

Improving Oregon Recycling Systems Infrastructure Research

Additional Alternative Scenario Analysis - Evaluation Criteria Summary

December 1, 2020 (FINAL)

IMPORTANT NOTE: Please take the following factors into account when reviewing this summary.

Figures in this report represent the consultant team's best modeling estimates given available data. Data were especially limited regarding current processing costs, revenues, bales produced, and bale quality. Figures represent 2025. Dollars are 2025\$ and weights are in short tons (2,000 pounds).

Access to Recycling	Original Baseline: Pre- Disruption List (S0)	Baseline: Post- Disruption List (S5)	+ Engagement (S6/A-)	+ Improved MRFs (S1/A)	+ Expanded Lists (S2/A+)	+ CRF (S3/B)	Dual-Stream (S4/C)	+ Statewide List (S7/A++)	+ Expanded Collection (S8/D- low)	+ Expanded Collection (S9/D- mid)	+ Expanded Collection (S10/D- hi)
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Alternative scenarios A, A+, A++, B expanded material lists but did not include changes to participation or recycling access in general.

In alternative scenario C (dual-stream), all single-family residential customers have effectively weekly collection (fiber one week, containers the next).

In alternative scenario D (low, mid, and high), on-route collected is expanded to more multifamily properties in Groupings 1, 2, and 3 and to single-family, multifamily, and commercial garbage customers in Grouping 4.

Number of Customers (participation rates)											
On-Route Single-Family Residential (weekly)	515,884	515,884	515,884	515,884	515,884	515,884	995,572	515,884	515,884	515,884	515,884
On-Route Single-Family Residential (not weekly)	479,688	479,688	479,688	479,688	479,688	479,688	-	479,688	532,076	558,270	584,463
On-Route Multifamily Residential Customers	17,726	17,726	17,726	17,726	17,726	17,726	17,726	17,726	23,544	31,640	36,022
On-Route Commercial Customers	68,407	68,407	68,407	68,407	68,407	68,407	68,407	68,407	73,974	74,956	75,611
Depot	NA (see population)	No change	No change	No change	No change	No change	No change	No change	No change	No change	No change
Population with Access											
On-Route and Depot Collection	3,856,631	3,856,631	3,856,631	3,856,631	3,856,631	3,856,631	3,856,631	3,856,631	4,511,478	4,511,478	4,511,478
Depot Collection Only	654,847	654,847	654,847	654,847	654,847	654,847	654,847	654,847	-	-	-

Materials Collected	Original Baseline: Pre- Disruption List (S0)	Baseline: Post- Disruption List (S5)	+ Engagement (S6/A-)	+ Improved MRFs (S1/A)	+ Expanded Lists (S2/A+)	+ CRF (S3/B)	Dual-Stream (S4/C)	+ Statewide List (S7/A++)	+ Expanded Collection (S8/D- low)	+ Expanded Collection (S9/D- mid)	+ Expanded Collection (S10/D- hi)
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This section summarizes in-scope materials collected, including those collected commingled and source-separated. Tonnages include contamination in collection, which largely drives the reduction in collected tons between the baselines and Scenario A-.

Inbound Collection Quantities (total tons)											
Single-Family Residential	576,235	554,695	541,085	541,085	615,969	615,969	617,501	618,603	630,952	649,395	663,559
Multifamily Residential	243,032	227,057	216,083	216,083	254,703	254,703	255,877	255,873	262,872	270,084	277,007
Commercial	23,376	22,987	22,454	22,454	26,373	26,373	26,397	26,403	31,299	43,032	51,175
Depot	231,207	228,717	226,977	226,977	251,786	251,786	252,121	252,118	255,505	258,341	260,776
Depot	78,621	75,933	75,571	75,571	83,108	83,108	83,106	84,209	81,276	77,938	74,600

Customer engagement methods include providing direct feedback to customers, with refusal to collect from customers with repeated contamination.

While customers appreciate clear instructions, there may be negative feedback from customers who habitually contaminate recycling.

Contamination Rates in Commingled SS and DS Collection											
Single-Family Residential	14.0%	12.5%	7.2%	7.2%	7.6%	7.6%	7.5%	7.5%	7.7%	8.0%	8.2%
Multifamily Residential	22.4%	21.2%	18.8%	18.8%	17.3%	17.3%	17.2%	17.2%	15.8%	16.3%	16.5%
Commercial	13.5%	13.0%	11.5%	11.5%	11.2%	11.2%	11.1%	11.1%	11.3%	11.6%	11.8%
Depot	15.8%	13.7%	8.1%	8.1%	5.3%	5.3%	5.3%	4.9%	4.9%	5.0%	5.0%

Bale/Commodity Tonnages	Original										
	Baseline: Pre-Disruption List (S0)	Baseline: Post-Disruption List (S5)	+ Engagement (S6/A-)	+ Improved MRFs (S1/A)	+ Expanded Lists (S2/A+)	+ CRF (S3/B)	Dual-Stream (S4/C)	+ Statewide List (S7/A++)	+ Expanded Collection (S8/D-low)	+ Expanded Collection (S9/D-mid)	+ Expanded Collection (S10/D-hi)
Total Bale Weights	534,050	516,484	512,921	504,670	570,171	570,052	575,644	572,620	582,613	597,156	608,230
Paper Bales	387,787	374,696	372,157	363,547	396,787	396,823	401,668	398,284	405,511	416,137	423,714
OCC (corrugated cardboard)	221,925	221,243	220,908	234,269	237,282	237,269	240,443	237,321	239,434	244,374	246,636
Sorted clean newsprint	1,211	1,211	1,211	1,211	1,211	1,211	1,211	1,211	1,169	1,127	1,086
Sorted residential paper and news	14,576	13,668	13,524	81,973	91,833	91,805	93,646	91,832	94,548	97,307	100,031
Mixed paper	148,385	137,884	135,827	45,320	63,799	63,877	63,510	65,256	67,690	70,607	73,205
Paperboard/old boxboard	1,022	447	447	447	1,022	1,022	1,022	1,022	987	952	916
Aseptic and gable-top cartons	669	243	240	327	1,640	1,639	1,836	1,641	1,683	1,771	1,839
Plastics Bales	23,231	19,856	19,266	18,957	40,858	40,706	41,841	41,799	43,655	46,269	48,381
PET #1 bottles and jars	7,000	6,885	6,568	6,728	6,877	7,705	7,379	6,905	7,270	7,817	8,247
PET #1 thermoforms and tubs	24	1	1	1	2,509	1,742	2,724	2,712	2,887	3,108	3,301
HDPE #2 natural bottles	2,115	2,124	2,073	2,036	2,059	2,047	2,149	2,059	2,145	2,243	2,335
HDPE #2 colored bottles	3,080	3,101	2,983	2,866	2,894	2,877	3,006	2,896	3,015	3,153	3,280
HDPE #2 and PP #5 tubs	410	208	201	189	1,413	1,389	1,444	1,414	1,476	1,606	1,693
PE clear film	3,684	3,684	3,684	3,684	3,707	3,707	3,707	4,257	4,208	4,158	4,109
Mixed bulky rigid plastics (mainly PE and PP)	2,439	1,541	1,481	1,397	14,403	14,427	14,054	14,417	15,140	16,092	16,879
PP #5 bottles and jars	68	33	32	29	196	190	215	197	205	217	226
PP #5 small rigid plastic	910	443	427	410	6,073	5,923	6,295	6,077	6,411	6,935	7,335
Solid PS #6 (rigid)	0	-	-	7	569	540	710	706	750	806	853
Foam PS #6 (transport block and shape, densified)	1	-	-	-	134	134	134	134	124	114	103
#3-7 bottles and small rigid plastics	3,498	1,835	1,817	1,609	25	25	25	25	23	21	19
Glass	58,421	58,421	58,421	58,421	64,552	64,552	64,552	64,552	66,000	67,057	68,768
Container glass	58,421	58,421	58,421	58,421	64,552	64,552	64,552	64,552	66,000	67,057	68,768
Metal Bales	64,611	63,512	63,077	63,746	67,974	67,971	67,583	67,985	67,447	67,693	67,367
Aluminum cans and foil	1,478	1,367	1,347	1,373	1,530	1,530	1,546	1,530	1,574	1,646	1,697
Steel cans	33,714	33,738	33,503	33,758	35,858	35,852	35,662	35,868	35,130	34,575	33,883
Scrap metal	29,420	28,407	28,227	28,615	30,586	30,588	30,375	30,586	30,743	31,472	31,787

Figures in this report represent the consultant team's best modeling estimates based on available data.
 Cascadia Consulting Group, Inc. | Circular Matters, LLC | Bell & Associates

Material Quality: Bale Contamination Rates	Original Baseline: Pre-Disruption List (S0)	Baseline: Post-Disruption List (S5)	+ Engagement (S6/A-)	+ Improved MRFs (S1/A)	+ Expanded Lists (S2/A+)	+ CRF (S3/B)	Dual-Stream (S4/C)	+ Statewide List (S7/A++)	+ Expanded Collection (S8/D-low)	+ Expanded Collection (S9/D-mid)	+ Expanded Collection (S10/D-hi)	
This section presents bale contamination rates for materials that are sorted at MRFs.												
Paper Bales	4.4%	4.1%	3.2%	1.2%	1.6%	1.5%	1.4%	1.6%	1.6%	1.6%	1.7%	
OCC (corrugated cardboard)	2.0%	2.0%	1.7%	0.8%	1.3%	1.3%	1.8%	1.3%	1.3%	1.3%	1.3%	
Sorted residential paper and news	4.8%	4.5%	3.2%	1.3%	1.6%	1.5%	0.7%	1.6%	1.6%	1.7%	1.7%	
Mixed paper	6.1%	5.8%	4.3%	1.8%	2.1%	2.0%	1.7%	2.0%	2.1%	2.2%	2.2%	
Aseptic and gable-top cartons	7.7%	7.8%	6.7%	2.9%	4.5%	4.4%	3.8%	4.5%	4.6%	4.6%	4.7%	
Plastics Bales	15.2%	15.2%	11.9%	6.2%	4.8%	4.7%	3.4%	4.8%	4.9%	5.0%	5.0%	
PET #1 bottles and jars	15.2%	16.0%	11.7%	6.1%	4.3%	4.7%	3.4%	4.3%	4.4%	4.5%	4.7%	
PET #1 thermoforms and tubs					3.4%	3.0%	2.8%	3.5%	3.6%	3.7%	3.8%	
HDPE #2 natural bottles	8.0%	8.4%	6.1%	3.0%	2.8%	2.8%	2.1%	2.9%	2.9%	2.9%	3.0%	
HDPE #2 colored bottles	12.7%	13.3%	9.7%	5.0%	4.6%	4.6%	3.4%	4.7%	4.7%	4.8%	4.8%	
HDPE #2 and PP #5 tubs	13.3%	13.7%	10.4%	4.0%	4.8%	4.5%	3.5%	4.9%	5.0%	5.0%	5.0%	
Mixed bulky rigid plastics (mainly PE and PP)	12.9%	13.4%	9.9%	4.5%	5.7%	5.7%	3.6%	5.9%	5.9%	5.9%	5.9%	
PP #5 bottles and jars	13.3%	13.7%	10.4%	4.0%	4.9%	4.6%	3.6%	5.0%	5.0%	5.0%	5.1%	
PP #5 small rigid plastic	13.6%	13.8%	10.5%	4.1%	4.6%	3.9%	3.5%	4.6%	4.7%	4.8%	4.8%	
Solid PS #6 (rigid)				4.0%	4.8%	4.4%	3.4%	4.8%	4.9%	4.9%	5.0%	
#3-7 bottles and small rigid plastics	23.4%	24.8%	24.1%	14.6%								
Metal Bales	6.0%	6.8%	4.8%	2.5%	2.9%	2.9%	1.8%	3.0%	3.0%	3.0%	3.0%	
Aluminum cans and foil	5.3%	5.7%	2.4%	0.8%	0.5%	0.5%	0.1%	0.5%	0.5%	0.5%	0.5%	
Steel cans	10.7%	11.2%	8.1%	4.2%	5.2%	5.2%	3.2%	5.3%	5.3%	5.3%	5.3%	
Scrap metal	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	

Material Quantities Baled Excluding Contamination (tons)	Original Baseline: Pre- Disruption List (S0)	Baseline: Post- Disruption List (S5)	+ Engagement (S6/A-)	+ Improved MRFs (S1/A)	+ Expanded Lists (S2/A+)	+ CRF (S3/B)	Dual-Stream (S4/C)	+ Statewide List (S7/A++)	+ Expanded Collection (S8/D- low)	+ Expanded Collection (S9/D- mid)	+ Expanded Collection (S10/D- hi)
Total Materials	518,617	502,700	502,518	500,629	563,764	563,735	570,138	566,100	575,742	589,743	600,387
Paper Materials	375,963	364,080	364,080	360,706	392,466	392,560	397,620	393,900	400,929	411,221	418,544
Corrugated cardboard	235,674	235,674	235,674	233,395	233,958	233,968	236,325	233,958	235,921	240,821	242,920
Newspaper	42,232	42,232	42,232	42,232	43,396	43,399	43,377	43,396	43,837	44,086	44,466
Printing and writing paper	51,056	48,813	48,813	48,301	56,895	56,932	58,796	56,897	59,268	61,842	64,270
Other paper recyclable with newspaper	2,681	2,178	2,178	2,154	4,319	4,322	4,345	4,319	4,580	4,840	5,092
Paperboard	36,289	29,525	29,525	28,925	39,020	39,024	38,991	39,020	40,183	41,354	42,573
Other paper not recyclable with newspaper	5,287	4,325	4,325	4,325	5,846	5,862	5,739	5,847	6,013	6,185	6,362
Gable tops & aseptics	1,100	516	516	536	1,703	1,703	1,768	1,703	1,745	1,835	1,905
Polycoated containers & cups	1,645	817	817	838	7,330	7,350	8,278	8,759	9,382	10,257	10,955
Plastic Materials	20,392	17,490	17,490	18,053	39,244	39,120	40,674	40,146	41,876	44,321	46,287
PET bottles (BB)	1,394	1,394	1,394	1,501	1,630	1,630	1,724	1,630	1,737	1,965	2,113
HDPE bottles (BB)	15	15	15	15	17	16	17	17	18	20	21
PP bottles (BB)	5	2	2	2	15	15	17	15	16	19	20
Other deposit plastic bottles	-	-	-	-	-	-	-	-	-	-	-
Other PET bottles & jars	4,414	4,414	4,414	4,756	4,815	4,846	5,124	4,815	5,036	5,308	5,548
HDPE bottles & jars	4,646	4,646	4,646	4,693	4,754	4,728	4,999	4,754	4,947	5,168	5,374
PP bottles & jars	55	26	26	26	172	167	191	172	179	188	195
Other other bottles	-	-	-	-	-	-	-	-	-	-	-
PET tubs	37	16	16	40	191	191	203	201	209	227	239
HDPE tubs	1,118	599	599	605	1,348	1,329	1,396	1,348	1,405	1,528	1,610
PP tubs and small rigids	1,683	877	877	877	1,941	1,914	2,011	1,941	2,021	2,217	2,338
Other accepted tubs & pails	76	40	40	41	6	6	6	6	5	5	4
PP rigid products	1,144	693	693	693	4,028	4,028	4,027	4,028	4,225	4,485	4,699
Other bulky rigids	1,038	672	672	672	9,718	9,718	9,723	9,718	10,195	10,822	11,339
PET thermoforms	216	21	21	51	2,385	2,385	2,736	2,594	2,763	2,969	3,152
Other other rigid plastic containers	-	-	-	-	-	-	-	-	-	-	-
PP rigid packaging and products	867	390	390	390	3,842	3,790	3,974	3,842	4,070	4,361	4,609
Polystyrene foam	1	-	-	-	134	134	134	134	124	114	103
Solid polystyrene	0	-	-	7	542	517	686	675	716	769	813
PE film	3,684	3,684	3,684	3,684	3,707	3,707	3,707	4,257	4,208	4,158	4,109
Glass Materials	58,421	58,421	58,421	58,421	64,552	64,552	64,552	64,552	66,000	67,057	68,768
Deposit glass bottles	10,516	10,516	10,516	10,516	11,731	11,731	11,731	11,731	12,154	12,649	13,144
Container glass	47,905	47,905	47,905	47,905	52,821	52,821	52,821	52,821	53,846	54,408	55,625
Metal Materials	63,841	62,710	62,528	63,449	67,502	67,504	67,292	67,502	66,937	67,144	66,788
Deposit and accepted aluminum cans	499	499	499	531	570	570	578	570	600	657	695
Accepted other aluminum	941	834	834	838	957	957	967	957	970	984	996
Deposit and accepted steel cans	7,333	7,333	7,333	7,806	9,735	9,736	9,729	9,735	10,197	10,818	11,318
Accepted other steel	30,563	29,539	29,539	29,924	31,862	31,863	31,858	31,862	30,726	30,033	29,007
Scrap metals	24,505	24,505	24,323	24,350	24,378	24,378	24,160	24,378	24,445	24,652	24,770

This section presents tonnages for all in-scope recyclables that are assumed to reach their intended markets. Tonnages include materials at MRFs that are sorted into their intended bales as well as materials collected source-separated. Tonnages exclude bale contamination, such as PET bottles in corrugated cardboard bales.

Transactional Costs	Original						+ CRF (S3/B)	Dual-Stream (S4/C)	+ Statewide List (S7/A++)	+ Expanded Collection (S8/D-low)	+ Expanded Collection (S9/D-mid)	+ Expanded Collection (S10/D-hi)
	Baseline: Pre-Disruption List (S0)	Baseline: Post-Disruption List (S5)	+ Engagement (S6/A-)	+ Improved MRFs (S1/A)	+ Expanded Lists (S2/A+)							

This section presents the transactional costs and revenues from recycling in-scope materials. It includes direct costs, avoided disposal, and bale sales.

Alternative scenarios include MRF capital investments to allow for sorting more materials with a long accepted materials list and less sort-line labor.

Alternative scenarios also include costs for contamination reduction through customer engagement, refusal to collect contaminated load, inbound load monitoring at MRFs and outbound bale quality monitoring through artificial intelligence visioning before the balers.

Costs in the dual-stream scenario are largely driven by the increase in single-family customers receiving collection effectively weekly instead of less than weekly.

Commodity values in alternative MRF scenario are not increased due to cleaner bales to offset potential decreases due to using only responsible markets.

Total System Dollar Costs and Avoided Disposal	\$ 211,841,588	\$ 209,478,926	\$ 240,354,579	\$ 241,349,912	\$ 246,935,883	\$ 246,087,017	\$ 290,797,092	\$ 246,936,260	\$ 286,598,643	\$ 309,870,813	\$ 326,889,850
Per ton (excluding commodity revenues)	\$ 408	\$ 417	\$ 478	\$ 482	\$ 438	\$ 437	\$ 510	\$ 436	\$ 498	\$ 525	\$ 544
Customer Engagement Costs	\$ 6,086,162	\$ 6,086,162	\$ 37,010,805	\$ 37,010,805	\$ 37,010,805	\$ 37,010,805	\$ 37,010,805	\$ 37,010,805	\$ 40,947,838	\$ 44,026,615	\$ 45,780,407
Collection Engagement Labor and Expenses	\$ 1,210,256	\$ 1,210,256	\$ 32,134,898	\$ 32,134,898	\$ 32,134,898	\$ 32,134,898	\$ 32,134,898	\$ 32,134,898	\$ 36,071,932	\$ 39,150,709	\$ 40,904,501
Local Government Engagement Labor and Expenses	\$ 4,875,906	\$ 4,875,906	\$ 4,875,906	\$ 4,875,906	\$ 4,875,906	\$ 4,875,906	\$ 4,875,906	\$ 4,875,906	\$ 4,875,906	\$ 4,875,906	\$ 4,875,906
Multifamily Property Improvements	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 15,182,938	\$ 20,404,194	\$ 23,230,127
Service level adjustments (included above)									NA	NA	NA
Signage, labels, and container color (included above)									NA	NA	NA
Collection area adjustments									\$ 8,119,776	\$ 10,912,084	\$ 12,423,382
Bulky collection									\$ 7,063,161	\$ 9,492,110	\$ 10,806,745
Collection	\$ 194,187,467	\$ 193,650,202	\$ 195,526,195	\$ 195,526,195	\$ 198,550,950	\$ 198,550,950	\$ 244,322,761	\$ 198,827,851	\$ 217,279,604	\$ 230,103,012	\$ 239,357,673
Collection Capital - Containers	\$ 4,325,535	\$ 4,282,031	\$ 4,276,792	\$ 4,276,792	\$ 5,344,917	\$ 5,344,917	\$ 17,584,721	\$ 5,381,681	\$ 5,602,508	\$ 5,689,949	\$ 5,732,819
Collection Capital - Trucks	\$ 15,433,133	\$ 15,433,133	\$ 15,433,133	\$ 15,433,133	\$ 15,433,133	\$ 15,433,133	\$ 24,835,097	\$ 15,433,133	\$ 16,895,673	\$ 17,874,542	\$ 18,672,178
Collection Labor	\$ 80,367,130	\$ 79,971,591	\$ 81,872,569	\$ 81,872,569	\$ 83,575,682	\$ 83,575,682	\$ 94,090,923	\$ 83,781,987	\$ 90,590,545	\$ 95,455,276	\$ 98,878,278
Collection Operations	\$ 38,322,717	\$ 38,274,180	\$ 38,263,143	\$ 38,263,143	\$ 38,383,943	\$ 38,383,943	\$ 43,556,110	\$ 38,399,397	\$ 42,582,219	\$ 45,582,404	\$ 47,784,054
Collection Administrative	\$ 33,138,813	\$ 33,089,129	\$ 33,080,420	\$ 33,080,420	\$ 33,213,137	\$ 33,213,137	\$ 35,068,186	\$ 33,231,516	\$ 36,643,594	\$ 38,813,838	\$ 40,316,636
Collection Margin and Franchise Fee	\$ 22,600,137	\$ 22,600,137	\$ 22,600,137	\$ 22,600,137	\$ 22,600,137	\$ 22,600,137	\$ 29,187,724	\$ 22,600,137	\$ 24,965,065	\$ 26,687,004	\$ 27,973,708
Cost Savings from Reduced Garbage Disposal	\$ (59,010,438)	\$ (57,236,089)	\$ (55,795,682)	\$ (55,795,682)	\$ (62,046,835)	\$ (62,046,835)	\$ (62,046,835)	\$ (62,236,542)	\$ (63,105,935)	\$ (64,870,144)	\$ (66,149,454)
Initial Transfer Transport	\$ 11,309,039	\$ 10,817,762	\$ 10,697,689	\$ 10,697,689	\$ 12,457,582	\$ 12,457,582	\$ 12,457,582	\$ 12,627,152	\$ 13,508,394	\$ 14,304,459	\$ 15,067,059
Sortation	\$ 59,269,359	\$ 56,160,889	\$ 52,915,572	\$ 53,910,906	\$ 60,963,382	\$ 60,114,515	\$ 59,052,779	\$ 60,706,994	\$ 62,785,804	\$ 65,902,676	\$ 69,604,038
Sortation Labor	\$ 31,319,707	\$ 29,559,820	\$ 28,468,392	\$ 24,497,527	\$ 27,148,917	\$ 26,573,862	\$ 26,427,335	\$ 27,303,312	\$ 28,506,405	\$ 30,272,420	\$ 32,369,383
Sortation Capital	\$ 1,947,466	\$ 1,947,466	\$ 1,947,466	\$ 5,519,062	\$ 5,888,844	\$ 5,412,536	\$ 5,620,928	\$ 5,888,844	\$ 5,888,844	\$ 5,888,844	\$ 6,332,560
Sortation Facility	\$ 8,728,792	\$ 8,217,125	\$ 7,869,139	\$ 7,869,139	\$ 9,497,567	\$ 9,458,195	\$ 9,558,958	\$ 9,535,277	\$ 9,868,473	\$ 10,340,646	\$ 10,705,820
Glass and Container Transfer	\$ 442,772	\$ 442,772	\$ 442,772	\$ 442,772	\$ 959,574	\$ 1,708,248	\$ 480,721	\$ 480,721	\$ 483,480	\$ 481,023	\$ 483,773
Sortation Residual Disposal	\$ 6,608,583	\$ 6,001,925	\$ 4,436,416	\$ 5,757,290	\$ 7,159,240	\$ 6,770,771	\$ 6,761,653	\$ 7,173,120	\$ 7,559,102	\$ 8,209,182	\$ 8,727,969
Sortation Administrative & Marketing	\$ 5,864,513	\$ 5,864,513	\$ 5,864,513	\$ 5,864,513	\$ 5,864,513	\$ 5,864,513	\$ 5,864,513	\$ 5,864,513	\$ 5,864,513	\$ 5,864,513	\$ 5,864,513
Sortation Margin	\$ 4,357,525	\$ 4,127,268	\$ 3,886,874	\$ 3,960,603	\$ 4,444,727	\$ 4,326,390	\$ 4,338,671	\$ 4,461,205	\$ 4,614,987	\$ 4,846,048	\$ 5,120,020

Sensitivity Analysis of Total System Dollar Costs and Avoided Disposal

Lower Range	\$ 172,928,406	\$ 171,467,727	\$ 199,868,427	\$ 200,664,694	\$ 203,736,590	\$ 203,057,496	\$ 243,402,738	\$ 203,724,626	\$ 228,360,493	\$ 244,968,683	\$ 257,672,273
-10% Customer Engagement Costs	\$ 5,477,545	\$ 5,477,545	\$ 33,309,724	\$ 33,309,724	\$ 33,309,724	\$ 33,309,724	\$ 33,309,724	\$ 33,309,724	\$ 36,853,054	\$ 39,623,954	\$ 41,202,367
-10% Collection	\$ 174,768,720	\$ 174,285,182	\$ 175,973,575	\$ 175,973,575	\$ 178,695,855	\$ 178,695,855	\$ 219,890,485	\$ 178,945,066	\$ 195,551,644	\$ 207,092,711	\$ 215,421,906
Custom Multifamily Property Improvements									\$ 2,986,125	\$ 4,013,023	\$ 4,568,817
+10% Cost Savings from Reduced Garbage Disposal	\$ (64,911,482)	\$ (62,959,698)	\$ (61,375,250)	\$ (61,375,250)	\$ (68,251,519)	\$ (68,251,519)	\$ (68,251,519)	\$ (68,460,196)	\$ (69,416,528)	\$ (71,357,159)	\$ (72,764,399)
-10% Initial Transfer Transport	\$ 10,178,135	\$ 9,735,986	\$ 9,627,920	\$ 9,627,920	\$ 11,211,824	\$ 11,211,824	\$ 11,211,824	\$ 11,364,436	\$ 12,157,555	\$ 12,874,013	\$ 13,560,353
-20% Sortation	\$ 47,415,487	\$ 44,928,711	\$ 42,332,458	\$ 43,128,725	\$ 48,770,705	\$ 48,091,612	\$ 47,242,224	\$ 48,565,595	\$ 50,228,643	\$ 52,722,141	\$ 55,683,230
Upper Range	\$ 250,754,770	\$ 247,490,125	\$ 280,840,730	\$ 282,035,131	\$ 290,135,177	\$ 289,116,537	\$ 338,191,446	\$ 290,147,893	\$ 344,836,794	\$ 374,772,943	\$ 396,107,427
+10% Customer Engagement Costs	\$ 6,694,778	\$ 6,694,778	\$ 40,711,885	\$ 40,711,885	\$ 40,711,885	\$ 40,711,885	\$ 40,711,885	\$ 40,711,885	\$ 45,042,622	\$ 48,429,277	\$ 50,358,448
+10% Collection	\$ 213,606,213	\$ 213,015,222	\$ 215,078,814	\$ 215,078,814	\$ 218,406,045	\$ 218,406,045	\$ 268,755,037	\$ 218,710,636	\$ 239,007,565	\$ 253,113,314	\$ 263,293,441
Custom Multifamily Property Improvements									\$ 27,379,750	\$ 36,795,366	\$ 41,891,437
-10% Cost Savings from Reduced Garbage Disposal	\$ (53,109,394)	\$ (51,512,480)	\$ (50,216,114)	\$ (50,216,114)	\$ (55,842,152)	\$ (55,842,152)	\$ (55,842,152)	\$ (56,012,887)	\$ (56,795,341)	\$ (58,383,130)	\$ (59,534,508)
+10% Initial Transfer Transport	\$ 12,439,943	\$ 11,899,538	\$ 11,767,458	\$ 11,767,458	\$ 13,703,340	\$ 13,703,340	\$ 13,703,340	\$ 13,889,867	\$ 14,859,234	\$ 15,734,905	\$ 16,573,765
+20% Sortation	\$ 71,123,230	\$ 67,393,067	\$ 63,498,686	\$ 64,693,087	\$ 73,156,058	\$ 72,137,418	\$ 70,863,335	\$ 72,848,392	\$ 75,342,965	\$ 79,083,211	\$ 83,524,845

Figures in this report represent the consultant team's best modeling estimates based on available data.

Commodity Revenues																						
Commodity Revenues																						
Commodity Sales (lower range)	\$	12,857,143	\$	12,796,829	\$	12,675,599	\$	15,254,983	\$	17,125,528	\$	15,102,256	\$	17,182,266	\$	18,674,922	\$	18,883,016	\$	19,363,034	\$	19,634,918
Commodity Sales (mid-point)	\$	44,750,522	\$	43,606,647	\$	43,237,519	\$	42,205,947	\$	48,638,696	\$	44,895,087	\$	48,178,417	\$	52,138,426	\$	52,914,587	\$	54,324,462	\$	55,245,177
Commodity Sales (upper range)	\$	76,643,901	\$	74,416,464	\$	73,799,438	\$	69,156,911	\$	80,151,864	\$	74,687,918	\$	79,174,568	\$	85,601,929	\$	86,946,158	\$	89,285,890	\$	90,855,437
Total System Cost net of Revenues (mid-point)	\$	167,091,066	\$	165,872,279	\$	197,117,060	\$	199,143,966	\$	198,297,188	\$	201,191,930	\$	242,618,675	\$	194,797,834	\$	233,684,056	\$	255,546,351	\$	271,644,673
Per ton	\$	322	\$	330	\$	392	\$	398	\$	352	\$	357	\$	426	\$	344	\$	406	\$	433	\$	452

Employment	Original	Baseline: Post-	+ Engagement	+ Improved MRFs	+ Expanded Lists	+ CRF (S3/B)	Dual-Stream	+ Statewide List	+ Expanded	+ Expanded	+ Expanded
	Baseline: Pre-Disruption List (S0)	Disruption List (S5)	(S6/A-)	(S1/A)	(S2/A+)		(S4/C)	(S7/A++)	Collection (S8/D-low)	Collection (S9/D-mid)	Collection (S10/D-hi)
Full-Time Equivalent (FTE) Employees	1,362	1,324	1,602	1,541	1,630	1,620	1,736	1,638	1,715	1,785	1,839
Recycling Customer Engagement	61	61	358	358	366	366	366	367	394	415	425
Local Government Engagement	61	61	61	61	61	61	61	61	61	61	61
New Engagement (costs listed in collection)	-	-	297	297	305	305	305	306	333	354	364
Recycling Collection	762	750	749	749	788	788	905	793	823	845	856
Route Drivers and Operations	430	430	430	430	430	430	527	430	468	500	522
Depot Operations	242	231	229	229	268	268	268	273	260	245	230
Management and Administrative	90	90	90	90	90	90	110	90	96	100	103
Sortation	540	512	495	434	476	467	465	478	497	525	558
Sorting Labor	406	382	366	302	333	326	317	335	352	376	404
Equipment Operators, Supervisors, Maintenance	89	85	84	87	98	96	103	98	101	104	109
Administrative and Marketing	45	45	45	45	45	45	45	45	45	45	45

Other Qualitative Criteria**Worker Safety**

Worker safety will improve because wrap-resistant screens will require less frequent cleaning and removal of tangles, which is a dangerous task. Optical sorters and robots will replace some manual sorters, reducing the prevalence of repetitive motion injuries and needle sticks. Fewer manual sorters will also reduce the potential for the spread of infectious diseases among the workers.

Equity Considerations

Alternative scenarios A-C do not address equity beyond standardizing materials collected in geographic groupings and increasing worker safety. Alternative scenario D expands access to on-route recycling to Grouping 4 and expands effective access to more multifamily customers in Groupings 1-3. For single-family customers with recycling collected less than weekly, the substantial increase in collection costs in Scenario C (dual-stream) may affect affordability of waste collection or worsen other affordability issues, which has equity implications.

Resiliency/Adaptability**Multiple Scenarios**

Investments in fiber cleanup in all of the MRFs in all of the scenarios provided greatly improved bale quality and thus provide more market resiliency. Fiber-line optical sorters can also change the grades being produced to either make sorted residential paper and news, mixed paper, or sorted office paper when running commercial fiber in response to market pricing and demand shifts. Scenarios A+, B, and C also provide advanced sorting of containers that meets end-market specifications and avoids producing mixed plastic bales.

+ Improved MRFs (S1/A)

See above.

+ Expanded Lists (S2/A+), + Statewide List (S7/A++), + Expanded Collection (S8/D-low), + Expanded Collection (S9/D-mid), + Expanded Collection (S10/D-hi)

These scenarios include high-technology container sorting at one MRF in Portland, in lieu of making investments in all Oregon MRFs.

If this MRF could not receive and sort loose containers for a period of time, contingency measures would be needed, which could include:

- (1) Baling and storing the mixed containers at the source MRFs until container sorting line is returned to operation.
- (2) Placing temporary manual sorters at the source MRFs to manually sort the material as is the case today.
- (3) Baling and sending the mixed containers to container-sorting facilities in British Columbia or California.

Scenario D (high) includes two MRFs with high-technology container sorting lines.

+ CRF (S3/B)

Scenario B (out-of-state CRF) has similar adaptability options as Scenario A+.

The existing in-state MRFs can resume sorting containers manually if there is a disruption to an out-of-state plastics recycling facility.

Dual-Stream (S4/C)

Scenario C sends all collected containers to a container-sorting facility. If there were a disruption to that facility, the container stream could be blended into the residential fiber on the tip floors of the MRFs and sorted temporarily as single-stream recyclables.

Stranded Assets

To prevent stranded assets, capital investment inputs assume that capital equipment with remaining lifespans will continue to be used. Capital equipment includes assumptions regarding current equipment and planned upgrades that have been publicly announced. Capital investments largely replace sort-line labor or allow MRFs to sort addition materials or commodities.

Social and Environmental Outcomes

Social and environmental outcomes will be presented separately by DEQ.