

## Improving Oregon Recycling Systems Infrastructure Research

# Phase 2 Research Plan: Collection and Processing Alternatives (Tasks 1 and 2)

October 23, 2019

## Phase 2 Task 1 Collection Alternatives

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### Task Overview

The goal of this task is to provide DEQ and Partners with information on several alternative collection methods that will help them decide whether to include in scenario analysis or not.

Contractor will develop two to three case studies for each collection alternative, of jurisdictions that use agreed-on collection methods, for a total of four to six (4-6). Contractor will also develop a 1- to 2-page high-level memorandum summarizing the benefits, drawbacks, and other relevant considerations of the collection methods included in case studies. The memorandum will include recommendations on which collection methods to include in scenario analysis. Other collection methods that may be included in scenarios (later), but are more well-known and are not studied here, are single-stream collection such as that conducted in Oregon with commingled containers and fibers in one containers and glass on the side (for residential and commercial), collection of both commingled and separated materials from nonresidential waste generators in both dumpsters and/or carts, and staffed and unstaffed drop-off depots for a range of materials.

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### Collection System Alternatives for Research in this Task

1. Cart-based single-family residential: split-cart dual-stream (fibers collected separately from containers) with glass on the side in a smaller container.
2. Cart-based single-family residential: two-cart dual-stream (fibers collected separately from containers) with carts collected in alternating weeks, with glass on the side in a smaller container.

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### Key Collection System Characteristics

To the extent data are available, research will seek to obtain information on:

- Capital and operating costs

- Equipment needs/types of equipment used
- Accepted materials (highlighting targeted materials from Phase 1)
- Contamination issues or changes relative to their earlier collection systems and/or Oregon’s present system
- Customer participation, such as:
  - Set-out or participation rates
  - Recovery amounts (tonnages, recycling rates, capture rates)
  - Contamination rates (in-bound) and factors (such as placing material in the wrong container, setting out the wrong container for that week, setting out non-program material, or material mixing during collection)
- Consumer acceptance, where data are available, such as through opinion surveys
- Type of MRF(s) receiving collected materials
- Level of customer education and compliance activities (e.g., basic mailers/marketing, cart tagging, refusal to collect contaminated materials).
- Fee and service structure (e.g., PAYT, embedded recycling and/or composting service, automatic/universal recycling service)
- Relevant recycling regulations (e.g., bottle bill, mandatory recycling or disposal bans)
- Ability to spot contamination or conduct audits

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## Collection Research Methodology

Research methods will include:

- Review of published reports, public data, and available private data for relevant collection operations in the U.S. (preferred) and/or Canada or Europe (if needed)
- Interviews with local programs (jurisdictions, collectors and MRFs)

## Phase 2 Task 2 Processing Alternatives

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### Task Overview

The goal of this task is to provide DEQ and Partners with information on alternative processing systems that will help them decide which processing methods to include in scenario analysis.

Contractor will develop one to two case studies per type of processing system, of facilities outside of Oregon that use agreed-on processing methods, for a total of six to ten (6-10). Contractor will also develop a 2- to 3-page high-level memorandum summarizing the benefits, drawbacks, and other

relevant considerations of the processing systems included in case studies. The memorandum will include recommendations on which processing systems to include in scenario analysis.

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## Processing System Alternatives

Processing for single-stream collection:

1. Secondary MRF taking unwanted materials from single-stream MRFs (glass may or may not be in the mix) including mixed materials, low-value materials, residuals, unders or a combination of these materials:

Specialized secondary MRF (optical sorters, robotics, and other specialized equipment) to process residuals coming out of well-established single-stream MRFs (potentially with minor improvements to avoid mixing picked contamination back into the materials needing further sorting)

2. Secondary container recovery facility taking unsorted containers from single-stream MRFs (glass may or may not be in the mix):

Container Recovery Facility (optical sorters, robotics, magnets, eddy current separators, and other specialized equipment) to sort mixed containers coming out of well-established single-stream MRFs (potentially with minor improvements and a focus on sorting fiber from mixed containers)

3. Modern MRFs for single-stream (glass may or may not be in the mix):

Fully modernized single-stream MRF (optical sorters, robotics, ballistic separators, non-wrapping screens, equipment for small cardboard, magnets, eddy current separators, glass screens) designed to maximize quality and through-put while reducing labor costs.

4. Commercial dry mixed-waste MRF sorting for recyclables that are either marketed directly or sent for further processing of mixed recyclables at a fully modernized single-stream MRF that may be collocated at the same site or at another facility:

Commercial dry mixed-waste facility separating recyclable items from other mixed waste coming from selectively-routed commercial dry mixed waste.

Fully modernized single-stream MRF (optical sorters, robotics, ballistic separators, non-wrapping screens, equipment for small cardboard) designed to maximize quality and through-put while reducing labor costs that may take separated recyclable materials from a mixed-waste MRF and mix it with source-separate materials or run separately for further processing.

Processing for dual-stream collection:

5. Dual-Stream MRF(s) (glass with containers)
  - Fiber-only MRF or processing line (relatively simple with OCC screens and paper sorting/QC but no optical sorters)
  - Container-only MRF or processing line with glass cleaning (optical sorters, robotics, magnets, eddy current separators, glass screens, and other specialized equipment)

## Key Processing System Characteristics

To the extent processors are willing to share data, research will seek to obtain information on:

- Capital and operating costs
- Equipment needs
- Maintenance needs
- Accepted generator streams (single-family residential, multifamily/commercial)
- Accepted materials
- Throughput
- Ability to remove non-program materials and properly sort program materials
- Outbound commodities produced including quality of materials, markets accessed or loads rejected
- Relevant recycling regulations (e.g., bottle bill, mandatory recycling or disposal bans)

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## Research Methodology

Data collection methods will include:

- Interviews with subcommittee members representing Oregon MRFs to confirm the configuration of existing Oregon MRFs.
- Interviews with trade associations for aggregated or higher-level information (e.g. ISRI, The Recycling Partnership, state industry associations, etc.)
- Interviews with operators of existing sorting and processing facilities using selected technologies and processes regarding in-field experience with equipment capabilities, capacities, capital costs, and operating costs.
- Interviews with equipment manufacturers regarding performance in operating MRF customers and regarding equipment capabilities, capacities, capital costs, and operating costs where data from operating MRFs is not available.

Proprietary information will be protected by the Contractor and will only be shared with DEQ and Partners in aggregated form and anonymized where requested by providing MRFs.

We will prioritize seeking actual cost and performance data from operational facilities (not manufacturers), focusing on those that have been upgraded or built within the last 5 years. Priorities for case study data quality are:

1. Operational named MRFs
2. Operational anonymous MRFs
3. Operational composite MRFs or consultant modeling based on experience and manufacturer information