) to determine the Oregon specific ACV for a given month.

Exhibit 32
Overview of Initial Oregon-Specific Average Commodity Value Differential

1. Compiled selected scrap market data for 2022 for the selected commodities (OCC, mixed paper (various grades), PET, HDPE Natural, HDPE color, mixed plastic (various mixes), aluminum cans, tin and/or steel cans)
2. Compiled monthly scrap data from CRPFs for the selected commodities
3. Evaluated DEQ 2022 material-specific tonnage data and determine percent of total for each facility, by commodity
4. For plastics, utilized resin-specific split from selected facilities to separate DEQ plastic tonnage data
5. Determine percent of total 2022 outbound tons for each material type based on DEQ data; For plastics, utilize resin-specific split from selected facilities to separate DEQ plastic tonnage
6. Determine the market data commodity price for the target month (August 2023) for each commodity
7. Determine a weighted average market data commodity price for the target month
8. Determined a weighted average Oregon price for each month for each commodity
9. Calculate an annual Oregon-specific differential between the market price data and the weighted average Oregon price for 2022
10. Multiply the current source market price by the Oregon adjustment factor for each commodity
11. Multiply the percent of outbound tons by the Oregon price to determine a pro-rated tonnage price
12. Sum the pro-rated tonnage prices to determine an Oregon specific price per ton of commingled recyclables
13. Calculate the overall differential between the Oregon ACV and the market data ACV (currently 7.19%)

Exhibit 33
Description of Initial Oregon-Specific Average Commodity Value Differential and Considerations for Each Step

Process Step	Considerations
1. Compiled selected scrap market data for 2022 for the selected commodities (OCC, mixed paper (various grades), PET, HDPE Natural, HDPE color, mixed plastic (various mixes), aluminum cans, tin and/or steel cans)	Crowe researched scrap market sources as described above and identified two sources. For purposes of comparison with facility data we determined weighted-average monthly scrap prices. Where there were multiple grades and/or sources, we calculated a weighted average of market data consistent with the data provided by facilities.
2. Compiled monthly scrap data from CRPFs for the selected commodities	Facilities provided an average per ton price for the commodities sold each month. Some facilities provided more detail on specific commodities and end-markets (export versus domestic), although often the data was aggregated into an overall price per ton.
3. Evaluated DEQ 2022 material-specific tonnage data and determine percent of total for each facility, by commodity, including residuals	Crowe compiled and analyzed the DEQ 2022 commingled recycling facility outbound data to determine overall percent of total by material type and percent of total by material type for each facility. We compared and reconciled this data with tonnage data provided by the facilities.
4. For plastics, utilized resin-specific split from selected facilities to separate DEQ plastic tonnage data	DEQ's tonnage data combined plastic resins and was not used consistently by the facilities. We leveraged facility-provided data broken out by resin type to determine an average tonnage for PET, HDPE natural, HDPE color, and mixed plastic. Facilities did not consistently report mixed plastics.
5. Determine percent of total 2022 outbound tons for each material type based on DEQ data; For plastics, utilize resin-specific split from selected facilities to separate DEQ plastic tonnage	Crowe utilized the 2022 DEQ tonnage data, as validated with facility data, to determine the percent of total 2022 outbound tons for each material type. We utilized these percentages to calculate the weighted average bale prices.
6. Determine the market data commodity price for the target month (August 2023) for each commodity	Crowe identified or determined market prices for each commodity for August 2023 based on the identified sources (recyclingmarkets.net and Waste Composite Index for baled OCC, mixed paper, and sorted residential paper). For purposes of calculating the ACV the price for residual and other materials is $0 per ton.
7. Determine a weighted average market data commodity price for the target month	Crowe utilized the percent of total 2022 outbound tons for each material type multiplied by the August 2023 market commodity price to determine an average market commodity price for comparison purposes. This average market commodity price as shown in the next exhibit is $49.39.
8. Determined a weighted average Oregon price for each month for each commodity	Crowe utilized the facility-specific pricing data and percent of annual tonnage data for each facility to determine a weighted average price for each commodity for each month. Using this methodology, we weighted the price of facilities with a higher proportion of tonnage more heavily than a facility with only a small share of total annual tons of that commodity.

Process Step	Considerations
9. Calculate an annual Oregon-specific differential between the market price data and the weighted average Oregon price for 2022	Crowe computed a simple average of the monthly market prices and a simple average of the weighted average Oregon specific monthly prices to determine average annual prices for 2022. We then determined the difference between the market data and Oregon pricing. As noted above, these differentials were in some cases very high, particularly on a month-to-month basis, reflecting limitations of market data, differences in bale content and quality, and volatility of scrap prices. Compliance with responsible end market requirements may improve consistency and pricing information in future studies.
10. Multiply the current source market price by the Oregon adjustment factor for each commodity	This calculation determines the Oregon specific price per ton for the selected time period. In this example, we utilized August 2023 market data.
11. Multiply the percent of outbound tons by the Oregon price to determine a pro-rated tonnage price	This calculation determines the contribution to the total price per ton for each commodity type. In the example, OCC contributes $21.41 to the total value of a ton of commingled recyclables ($52.94).
12. Sum the pro-rated tonnage prices to determine an Oregon specific price per ton of commingled recyclables	The final result is a per-ton price for Oregon commingled recyclables. Based on August 2023 market prices and the current iteration of the model, the blended price per ton is $52.94.
13. Calculate the differential between the Oregon ACV and the market data ACV	This calculation (Oregon price – market price) / market price determines the percent differential to apply to market data for purposes of calculating the monthly ACV. The percent difference is 7.19%. For an average market data price of $100.00 per ton, the Oregon ACV would be $107.19.

Exhibit 34
Example Calculation of Market Data and Oregon-Specific Scrap Prices for HDPE Natural (dollars per ton)

Month (2022)	HDPE Natural Bale Price, Northwest, recyclingmarket.net	Oregon Weighted Average HDPE Natural Bale Price	Percent Change (Oregon as compared to Market Data)
January	$945	$798	-15.6%
February	903	886	-1.9%
March	850	995	17.1%
April	906	1,026	13.3%
May	975	1,010	3.6%
June	1,050	1,221	16.2%
July	950	1,001	5.4%
August	880	824	-6.4%
September	730	744	1.9%
October	765	789	3.1%
November	987	1,037	5.1%
December	1,020	1,068	4.7%
Annual Average	**$913**	**$950**	**4.0%**

Exhibit 35
Example Calculation of Oregon Specific Price per Ton for Commingled Recyclables (dollars per ton)

Material	Total Outbound Tons (2022)	Percent of Tons (2022)	Source Market Price August 2023	Weighted Average Market Price	Adjustment Between Market and Average Oregon Price[32]	Calculated Oregon Price	Ton Price Share (Percent of Tons × Oregon Price)	Source Market Price Description/Calculation
Cardboard (OCC)	140,319	50.0%	$37.50	$42.81	14.2%	$42.81	$21.41	Blended average between recyclingmarkets.net* of 50% OCC PS11 and 50% Waste Composite baled OCC.
Paper (FIB)	92,645	33.0%	$16.97	$24.11	42.1%	$24.11	$7.96	Weighted average of 78% mixed paper price (Recyclingmarkets.net, PS54 and Waste Composite Mixed Baled Waste Paper) + 22% Sorted Residential Papers
PET	5,931	2.1%	$130.00	$162.99	25.4%	$162.99	$3.45	Recyclingmarkets.net baled PET picked up.
HDPE Natural	4,169	1.5%	$498.33	$518.27	4.0%	$518.27	$7.70	Recyclingmarkets.net baled HDPE Natural picked up.
HDPE Color	5,533	2.0%	$91.67	$124.46	35.8%	$124.46	$2.45	Recyclingmarkets.net baled HDPE Color picked up.
Mixed Plastic	3,616	1.3%	-$36.67	$19.13	-152.2%	$19.13	$0.25	Recyclingmarkets.net baled #3-#7 baled, picked up.
Tin/Steel Cans (TC)	4,051	1.4%	$225.00	$221.94	-1.4%	$221.94	$3.20	Recyclingmarkets.net steel cans, sorted, baled, picked up.
Aluminum (AL)	2,310	0.8%	$1,250.00	$792.36	-36.6%	$792.36	$6.52	Recyclingmarkets.net aluminum cans, sorted, baled, picked up.
Residual and Other Materials	22,057	7.9%	$0.00	$0.00	NA	$0.00	$0.00	Residual and other materials assumed to have a value of $0 (excluding covered glass and film tons).
Total	**280,632**	**100.0%**		**$49.39**	**7.19%**		**$52.94**	

** All Recyclingmarkets.net prices are for the Pacific Northwest.*

[32] Calculated based on an annual Oregon-specific differential between the selected market prices and weighted average Oregon price for 2022. This differential serves as the adjustment factor between Oregon-specific market prices and Oregon market prices.

Exhibit 36
Example Calculation of Monthly Market Price Commodity Value and Oregon Average Commodity Value (dollars per ton)

Material	Total Outbound Tons (2022)	Percent of Tons (2022)	Source Market Price August 2023	Weighted Average Market Price	Adjustment Between Market and Average Oregon Price[33]	Calculated Oregon Price	Ton Price Share (Percent of Tons × Oregon Price)	Source Market Price Description/Calculation
Cardboard (OCC)	140,319	50.0%	$37.50	$42.81	14.2%			Blended average between recyclingmarkets.net* of 50% OCC PS11 and 50% Waste Composite baled OCC.
Paper (FIB)	92,645	33.0%	$16.97	$24.11	42.1%			Weighted average of 78% mixed paper price (Recyclingmarkets.net, PS54 and Waste Composite Mixed Baled Waste Paper) + 22% Sorted Residential Papers
PET	5,931	2.1%	$130.00	$162.99	25.4%			Recyclingmarkets.net baled PET picked up.
HDPE Natural	4,169	1.5%	$498.33	$518.27	4.0%			Recyclingmarkets.net baled HDPE Natural picked up.
HDPE Color	5,533	2.0%	$91.67	$124.46	35.8%			Recyclingmarkets.net baled HDPE Color picked up.
Mixed Plastic	3,616	1.3%	-$36.67	$19.13	-152.2%			Recyclingmarkets.net baled #3-#7 baled, picked up.
Tin/Steel Cans (TC)	4,051	1.4%	$225.00	$221.94	-1.4%			Recyclingmarkets.net steel cans, sorted, baled, picked up.
Aluminum (AL)	2,310	0.8%	$1,250.00	$792.36	-36.6%			Recyclingmarkets.net aluminum cans, sorted, baled, picked up.
Residual and Other Materials	22,057	7.9%	$0.00	$0.00	NA			Residual and other materials assumed to have a value of $0 (excluding covered glass and film tons).
Total	**280,632**	**100.0%**		**$49.39**	**7.19%**		**$XX.XX**	

** All Recyclingmarkets.net prices are for the Pacific Northwest.*

[33] Calculated based on an annual Oregon-specific differential between the selected market prices and weighted average Oregon price for 2022. This differential serves as the adjustment factor between Oregon-specific market prices and Oregon market prices.

Appendix A:
Recycling Modernization Act – ORS 459A.920 and 459A.923

Exhibit 37
Text from ORS 459A.920 and .923 of the Recycling Modernization Act

ORS 459A.920. Contamination management fee. (1) The Environmental Quality Commission shall by rule adopt and periodically revise a contamination management fee to be paid by producer responsibility organizations to commingled recycling processing facilities to compensate the facilities for the costs of removing and disposing covered products that are contaminants. The amount of the fee shall be based on the result of the study conducted under subsection (2) of this section. Rules adopted under this section must:

(a) Provide that payment of the fee may not be required more frequently than once per month and must be paid within 45 days of a request for payment;

(b) Provide that the fee may not be based on commingled recycling originating outside of Oregon; and

(c) Establish a review process to ensure that the fee is appropriately charged.

(2) The Department of Environmental Quality shall contract with an independent organization to conduct the study under this subsection. The study must:

(a) Estimate the cost to commingled recycling processing facilities of removing and disposing of covered products that are contaminants, reported as the cost per ton of covered products; and

(b) Estimate the costs to commingled recycling processing facilities of removing and disposing of all contaminants, reported as the cost per ton of all contaminants.

(3) A commingled recycling processing facility that does not participate in the review process described in subsection (1) of this section or the study described in subsection (2) of this section is not eligible to receive a contamination management fee.

(4) Any proprietary information provided to the department under subsection (1) of this section or to a person conducting a study under subsection (2) of this section may be designated confidential by a commingled recycling processing facility. Information designated confidential is not subject to public disclosure under ORS 192.311 to 192.478, except that information may be disclosed as summarized or aggregated data if doing so does not directly or indirectly disclose the proprietary information of any specific facility.

(5) The department shall review the contamination management fee at least once every five years. The department may not review the contamination management fee more frequently than once per year.

ORS 459A.923. Processor commodity risk fee. (1) As used in this section:

(a) “Anticipated program cost” means all additional costs related to any new requirements of sections 1 to 43 of this 2021 Act that are anticipated prior to the next review of the processor commodity risk fee under subsection (6) of this section.

(b) “Average commodity value” means the average revenue paid by brokers or end markets, after processing by a commingled recycling processing facility, for a composite ton of commingled material collected for recycling in Oregon.

(c)(A) “Eligible processing cost” means all costs associated with owning and operating a commingled recycling processing facility as determined by the study conducted under subsection

(3) of this section, including but not limited to sorting, handling, storing, disposal, marketing and shipping, administration, rent, fees, depreciation, fixed costs, profit, the target price paid for commingled recycling collected from Oregon as described in subsection

(2)(d) of this section and anticipated program costs.

(B) “Eligible processing cost” does not include revenue from the sale of recyclables and any costs that are reimbursed by producer responsibility organizations or other parties, including the contamination management fee established under section 24 of this 2021 Act.

(2) The Environmental Quality Commission shall by rule adopt and periodically revise a processor commodity risk fee to be paid by producer responsibility organizations to commingled recycling processing facilities to ensure that producers share in the costs of fully processing commingled recyclables that are covered products and to allow local governments to reduce the financial impacts on ratepayers. The processor commodity risk fee shall be based on the eligible processing costs of facilities less the average commodity value of recyclable materials processed by facilities. Rules adopted under this section must:

(a) Provide that payment of the fee may not be required more frequently than once per month and must be paid within 45 days of a request for payment.

(b) Provide that the fee may not be based on commingled recycling originating outside of Oregon.

(c) Establish a review process to ensure that the fee is appropriately charged.

(d) For purposes of calculating the processor commodity risk fee, allow the average fee charged by commingled recycling processing facilities for acceptance of commingled recyclables collected from Oregon to target a price of $0 per ton, expressed on the basis of compensation per ton of delivered material.

(e) Provide that the fee is to be paid on the basis of recyclable material received by or sold from a commingled recycling processing facility.

(f) Ensure that materials handled by more than one commingled recycling processing facility are not double counted for purposes of calculating the fee.

(g) Allow local governments to protect ratepayers from cost increases associated with the volatility of commodity markets.

(h) Establish methods to determine and periodically update, but no more frequently than once per month, the average commodity value per ton of commingled materials collected from single-family residences in Oregon and from all other sources in Oregon. The methods developed under this paragraph must include:

(A) The average composition of materials by percentage in each mix, multiplied by published market values;

(B) The sources of the published market values used; and

(C) Any adjustments to published market values for each commodity to reflect conditions in Oregon.

(3) Subject to subsection (6) of this section, the Department of Environmental Quality shall contract with an independent organization to conduct the study under this subsection. The study must:

(a) Estimate the average eligible processing cost at commingled recycling facilities that process commingled recycling generated in Oregon; and

(b) Report the costs on the basis of tons of commingled recycling received and materials shipped to end markets.

(4) A commingled recycling facility that does not participate in the review process described in subsection (2) of this section or the study described in subsection (3) of this section is not eligible to receive a processor commodity risk fee.

(5) Any proprietary information provided to the department under subsection (2) of this section or to a person conducting a study under subsection (3) of this section may be designated confidential by a commingled recycling processing facility. Information designated confidential is not subject to public disclosure under ORS 192.311 to 192.478, except that information may be disclosed as summarized or aggregated data if doing so does not directly or indirectly disclose the proprietary information of any specific facility.

(6) The department shall contract for the study under subsection (3) of this section to be performed at least once every five years. The department may contract for the study under subsection (3) of this section to be performed no more than once per year. If a study under subsection (3) of this section demonstrates that the average per-ton eligible processing cost has changed by more than 10 percent since the commission last established the processor commodity risk fee, the commission shall by rule revise the processor commodity risk fee.

Appendix B:
Anticipated Program Costs

This Appendix describes Crowe's Anticipated Program Cost (APC)methodology. We utilized this approach during the iterative process of research and interviews. ORS 459A.923(1)(a) defines Anticipated Program Costs as "all additional costs related to any new requirements of sections 1 to 43 of this 2021 Act that are anticipated prior to the next review of the processor commodity risk fee". There are significant unknowns related to anticipated program costs. First, during the early phases of the study many of the requirements were not yet formally defined. Many of the requirements were under active discussion as part of proposing performance standards and other permit conditions as part of rule concept development. As a result, there was some give-and-take between development of permit rules and estimation of anticipated program costs. This was an iterative process and included scenarios or options reflecting potential performance standards, permit conditions, and differing levels of capital investment. Another uncertainty is that there is no set date for the next review of the Processor Commodity Risk Fee (PCRF), other than within the next five years (although likely this review would be sooner).

Crowe prepared and asked a series of questions related to categories of anticipated program costs during the facility visits. In addition, we conducted follow-up telephone interviews with commingled recycling processing facilities (CRPFs) in October and November 2023 to identify anticipated program costs once rulemaking was further defined (e.g., defining living wage and supportive benefits for CRPF workers and permit standards). Anticipated program costs could include, but are not limited to, the following:

- Administrative and reporting requirements necessary to comply with permits, including disposition reporting and responsible end market standards
- Operational changes necessary to add sorting capability for materials listed on the Uniform Statewide Collection List
- Quality enhancements necessary to comply with permit requirements including costs associated with:
  - Re-running material through the sort line
  - Adding employees (or reducing employees)
  - Equipment
  - Capacity expansions
- Cost estimations to satisfy contamination standards ultimately established during the rulemaking process (which may vary by bale type, e.g., 5%, 4%)
- Cost estimates to satisfy the capture rates standards ultimately established during the rulemaking process
- Living wage and supportive benefits requirement, though requirement does not take effect until January 1, 2027
- Potential changes to material disposition, such as eschewing existing end markets that may not meet future standards for "responsible end markets" and/or sending partially-processed materials on to another commingled recycling processing facility (or other entity) for secondary processing

A. Approach

Crowe's approach to identifying anticipated program costs for CRPFs included the following activities:

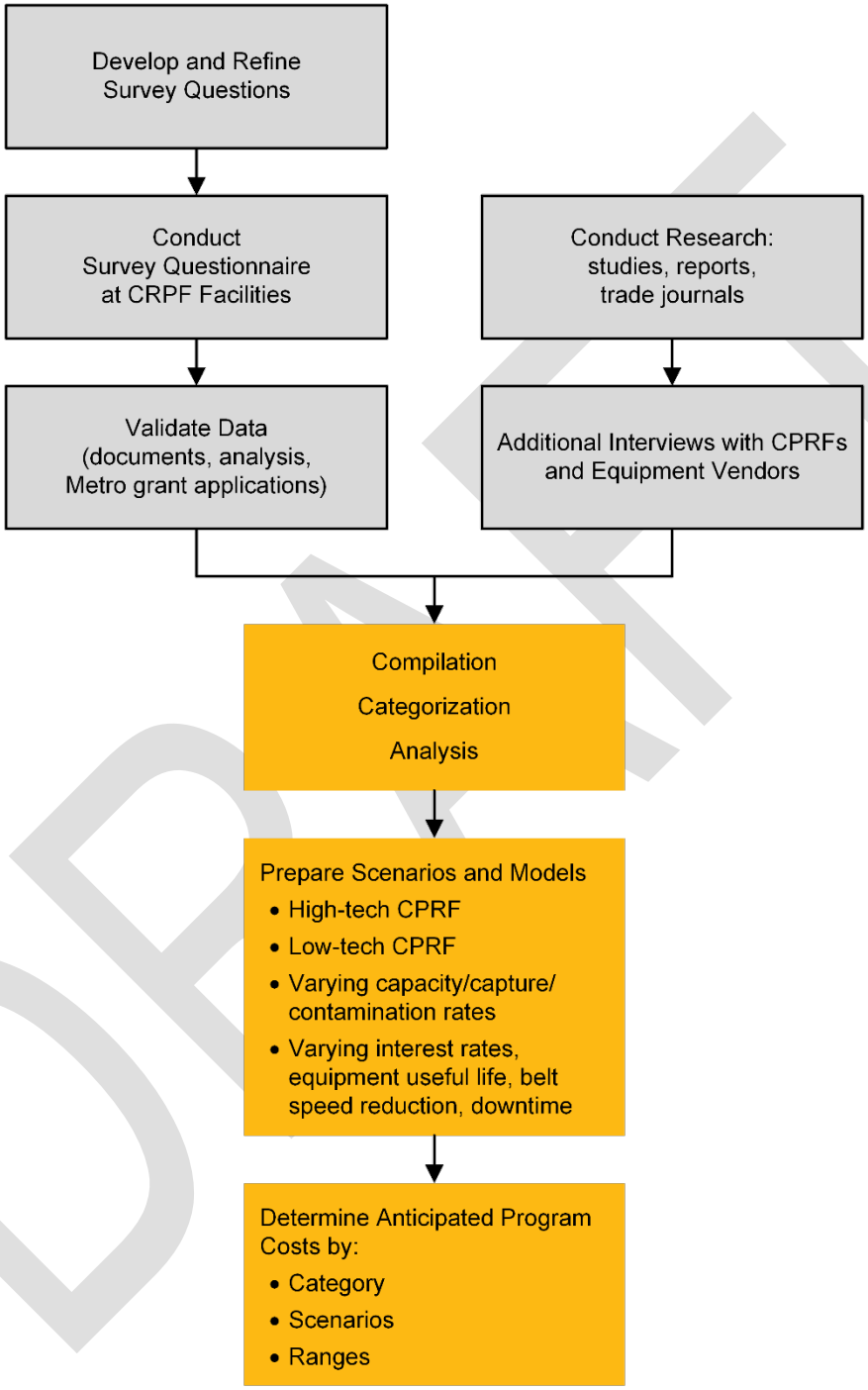
- Development of a questionnaire to be completed during the CRPF facility visits. The questionnaire, provided below, will include the following categories:
  - Administration and reporting
  - Living wage and supportive benefits
  - Employment changes
  - Equipment updates
  - Operational/quality changes
  - Capacity and material acceptances changes
- Validation of survey data
- Research on facility upgrades and equipment prices through:
  - Existing studies and reports
  - Trade literature
  - Equipment vendors
  - Interviews with out-of-state processors (beyond the Oregon CRPFs)
- Follow-up meetings with CRPFs in Fall 2023
- Compilation and categorization of survey data
- Development of models and scenarios that depict high-tech and low-tech approaches to upgrading facilities
- Presentation of aggregated results across RMA cost categories, Crowe's methodology categories, and separately for high-tech and low-tech scenarios.

Exhibit 38 provides an overview of Crowe's approach to conducting the anticipated program costs activities. In conducting this work, our overall goal is to be:

- Comprehensive in capturing and evaluating a wide range of costs and cost trade-offs
- Transparent in describing our methodology, data inputs, categories, scenarios, and assumptions
- Consistent in following our general methodological approach and categorization of costs
- Conservative in determining the minimum costs required to meet proposed RMA requirements and/or scenarios
- Focused on capturing costs supported by documentation, where possible (e.g., equipment price quotes)
- Distinguishing anticipated program costs required to comply with the RMA from costs that a CRPF would otherwise have to incur to run its business absent the RMA.

Crowe presents anticipated program costs in several categories. We determined total anticipated program costs across each of the broad RMA areas outlined above (administration/reporting, living wage and supportive benefits, capacity/material acceptance, and capture rates/contamination rates).

Exhibit 38
Overview of Anticipated Program Costs Methodology



B. Anticipated Program Costs Survey

As a component of each CRPF facility site visit, Crowe conducted a survey to identify potential anticipated program costs. Crowe followed the same confidentiality procedures with anticipated program costs as with facility cost and associated data provided during this study. The remainder of this section provides the anticipated program costs survey. We completed the anticipated program cost survey with the CRPF after we conducted the site tour and reviewed financial and labor information. At this point, we had a good understanding of the facility's operations and ability to meet future performance standards. The first two questions framed the conversation and allowed our team to focus questions on the types of anticipated program costs most applicable to each CRPF. For example, if a facility stated that they will not be upgrading equipment in response to question #2, we did not ask the questions related to new equipment.

In order to target the quality levels that will be required for permit compliance, we started with two assumptions: a 5% and a slightly a lower rate outbound contamination rate on average (for all materials combined), with corresponding capture rates that support the facility meeting the 5% or slightly lower targets.[34] We followed up with each CRFP to further discuss anticipated program costs in the Fall of 2023.

Exhibit 39 provides the initial anticipated program costs survey. Responses to this survey provided a starting point for the iterative process that will unfold over the remainder of 2023.

[34] There is ongoing discussion around outbound contamination rate targets to be incorporated into performance standards. Proposals under discussion include, but are not limited to 5%, APR or ISRI Grade A, a 20% improvement over ISRI or APR standards, and commodity specific versus average rates.

Exhibit 39
Anticipated Program Costs Survey

Section	Question No.	Question
1. Primary Concerns	1a	What are your primary concerns in meeting new requirements for Materials accepted?
	1b	Capture rates?
	1c	Contamination rates?
	1d	Living wage and supportive benefits?
	1e	Other requirements of the RMA?
2. Considerations Meeting RMA Requirements	2a	What are your facility's considerations related to meeting the RMA requirements through: Moving materials to another CRPF?
	2b	Adding employees?
	2c	Adding equipment/technology? What documentation do you have related to future equipment purchases (quotes, plans, proposals, etc.)?
	2d	Other?
3. Administration and Reporting	3a	How much time does your facility currently spend on reporting to Oregon DEQ? To Metro (if applicable)?
	3b	Of that time, how much time is spent on tonnage reporting?
	4	Are there any other reporting categories you currently report on? If yes, please specify and provide the amount of time spent on each.
	5a	How much additional labor cost or other expenses do you anticipate incurring for administration and reporting for permit /certification compliance?
	5b	Reporting related to the living wage and supportive benefits wage compliance?
	5c	Responsible end-market compliance?
	5d	Tonnage and contamination reporting?
	5e	Participation in audits and inspections?
	5f	Fee invoicing?
	5g	Other (please specify)?
4. Living Wage and Supportive Benefits	6	PTO - How many days of paid time off (including holidays, sick days, and vacation) are provided to workers in a year?
	7a	Does your facility provide health benefits? (If yes, provide specifics on premium levels, co-pays, deductibles)
	7b	Dental benefits? (Yes/No)
	7c	Vision benefits? (Yes/No)
	7d	Retirement benefits? (Yes/No)
	7e	Training and education benefits? (Yes/No)
	7f	Other benefits? (Yes/No, please specify)
	8	Estimate the total annual cost per employee for all benefits provided by your facility. Provide by employee category or job classification if there are differences.
	9	Estimate the current average percentage that benefits represent of salaries and wages by worker category.
	10	Do you expect an increase in temporary agency staffing use and related administration fees? If yes, how are benefits calculated for these temporary laborers? Will their benefits increase? How will temporary agency fees be increased?
	11	Have you considered wage compression implications? If yes, describe how they will impact your labor costs across all employees, on average, using a hypothetical 25% increase from current entry-level rates (e.g., $20/hour to $25/hour).

Section	Question No.	Question
5. Capacity and Material Acceptance	12	What changes will be required to accept additional materials as part of the Uniform Statewide Collection List (USCL), as currently proposed?
	13	What is your current daily capacity in tons per day (all materials combined)? Please provide documentation.
	14	Can you provide documentation of any planned capacity increases?
	15	What are the reasons for any planned capacity increases?
6. Current Quality Levels	16	What is your current average bale contamination rate (all materials combined)? Please provide documentation. Please provide average contamination rates for each commodity (OCC, mixed paper, HDPE (natural/color), PET, tin/steel, aluminum, etc.)
7. Operational Changes	17	Are you planning additional sorting procedures? If yes, will they be primarily manual or automated?
	18	What other procedural changes do you anticipate?
	19	What changes do you expect in the number of employees due to reductions from automation?
	20	What changes do you expect in the number of employees due to increases in manual labor needs?
	21	How do you expect your residual/ disposal costs to change due to higher quality outputs?
8. Equipment Changes	22	Are you planning to invest in new equipment to meet the materials on the USCL and/or performance standards starting July 1, 2025 (assume 5%)? If yes, please identify the types and quoted prices for each equipment.
	23	Are you planning to apply for grants (matching or otherwise) from Metro, Carton Council, or other organizations for new equipment?
	24	If new equipment is being or will be purchased, do you plan to perform facility upgrades to incorporate the new equipment? If yes, describe the upgrades needed and estimated costs. Provide quotes if possible.
	25	Are there any staffing changes which would result from adding new/upgraded equipment?
	26	If certain processes will be automated, how do you anticipate reallocation of resources with automation?
	27	Will equipment maintenance costs be impacted? If yes, provide an estimate of the additional costs or cost savings.
	28	If new equipment is being purchased, does it require ongoing subscription costs (for example, monthly software/support for advanced equipment)? If yes, provide an estimate of how much monthly costs would be.