Compostable Products Management in Washington State

Report to the Legislature

By

Cascadia Consulting Group

For the
Solid Waste Management Program

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Executive Summary

Background

To support Washington's food and organic waste reduction goals and the production of marketable compost across the state, the legislature directed the Department of Ecology (Ecology) to "contract with an independent, third-party facilitator to convene a stakeholder advisory committee. The advisory committee shall make recommendations to …the legislature on the development of standards for the management of compostable products, especially food service products, by composting and other organic materials management facilities" (RCW 70A.205.720).

Cascadia Consulting Group provided the third-party facilitation and held ten committee meetings from October 2023 – July 2024 to share research and draft recommendations. Cascadia conducted qualitative research on the topics listed in RCW 70A.205.720(2) through a literature review, commercial compost facility interviews, written information requests from the committee members, and other desktop research and interviews.

The following summarizes the key research findings, the most significant compostable product management challenges (as identified by the advisory committee), and suggested next steps. Further detail about each of these topics are discussed throughout the report.

Key research findings

Key findings from the research process are:

- Consumer confusion about compostable products leads to incorrect disposal decisions (i.e., putting items in the wrong bin) and causes contamination at compost and recycling facilities.
- Compostable products are a small portion (0.4% by weight) of what is currently sent to commercial compost facilities in Washington, but the associated contamination disproportionally increases costs of processing materials.
- There is an opportunity to send more food waste to compost facilities instead of the landfill, but data about how well compostable products increase food waste diversion is limited.
- Organic materials management facilities in Washington vary in their processing methods, times, and conditions, as well as their capacity and ability to accept food waste and compostable products.
- Laws and polices related to compostable products and managing organic waste are relatively new and their impact not yet known.

Challenges for compostable products management in Washington:

Using available research and drawing on their expertise, committee members identified six key challenges for managing compostable products in Washington. Their recommendations are designed to address these challenges:

Challenge 1: Consumer confusion about compostable products leads to increased contamination at organic materials management facilities. Unclear labeling (terms, colors, lookalikes, etc.) and different collection processes across jurisdictions contribute to consumer confusion.

Challenge 2: Existing facilities may not have capacity and/or a willingness to accept compostable products and/or food waste. In some cases, facility operations do not match the processing times of compostable products. Moreover, it is also difficult to site new facilities.

Challenge 3: It is not clear how effectively compostable products divert food waste from landfills to organics management facilities.

Challenge 4: Enforcement for existing compostable product labeling requirements is unknown. There are questions about funding, roles and accountability. It is not clear how much energy and resources to invest in this effort based on the total volume of compostable products in use.

Challenge 5: Compostable products do not break down the same at all facilities. Standards for certifying compostable products are not inclusive of all processing types and facility conditions.

Challenge 6: Accepting compostable products and food waste changes the compost's marketability. Compost that includes compostable products cannot be certified organic or listed as an input for organic farming. Accepting these materials can introduce more contamination into finished compost.

Summary of Recommendations

Committee members voted on a final set of recommendations. Actions with 80% or more supportive votes are included in this report. Recommendations are divided into themes with specific actions listed below each theme. Detailed recommendations are available in the Recommendations section.

1. **Address consumer confusion around compostable products**

    1.1. Track effectiveness of new, current labeling standards

    1.2. Conduct statewide education and outreach related to compostable products

    1.3. Support consistent enforcement at bin/cart collection to reduce contamination at organic management facilities

1.4. Explore an additional ban on certain products or labeling attributes

2. Increase facility capacity to accept compostable products and food waste

2.1. Increase statewide facility capacity to accept compostable products

2.2. Increase statewide facility capacity to accept food waste

3. Increase understanding of how compostable products impact food diversion rates

3.1. Further research compostable products' impacts on food waste diversion and overall environmental benefit

4. Clarify enforcement of compostable products labeling

4.1. Provide funding, technical assistance, and tools to jurisdiction for enforcement

4.2. Continue to research best management practices for compostable products

5. Better align accepted compostable products with facility conditions and processing types

5.1. Develop metrics and support research around compostable product breakdown at facilities

6. Support marketability of compost that has food waste and compostable products as feedstocks

6.1. Understand end markets

Background

The Washington State Legislature has declared food waste "a misuse of resources, including the water, land, energy, labor, and capital that go into growing, harvesting, processing, transporting, and retailing food for human consumption" (RCW 70A.205.715). Less food and organic waste in landfills will help people and the planet by reducing methane gas generation. Since 2019, Washington has pursued goals related to organic waste management:

- Reduce food waste by 50% by 2030 compared to 2015 levels (RCW 70A.205.715), and
- Reduce organic material reaching landfill by 75% by 2030, compared to 2015 levels (RCW 70A.205.007).

To support these goals and the production of marketable compost across the state, the legislature directed the Department of Ecology (Ecology) to "contract with an independent, third-party facilitator to convene a stakeholder advisory committee. The advisory committee shall make recommendations to the appropriate committees of the legislature on the development of standards for the management of compostable products, especially food service products, by composting and other organic materials management facilities" (RCW 70A.205.720).

The committee's discussions were framed by "the state's goals of managing organic materials, including food waste, in an environmentally sustainable way that increases food waste diversion and ensures that finished compost is clean and marketable" (RCW 70A.205.720). The legislation also had a list of required research topics for the facilitator to research and discuss with the committee.

Cascadia Consulting Group ("Cascadia") provided third-party facilitation and held ten committee meetings from October 2023-July 2024 to share research and draft recommendations. Cascadia did qualitative research on the topics listed in RCW 70A.205.720(2) through a literature review, commercial compost facility interviews, written information requests from the committee members, and other desktop research and interviews. See Table 1 for research topics and methods.

Committee Process

Facilitation

Ecology invited committee members to participate in a facilitated process with Cascadia. For each meeting, Cascadia presented research results and gave opportunities for members to add their input and expertise. Goals for each meeting are below:

Meetings 1-2: Define the committee's structure, process, and vision for compostable products management; confirm a research plan.

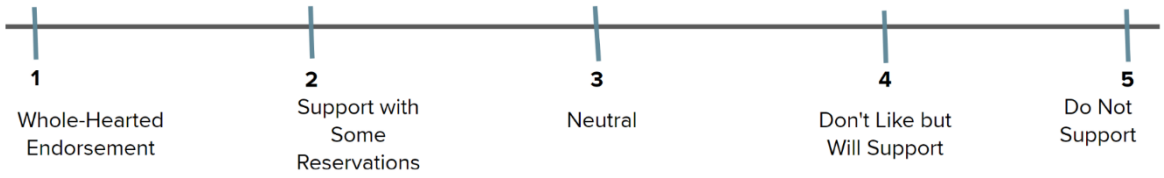
Meetings 3-6: Discuss and interpret available research to understand the key challenges of managing compostable products to address with recommendations.

Meetings 7-8: Discuss and interpret final research outcomes; identify potential solutions and implementation considerations.

Meetings 9-10: Refine and finalize recommendations.

The committee made recommendations using consensus-based decision making. Members voted in two rounds on the set of recommendations – first, a draft set, then a final set of recommendations. Members used the scale in Figure 1 to vote. A vote of 1 (whole-hearted endorsement) through 4 (don't like but will support) was considered a supportive vote. Recommendations with 80% or more supportive votes are included in this report, with any diverging opinions noted. Recommendations that did not receive at least 80% supporting votes are included in **Appendix G. Additional Strategies Considered by the Committee**.

Figure 1. Decision scale used for committee votes



Research

Cascadia and their subcontractors studied the relevant information about compostable products. The goal was to identify strengths, weaknesses, opportunities, barriers, and information gaps in the existing system of managing compostable products. In November 2023, the group reviewed the research plan, identified additional research topics, and approved research topics and methods. The final list of research topics included those in legislation (RCW 70A.205.720) and other topics raised by committee members.

Cascadia used a combination of research methods including a literature review, commercial compost facility interviews, written information requests from committee members, and other desktop research and interviews. For each research topic, Cascadia identified the method(s) that would provide the best information within the available timeframe and resources. For example, for research topic "Estimates of the percentage of compostable products used in Washington that are disposed of at organics materials management facilities" in Table 1, the 2021 statewide organics characterization study provided the most accurate data. Other topics required a broader scan of research and/or input from involved stakeholders. Table 1 lists research topics and method(s) used to address each one. Additional detail about the research process is available in **Appendix B. Summary of Research Process & Findings**.

Table 1. Research Topics and Methods

Research Topic	Literature Review	Information Requests	Desktop Research & Interviews	Compost Facility Interviews	ASTM Staff Presentation
The types of compostable products, and amounts if known, sold or distributed in Washington	✓	✓	✓		
Consumer confusion caused by noncompostable products that can lead to contamination issues	✓	✓		✓	
Compostable standards related to the breakdown of products in facilities and home composting		✓	✓	✓	✓
The status of acceptance of compostable products by organic materials management facilities in Washington, including consideration of organic certifications		✓	✓	✓	
Estimates of the percentage of compostable products used in Washington that are disposed of at organic materials management facilities	✓				
Financial incentives for organic materials management facilities accepting compostable products		✓	✓	✓	
Current laws related to compostable products and the enforcement of these laws	✓	✓	✓		
Any work product from other contemporaneous stakeholder advisory committees currently discussing similar topics in other jurisdictions or nationwide	✓	✓	✓		
Policy options addressing contamination of organic waste streams and increasing use of reusable and refillable items	✓	✓	✓		
Additional topics recommended by the Committee:					
GHG emissions related to composting compostable products	✓		✓		
Toxic chemical contamination (PFAS)					

Findings & Recommendations

Key research findings

Cascadia summarized the key findings from the research process. These five key findings are described below.

1. **Consumer confusion about compostable products leads to incorrect disposal decisions (i.e., putting items in the wrong bin) and causes contamination at organic materials and recycling facilities**. Consumer confusion is caused by unclear labeling, lookalike products, inconsistent bin colors and labels, and variations in what is accepted for composting in cities and counties across the state.

2. **Compostable products are a small portion (0.4% by weight) of the materials sent to composting facilities in Washington, but the associated contamination disproportionally increases costs of processing materials**, according to commercial compost facility interviewees. Interviewees whose facilities accept compostable products said that they see more contamination from non-compostable products, particularly lookalike products. Interviewees whose facilities do not accept compostable products were concerned about the potential for more contamination when considering compostable products.

3. **Compostable products are an opportunity to send more food waste to compost facilities instead of the landfill, but data about how well they increase food waste diversion is limited.** Ecology's 2020-2021 statewide waste characterization study showed food waste was almost 20% of residential garbage. Several studies completed at sports and food service venues in the U.S. show compostable food service products can increase food waste diversion in these commercial settings. Some committee members said they had access to municipal-level data to support the relationship between compostable products and food waste diversion, but the information was not shared with Cascadia nor made public.

4. **Organic materials management facilities in Washington vary in their processing methods, times, and conditions, as well as their ability to accept food waste and compostable products.** Not all facilities in Washington have conditions that support the full breakdown of

compostable products, including products certified to meet ASTM standards D6400 and/or D6868. Adding compostable products as a feedstock can lengthen processing times and impact operational efficiency. Several facilities that do not currently accept food waste and/or compostable products were concerned that accepting these materials would require changes in their operations (e.g., equipment upgrades, additional screening equipment, more staff, and/or more space). Most facilities interviewed that accept compostable products are in western Washington.

5. **Organics management laws and polices related to compostable products are relatively new, including in Washington, and their impact is not yet known**. Active policies outside of Washington include labeling laws, extended producer responsibility (EPR), needs assessments, contamination fees and load rejections, technical assistance and incentive programs, and reuse programs. Several local government interviewees outside of Washington said they are starting to encourage reusable items over compostable products.

More details are available in **Appendix B. Summary of Research Process & Findings**. Research memos with full results are in:

- **Appendix C. Compostable Products Management Literature Review,**
- **Appendix D. Organic Materials Management Facility Interviews Summary,**
- **Appendix E. Types of Compostable Products Produced and Disposed In Washington, Based On 2024 Product Registry and 2022-2023 Statewide Organics Characterization Study, and**
- **Appendix F. Compostable Products Management Policy Research Summary**

Challenges for compostable products management in Washington

The committee drew from the research results and members' expertise to identify six key challenges for managing compostable products in Washington. Their recommendations are designed to address these challenges:

Challenge 1: Consumer confusion about compostable products leads to increased contamination at organic materials management facilities. Unclear labeling (terms, colors, lookalikes, etc.) and different collection processes across jurisdictions contribute to consumer confusion.

Challenge 2: Existing facilities may not have capacity and/or a willingness to accept compostable products and/or food waste. In some cases, facility operations do not match the processing times of compostable products. Moreover, it is also difficult to site new facilities.

Challenge 3: It is not clear how effectively compostable products divert food waste from landfills to organics management facilities.

Challenge 4: Enforcement for existing compostable product labeling requirements is unknown. There are questions about funding, roles and accountability. It is not clear how much energy and resources to invest in this effort based on the total volume of compostable products in use.

Challenge 5: Compostable products do not break down the same at all facilities. Standards for certifying compostable products are not inclusive of all processing types and facility conditions.

Challenge 6: Accepting compostable products and food waste changes the compost's marketability. Compost cannot be certified organic, listed as an input for organic farming, and accepting these materials can introduce more contamination into finished compost.

Recommendations

The committee developed 11 recommendations across six themes. All 11 recommendations were supported by 80% of the committee, and most recommendations received 90% or more support. For each recommendation, committee members discussed implementation and diverging points of view. These are included along with comments from members who did not support a recommendation. The recommendations are also flagged with attributes that describe critical elements of each theme.

Attribute descriptions

Full Committee Support: All committee members who voted were in support of the recommendation.

Foundational Recommendation: Committee members indicated that the recommendation is essential to the success of one or more other recommendations.

1. Address consumer confusion around compostable products

1.1 Track effectiveness of new, current labeling standards

Attribute(s): Full Committee Support, Foundational Recommendation

Recommendations

1.1.1 Create a status report in 5 years that evaluates the effectiveness of the current labeling standards within the Plastic Product Degradability Law (chapter 70A.455 RCW).

Implementation Considerations

- "Effectiveness" requires a clear definition.

Diverging Points of View

- None

1.2 Conduct statewide education and outreach related to compostable products

Attribute(s): Foundational Recommendation

Recommendations

1.2.1 Fund, research, design and develop regional campaigns teaching the public how to identify compostable products. Regional campaigns will account for variations in facility processing capacity.

1.2.2 Create messaging and a toolkit customized for different messengers (such as local governments or businesses) and audiences (such as residents or staff). The toolkit should be visual and leverage graphics.

Implementation Considerations

- It is important to ensure campaigns are specific to regional requirements, while recognizing that regional differences in requirements can be confusing to consumers.
- This recommendation must be adequately funded.
- There must be realistic expectations about the level of behavior change an education campaign will create.
- There is a role for state-led messaging and guidance to precede regional campaigns.
- More specificity is needed on this recommendation.

Diverging Points of View

- Regional campaigns are too broad to reflect local differences in materials that compost facilities accept.

1.3 Support consistent enforcement at bin/cart collection to reduce compost stream contamination

Attribute(s): Full Committee Support

Recommendations

1.3.1 Create a system for residents to report consistent contamination at multifamily residences and businesses. Incorporate feedback from haulers and compost facilities.

1.3.2 Establish communication tools for generators to use, such as "oops" tags, compliance obligation letters, and other messaging that disincentivizes contamination.

1.3.3 Fund and require periodic audits of high-volume waste generators to assess contamination of their organics streams and require compliance with local policies and guidelines.

1.3.4 Establish best management practices for load rejection at pickup from the generator, such as contamination fines, fees for rejected loads, and landfill disposal charges.

Implementation Considerations

- Need to clarify who is responsible for enforcement.
- This recommendation must be adequately funded.
- Complaints recorded about generators' contamination at the bin must go to local haulers.
- "High-volume waste generator" must be defined.
- Best management practices for load rejection must be rigorously evaluated, with thresholds for rejection. There are limits to visual assessment of contamination, Additionally, facilities express consistency concerns specific to the handling of contaminated loads. They fear the potential for lost business when rejecting a load.
- There have been instances where systems for residents to report contamination have caused conflicts among those reported and those reporting; there is a need to understand and manage this potential outcome.

Diverging Points of View

- None

1.4 Explore an additional ban on certain products or labeling attributes

Attribute(s): None

Recommendations

1.4.1 Track the effectiveness of the current ban for green, beige, or brown color schemes for non-compostable film bags (70A.455.070). In 5 years, create a status report to evaluate effectiveness and consider applying the same standards to other product types.

Implementation Considerations

- There is a need for more information about what lookalikes cause issues and how they are affecting compost facilities.
- The discussion about whether to consider a ban could occur sooner than in 5 years.

Diverging Points of View

- Effectiveness of the current law should be tracked and evaluated without a solution already in mind.

2. Increase facility capacity to accept compostable products and food waste

2.1 Increase statewide facility capacity to accept compostable products

Attribute(s): Full Committee Support

Recommendations

2.1.1 Offer grants, rebates, and/or other financial incentives to reimburse organic materials management facilities for overs testing, screening equipment, and facility upgrades.

2.1.2 Offer education and resources for compost facilities to invest in upgrades and/or equipment.

Implementation Considerations

- We need more information to create the right grants and incentives – for example, we need to understand end markets, and the facility costs for accepting compostable products and food waste.
- It is important to understand the potential of compostable products to divert food waste before building facility capacity to accept them.
- Facilities should maintain their authority over their accepted feedstocks.
- Facilities should not be able to advertise that they accept compostable products if they screen them out and dispose them; de-packaging equipment should not be included in any grant, rebate, or incentive programs.
- Too narrow of a scope for eligibility (types of facilities or accepted business practices) could increase costs of goods and to consumers.

Diverging Points of View

- None.

2.2 Increase statewide facility capacity to accept food waste

Attribute(s): None

Recommendations

2.2.1 Review regulatory and permitting requirements to identify barriers and opportunities to provide organic materials management facilities more flexibility to accept and process food waste and compostable products.

2.2.2 Support jurisdictions to develop RFIs/RFPs to attract an organics entrepreneur/hauler to expand organics capacity.

Implementation Considerations

- Air quality regulations should be included in the review of requirements.
- This recommendation requires more specificity.

Diverging Points of View

- This recommendation is outside the scope of this group, since it's not directly related to compostable products.

3. Increase understanding of how compostable products impact food diversion rates

3.1 Further research compostable products' impacts on food waste diversion and overall environmental benefit

Attributes: Full Committee Support, Foundational Recommendation

Recommendations

3.1.1 Support research into the environmental benefits of compostable products, the costs of their production, and concerns about their collection/processing such as contamination in the recycling system.

3.1.2 Conduct research on which types and use cases of compostable products are most effective at diverting food waste (e.g., cups vs. straws vs berry clamshells) and whether compostable products are more effective in certain scenarios (residential or commercial).

Implementation Considerations

- There was no consensus on whether further research into environmental benefits of compostable products should include a life cycle analysis, as the methodology is not standard and results are highly dependent on model assumptions.
- This recommendation is essential to support the broader recommendations.
- Research is also needed around environmental benefits and impacts of reusable products as an alternative to compostable products, particularly concerning greenhouse gas emissions reduction impacts.
- Washington can collaborate with state governments, the federal government, and organizations in supporting research.
- There is a need for a comprehensive review of existing research.

Diverging Points of View

- None.

4. Clarify enforcement of compostable products labeling

4.1 Provide funding, technical assistance, and tools to jurisdiction for enforcement

Attribute(s): None

Recommendations

4.1.1 Fund an education campaign to inform consumers about required compostable product labeling and reporting opportunities.

4.1.2 Create and communicate model enforcement or standards and other educational tools for jurisdictions to adopt, such as examples of compliant and non-compliant products.

4.1.3 Provide state funding for staff enforcement at local and state levels. Consider prioritizing funding for jurisdictions that accept compostable products.

4.1.4 Define who is responsible for enforcement and clarify the role of local ordinances and laws.

Implementation Considerations

- Education should precede enforcement. It's important that consumers understand how to identify compostable products and to buy into current laws.
- Future enforcement must be informed by results of Recommendation 1.1: Track effectiveness of new, current labeling law
- It is important that enforcement does not become an unfunded mandate for local governments.
- This recommendation must be adequately funded.

Diverging Points of View

- This recommendation does not apply to regions in the state where compostable products are not accepted.
- Ensure that Actions 4.1.2 – 4.1.4 are consistent with state law.
- Providing technical assistance and education should be prioritized rather than financial penalties.

4.2 Continue to research best management practices for compostable products

Attributes(s): Full Committee Support

Recommendations

4.2.1 At the state level, participate in existing forums and/or facilitate new government-to-government communications to discuss and harmonize policies and best management practices regarding compostable products, including communities or stakeholders burdened by practices.

4.2.2 Conduct surveys to understand any communities, regions, or specific stakeholders bearing the burden of potential enforcement solutions. Ensure that this outreach includes rural jurisdictions, haulers, businesses that use compostable products, and other stakeholders.

Implementation Considerations

- There is support for participation at the state level, but not for establishing an ongoing stakeholder committee on this issue.

Diverging Points of View

- None.

5. Better align accepted compostable products with facility conditions and processing types

5.1 Develop metrics and support research around compostable product breakdown at facilities

Attributes(s): None

Recommendations

5.1.1 Communicate existing information about compostable product type breakdown in various facility conditions from product certifiers to facilities and leverage this information in conversations about accepted product types.

5.1.2 Develop key metrics that describe the most common contaminants, including details on compostable products and lookalikes, and require reporting as part of compost facilities' annual report to Ecology (due each April).

5.1.3 Support new research about compostable products' breakdown in varying conditions, emphasizing field testing.

Implementation Considerations

- Use of the data needs to be clarified.
- Facilities may need financial assistance to cover the costs of testing and/or staffing to identify patterns in contamination.

Diverging Points of View

- Because facilities change their operations frequently, this is a moving target.
- A required annual report is onerous for facilities.
- There is data available in these areas of research. We should make use of them first before suggesting more research is needed.
- This recommendation is best accomplished by a third-party.
- This needs to include minimum or ideal facility operating conditions for this data to be useful.

6. Support marketability of compost that has food waste and compostable products as feedstocks

6.1 Understand end markets

Attributes(s): None

Recommendations

6.1.1 Evaluate the marketability of compost that has compostable products as feedstocks.

6.1.2 Understand end user standards for “clean” compost, which may be different for different applications.

Implementation Considerations

- "Clean" compost requires a definition. "Marketable" might be a better option.
- There is a need to explore market development in addition to research.
- Include research into local government uses for compost and compost procurement plans.
- This work should inform the availability and size of financial incentives and grants for facilities willing to accept food waste and compostable products.
- This recommendation must be adequately funded.
- Marketability of end compost to commercial produce farms will depend less on the feedstock and more on the treatment process. Facilities should follow Food Safety Modernization Act (FSMA) Produce Safety Rule requirements and provide documentation.

Diverging Points of View

- General marketability of compost is a good thing, but it is not and should not be related to compostable products.

Next Steps

This report sheds light on the most relevant considerations for the legislature in the next phase of compostable product management in Washington. In the path to best managing these products, Ecology and partners are concurrently working on the following actions that support the recommendations described in the previous section.

Implementing the existing compostable product labeling law. Washington's Plastic Product Degradability Law (chapter 70A.455 RCW) sets marketing claim standards and labeling requirements for compostable products in the state. As of January 1st, 2024, these requirements apply to all compostable products sold, offered for sale, and distributed in Washington. The public observation form to report non-compliant products opened in July 2024.

Compost Market Study. By June 2025, Ecology will have a compost market study that projects the impact of the organic management laws on the compost industry and market from 2025-2026. This analysis will consider the marketability of compost produced with feedstocks that include compostable products.

Opening chapter 173-350 WAC to address contamination. As part of RCW 70A.205.540, Ecology will open chapter 173-350 WAC to add contamination thresholds for incoming feedstock and outgoing finished product at organics management facilities. Ecology will adopt new or amend existing rules to establish permit requirements. This process will run from October 2024 to October 2026 and include a stakeholder engagement process.

WSDA is implementing the Compost Reimbursement Program and waiting for feedback from farmers. As directed by RCW 15.04.420, the Washington State Department of Agriculture has implemented a Compost Reimbursement Program. Through this program, Washington farmers can be repaid for the purchase of compost (produced in Washington) or compost spreading equipment. The program began in fall 2023, a second round of grant application were opened in July 2024. A total of $2.4 million has been invested in this program to-date. We await feedback from farmers regarding the program, including experiences with compostable products as a feedstock and/or contaminated compost.

The Advisory Committee also identified opportunities for further research on topics raised throughout this process but not addressed in the recommendations. The following research topics include finding answers to lynchpin questions critical to identifying best management practices for compostable products.

What is the correlation between compostable products and food waste diverted, particularly at city, county, or statewide levels?

This includes looking into which products, if any, have a higher impact on food diversion rates than others. Filling these gaps will clarify the extent to which compostable products can help the state achieve its goal of diverting food waste from landfill.

What is the composition of organic waste generated from different commercial sector groups (ex., restaurants, grocery stores, etc.)?

This will enable more tailored decision-making about compostable products management for businesses and others in the commercial sector. Washington's 2022-2023 Recycling and Organics Characterization study did not contain enough data to estimate tonnages and composition for commercial generators.

What are other ways to measure and monitor compostable products in the waste stream, such as volume or counts, or data from organic materials management facilities?

The impact and recovery rates of compostable products are not well understood. Capture rate data is limited, and waste characterization studies use weight to measure compostable product capture rates. Weight may be a misleading metric since compostable products are lightweight compared to other organic materials like food waste. In addition, waste characterization studies collect data after waste is collected from curbside bins but before it reaches organic materials management facilities, so it is not clear what percent and types of compostable products are successfully recovered.

How effective are statewide labeling laws in the U.S., including in Washington, when it comes to reducing consumer confusion and lookalike products?

These laws are new and data is not yet available about their impacts. Opportunities for future work include monitoring the impact of labeling laws on contamination rates and consumer confusion both in Washington and other states with similar policies.

How extensive is microplastic contamination in compost products?

The presence of microplastics in finished compost is a concern for purchasers, especially as local jurisdictions are encouraged to buy and use more. There is limited data available about microplastics in compost. Furthermore, facilities do not have a mechanism for measuring or reporting microplastics and toxic chemicals in finished compost. This is also true for tracking and reporting the most common contaminants in their feedstocks.

How would potential decisions about managing compostable products impact businesses and rural communities?

The committee saw these as important perspectives in compostable products management and impacts of potential compostable products management decisions would need to be brought to these stakeholders.

What investments are needed for facilities to manage compostable products and food waste?

More research on the costs of managing compostable products would help guide the state's goals to divert food and other organic materials away from the landfill for a higher and better use (e.g., compost). During interviews, facilities were not able to estimate the financial impact of compostable products on their operations.

How do compostables, reusables, and recyclable food serviceware compare to each other?

Identifying the best option(s) will need to look at food waste diversion, reducing contamination at organic materials management facilities, and environmental impacts. Feasible implementation and cost will need to be considered.

Appendix A. Definitions

ASTM International: A leading expert in developing scientific standards for degradability and disintegration of compostable products.

Commercial compost facility: A facility that meets solid waste handling requirements (chapter 173-350 WAC) and accepts municipal and commercial organic materials from generators and haulers. Through controlled aerobic decomposition, the facility creates compost that meets state testing standards. Common composting methods include windrow, aerated static pile, and in-vessel composting.

Commercial generators: Non-residential properties including businesses, industries (ex. farms, factories), institutions (ex. correctional facilities, hospitals, churches), and governments (ex. highways, parks) (2022-2023 Washington Statewide Recycling and Organics Characterization Study).

Food service packaging: A single-use product used for food or drink. Food service products include, but are not limited to, containers, plates, bowls, cups, lids, beverage containers, meat trays, deli rounds, utensils, sachets, straws, condiment packaging, clamshells and other hinged or lidded containers, wraps, and portion cups (RCW 70A.245.010).

Lookalike product: Products that are conventional plastic but are easily confused for products that can be commercially composted.

Organics capture rate: The percentage of compostable material properly separated into the organics compared to the total amount of compostable material generated.

Organic materials management facility: A facility that picks up and processes organic waste generated by homes and commercial businesses and turns it into a viable product for reuse.

Per- and polyfluoroalkyl substances (PFAS): A large family of human-made chemicals in use since the 1950s to make a wide variety of stain-resistant, water-resistant, and non-stick consumer products. Visit the Washington Department of Health's PFAS pages for a detailed description and resources. PFAS are long lasting with negative environmental and health impacts.

Polylactic acid (PLA): A very common, compostable resin made from sugarcane or corn.

Residential generators: Includes single-family and multifamily residences with commercial waste and recycling collection services (2022-2023 Washington Statewide Recycling and Organics Characterization Study).

Service providers: Waste and recycling collection services for commercial and residential generators.

Appendix B. Summary of research process and findings

To achieve a set of recommendations for managing compostable products that centers the state's organic diversion goals, the project team did robust qualitative research through interviews and literature reviews. The facilitation team held nine meetings with the committee designed to interpret the research and generate recommendations. The approach and findings are presented below.

Research approach

Cascadia Consulting Group (Cascadia) and its subcontractors conducted research and analyzed the relevant information about compostable products. The intent was to help the Advisory Committee identify strengths, weaknesses, opportunities, barriers, and information gaps in the existing system of managing compostable products, while addressing research topics dictated in the legislation. After Cascadia drafted the research plan, Ecology and the committee reviewed it, identified additional research topics, and confirmed the proposed research methods. The final list of research topics included those mandated by legislation and other topics raised by committee members at the November 2023 meeting.

Cascadia used a combination of research methods including a literature review, commercial compost facility interviews, written information requests from the Advisory Committee, and other desktop research and interviews. For each research topic, Cascadia identified the method(s) that would provide the best information within the available timeframe and resources. For example, for research topic "Estimates of the percentage of compostable products used in Washington that are disposed of at organics materials management facilities" in Table 1, the 2021 statewide organics characterization study would provide the most accurate data. Other topics required a broader scan of research and/or input from involved stakeholders. Table 1 lists the research topics and method(s) used to address each one.

Table 1. Research Topics and Methods

Research Topic	Literature Review	Information Requests	Desktop Research & Interviews	Compost Facility Interviews	ASTM Staff Presentation
The types of compostable products, and amounts if known, sold or distributed in Washington	✓	✓	✓		
Consumer confusion caused by noncompostable products that can lead to contamination issues	✓	✓		✓	
Compostable standards related to the breakdown of products in facilities and home composting		✓	✓	✓	✓
The status of acceptance of compostable products by organic materials management facilities in Washington, including consideration of organic certifications		✓	✓	✓	
Estimates of the percentage of compostable products used in Washington that are disposed of at organic materials management facilities	✓				
Financial incentives for organic materials management facilities accepting compostable products		✓	✓	✓	
Current laws related to compostable products and the enforcement of these laws	✓	✓	✓		
Any work product from other contemporaneous stakeholder advisory committees currently discussing similar topics in other jurisdictions or nationwide	✓	✓	✓		
Policy options addressing contamination of organic waste streams and increasing use of reusable and refillable items	✓	✓	✓		
Additional topics recommended by the Committee:					
GHG emissions related to composting compostable products	✓		✓		
Toxic chemical contamination (PFAS)					

Cascadia summarized findings in four research memos, which were sent to the Committee before the December 2023, January 2024, April 2024, and May 2024 meetings. A description of each research method follows.

Literature review

The literature evaluated the current state of managing compostable materials in Washington by examining existing studies, laws, and work products from advisory committees in Washington and other jurisdictions. The literature review process also included a review of recent Washington State waste composition study data. Cascadia's research team identified and researched existing studies and other relevant information, then requested input on additional topics and sources from Ecology and the Advisory Committee. Results were presented to the Committee via two memos and presentations, in December 2023 and January 2024.

Commercial compost facility interviews

To gather information on compostable product management, Cascadia, in collaboration with the Washington Department of Ecology, identified and interviewed organic materials management facilities in Washington. The selection process began with a list of 56 organic materials management facilities permitted under WAC 173-350-220, WAC 173-308, or both, including exempt facilities reporting annual tonnages, then excluded anaerobic digesters and biosolids-only facilities from the list, as well as facilities that process less than 1,000 pounds of feedstock each year.

Of the remaining facilities, which were all commercial compost facilities, 27 received recruitment requests, ensuring that this list represented Washington's four regions (Northwest, Southwest, Eastern, and Central) and varied in their composting methods and the types of feedstocks they accept. Of these 27 facilities, 14 responded to information requests. Cascadia sought responses to questions via interviews where possible, as well as written replies to emailed questions. All facilities interviewed accept yard waste and some also accept food waste (generally pre-consumer). The five interviewed facilities that accept post-consumer food waste and compostable products are located near larger population centers.

Findings, presented to the Committee via a memo and presentation in April 2024, reflect the varied composting processes and operations, common considerations, and concerns across facilities in Washington.

Information requests

Information requests leveraged Committee members' respective experience and subject matter expertise to gather information on compostable product performance and disintegration rates across composting technologies, as well as policy options addressing contamination of organic waste streams and to increase the use of reusable and refillable items. Findings were presented as part of memos and presentations to the Committee from January-June 2024.

Desktop research and interviews

Desktop research and interviews were used to review current policies for managing compostable products across the United States and internationally, and to evaluate the feasibility and impacts of reusables. The research team conducted eight interviews with Committee members representing cities and counties in Washington State, held ten interviews with representatives of jurisdictions and compost facilities outside of Washington State where compostable products are or have been accepted in the organics stream, and completed desktop research on policies and programs for compostable products management with a focus on what is happening in other countries.

Cascadia selected interviewees with input from Ecology and the Committee. Cascadia partnered with Full Circle Environmental to conduct the interviews with state and local governments and facilities outside of Washington. Results were presented in a memo and presentation to the Committee in June 2024.

ASTM staff presentation

To address Committee questions about standards related to the breakdown of compostable products, Cascadia invited two representatives from American Society for Testing and Materials (ASTM), for a presentation at the January 2024 Committee meeting. At that time (before passage of HB 2301), Washington's labeling rules related to compostable products applied to products meeting ASTM standard specifications (D6400 or D6868) among other product types.

Research key findings

Through research and discussion, the Committee identified key themes around the management of compostable products. These were refined and leveraged to develop recommendations. Key findings are presented below.

1. Consumer confusion about compostable products

Consumer confusion about compostable products often leads to incorrect disposal decisions (i.e., putting items in the wrong bin). Unclear product labeling, inconsistent bin colors and labels, and enforcement for organics collection make incorrect disposal more common since accepted materials vary based on collection program or jurisdiction. Reducing consumer confusion is key to reduce contamination.

The main drivers of confusion and contamination around compostable products are unclear product labeling and inconsistency in organics collection programs across and within jurisdictions. Education and enforcement during curbside collection is more effective than removing contaminants during the composting process. Options for preventing curbside compost contamination include increasing labeling requirements[1], sector-specific education programs, jurisdictional cooperation, and cohesive management policies[2].

As identified through research and facility interviews, the top contaminants at Washington organics management facilities are: film plastic, plastic, dog toys, metal, glass, garbage, and "lookalike" products.

[1] Unpacking Labeling and Design: U.S. Consumer Perception of Compostable Packaging, Composting Consortium, BPI, 2022

[2] Controlling Contamination In Collected Organics, BioCycle, 2015

2. Compostables are a small (by weight) portion of the inbound organics stream but are a gateway to increased contamination

Although compostable products currently make up a very small portion of the organics stream, their acceptance at an organics management facility can increase overall contamination. This adds to facility operating costs.[3]

The associated contamination with compostable products disproportionately increases the cost of processing organic material into marketable compost. Higher contamination rates require more equipment and staff, and it wears down equipment faster. Additional costs come from disposal fees for contaminants.

Current capture rates for compostable products vary across the state and are overall low. Data for King County and the City of Seattle shows that the capture rate of compostable products (except for compostable plastic bag liners) is below 65% and is as low as 2% for single-use food service compostable paper in Seattle.

Compostable film bags are the most commonly declared product in Washington's Waste Reduction Portal (a database where producers must provide a list of compliant compostable product sold or distributed in the state). Polylactic acid (PLA) is the most common material type listed across declarations.

Oregon Department of Environmental Quality did a life cycle analysis (LCA) of compostable packaging and other foodservice products in 2017. The LCA suggested that the lifecycle of compostable products, when composted, posed more environmental impacts than lifecycles of non-compostable materials, and compostable materials when recycled, landfilled, or incinerated.[4] Notably, the LCA did not consider impacts of potential diversion of food waste from the landfill through the use of compostable products. In response to this report, BPI members with expertise in LCA methodology found that the study did not account for how compostable products are linked to value compost and the composting process which is essential for understanding the true environmental footprint of compostable materials. Flaws in the methodologies, such as outdated or misleading inputs were also noted.

[3] 2020 - 2021 Washington Statewide Waste Characterization Study

[4] MATERIAL ATTRIBUTE: Recycled Content, Oregon DEQ, 2018

3. Opportunity to increase food waste diversion

While there is still food waste ending up in the landfill, it is not yet clear how compostable products can help divert it.

There is potential to increase the capture of food waste in the organics stream. Ecology's 2020-2021 statewide waste characterization study showed nearly 20% of residential garbage weight was food waste[6].

Evidence that compostable products increase food waste diversion rates at a municipal level is limited, although several studies completed at sports and food service venues in the U.S. show that compostable food service products can increase food waste diversion in these settings.

4. Variation in organic materials management facilities

Organic materials management facilities across the state vary in their capacity to take food waste and compostable products. This is related to different processing methods and conditions across facilities. Most facilities interviewed that accept compostable products are in Western Washington.

Organic materials management facilities in Western Washington currently have more available capacity, leaving service gaps in other areas of the state, including rural and remote communities. All five facilities that reported accepting compostable products are located near larger population centers.

Several organic materials management facilities were concerned about having enough space for accepting additional feedstock from new sources or generators (e.g., adding food waste to yard waste-only facilities).

Several facilities that do not currently accept food waste and/or compostable products were concerned that accepting these materials would necessitate changes in their operations or business models (e.g., equipment upgrades, additional screening equipment, more staff, and/or more space). While compostable products do not require a significant amount of additional to process, they can lengthen a facility's processing time, which impacts overall efficiency.

6 2020 - 2021 Washington Statewide Waste Characterization Study

The five facilities that accept certified compostable products in Washington said compostable products disintegrate in their composting processes.

Composting methods, conditions, and processing times vary across facilities in Washington. Aerated static piles are the most common. Not all facilities have conditions that support the full breakdown of compostable products or ASTM standards D6400 and/or D6868. For example, facility processing times ranged from 35 days to as long as six months, and ASTM standards require 90% degradation within 84 days (12 weeks or about three months).

Organic management facilities were concerned about more contamination that comes with compostable products. While nobody pointed to compostable products as directly causing problems in the composting process, organic management facilities said accepting compostable products as a feedstock led to more contamination from non-compostable products, particularly lookalike products.

Facilities that do not accept compostable products said increased contamination (with impacts for marketability), potential loss of their compost's organic certification, or a desire to continue listing their compost with the Organic Materials Review Institute as reasons for not accepting them.

No organic management facility identified any clear incentives, financial or otherwise, that could assist them with accepting compostable products. On the other hand, all facilities noted multiple barriers and challenges to accepting compostable products.

5. Impact of new organics management laws and related polices

Washington's compostable product labeling law aims to reduce confusion with standard labeling practices for compostable products and prevent lookalike products from entering the state. Yet enforcement is new, and the law's impacts unknown. Additional policies to consider include more labeling laws, extended producer responsibility (EPR), needs assessments, contamination fees and load rejections, technical assistance and incentive programs, and reuse programs:

Compostable product labeling standards are used by several states, but data on their effectiveness is not yet available. States like Washington have passed laws to prevent (or discourage) lookalike products from entering the state and reduce consumer confusion. Interviewees from in- and outside Washington noted that enforcement is a challenge, and they continue to see lookalike products, specifically plastic film and other plastics, coming into their facilities.

Extended Producer Responsibility (EPR) laws that cover compostable products are used in states

like Colorado, California, and Oregon to manage compostable products. Choosing and defining covered materials under EPR programs as well as conducting a needs assessment are key components of this policy option. Collecting information from composters is also crucial to understand the needed investments for effectively managing compostable products at organics management facilities.

Aside from labeling laws, contamination reduction strategies include outreach, technical assistance, and fees or load rejections applied to haulers and/or generators where contamination is above a certain threshold. Some jurisdictions have more, or stricter, contamination reduction strategies in place than others.

Many interviewees said they prefer and/or are starting to encourage reusable over compostable products whenever possible. Moving toward reusables eases concerns about compostable products introducing PFAS, microplastics, and other potentially harmful chemicals into runoff from organic materials management facilities and their finished compost products. Additionally, some studies show reusables having a lower environmental impact than compostable products. More research is needed to corroborate these claims.

Based on interview responses, developing reuse programs will require incentives, technical assistance, and infrastructure within communities (collection services, wash hubs, etc.)

Opportunities for future research

The Committee identified key areas where more research is needed to provide a long-term roadmap for managing compostable products in Washington State. Addressing these research gaps stands to build a robust compost market while advancing the state toward its waste diversion goals.

Questions for future research include:

What is the correlation between compostable products and food waste diverted, particularly at city, county, or statewide levels?

This includes looking into which products, if any, have a higher impact on food diversion rates than others. Filling these gaps will clarify the extent to which compostable products can help the state achieve its goal of diverting food waste from landfill.

What is the composition of organic waste generated from different commercial sector groups (ex., restaurants, grocery stores, etc.)?

This will enable more tailored decision-making about compostable products management for businesses and others in the commercial sector. Washington State's 2024 waste characterization study did not contain enough data to estimate tonnages and composition for commercial

generators. Gathering this information from multiple generator types within the commercial sector will support more informed decision-making about compostable products management for businesses and the commercial sector.

What are other ways to measure and monitor compostable products in the waste stream, such as volume or counts, or data from organic materials management facilities?

The impact and recovery rates of compostable products are not well understood. Capture rate data is limited, and current waste characterization data uses weight to measure compostable products capture rates. Weight may be a misleading metric since compostable products are lightweight compared to organic materials like food waste. In addition, waste characterization studies collect data after waste is collected from curbside bins but before it reaches organic materials management facilities, so it is not necessarily clear what percent and types of compostable products are successfully recovered by organic materials management facilities.

How effective will statewide labeling laws be in the U.S., including in Washington, when it comes to reducing consumer confusion and lookalike products?

These laws are new and data is not yet available about their impacts. Opportunities for future work include monitoring the impact of labeling laws on contamination rates and consumer confusion both in Washington and other states with similar policies.

How extensive is microplastic contamination in compost products?

The presence of microplastics in finished compost is a concern for purchasers, especially as local jurisdictions are encouraged to buy and use more. There is limited data available about microplastics in compost. Furthermore, facilities do not have a mechanism for measuring or reporting microplastics and toxic chemicals in finished compost. This is also true for tracking and reporting the most common contaminants in their feedstocks.

How would potential decisions about managing compostable products impact businesses and rural communities?

The Committee saw these as important perspectives in compostable products management and impacts of potential compostable products management decisions would need to be brought to these stakeholders.

What investments are needed for facilities to manage compostable products and food waste?

More research on the costs of managing compostable products would help guide the state's goals in managing compostable products. During interviews, facilities were not able to provide detailed

estimates of the impact of compostable products on their operational costs.

How do compostables, reusables, and recyclable food serviceware compare to each other?

Identifying the best option(s) will need to look at food waste diversion, reducing contamination at organic materials management facilities, and environmental impact. Feasible implementation and cost will need to be considered.

Appendix C. Compostable products management literature review

Memorandum

To: Compostable Products Advisory Committee
From: Cascadia Consulting Group, Inc.
Date: November 29, 2023
Subj: Compostable Products Management Literature Review

Purpose and methodology

The goal of this literature review is to establish what we know about the current state of managing compostable materials in Washington by drawing upon existing studies and research, as well as review current laws and work products from other advisory committees in Washington and other jurisdictions. The purpose of reviewing this information is to help the Advisory Committee determine strengths, weaknesses, opportunities, and barriers with the existing system as well as gaps in existing information. The research topics that frame this literature review are:

- Organic materials management facilities and infrastructure related to managing compostable products in Washington and across the U.S.
- Consumer confusion caused by compostable and noncompostable products and resulting contamination issues. This includes outreach and education programs and the role of education to prevent contamination.
- Types of compostable products and standards related to the breakdown of products in industrial facilities and home composting, such as composting methods, third- party certifications, and American Society for Testing and Materials (ASTM) standards.
- Downstream impacts of compost, such as existing research on Greenhouse gas emissions and toxic chemical contamination of PFAS in finished compost.
- Current laws related to compostable products in Washington and other jurisdictions.
- Work products from contemporaneous stakeholder advisory committees.

Discussion questions for consideration

- What does this research tell us about what is working to achieve "the state's goal of managing organic materials, including food waste, in an environmentally sustainable way that increases food waste diversion and ensure that finished compost is clean and marketable?"
- What does it tell us about what is not working to achieve the state's goal?
- Where do we see opportunities and barriers to improve compostable products management in Washington?

- In what areas do we still need more information to move this committee's work forward?
- Are there findings that do not align with your experience? If so, what is the difference?

Methodology

Cascadia's research team identified and researched existing studies and other relevant information, then requested input on additional topics and sources from the Washington Department of Ecology ("Ecology") and the Advisory Committee. From there, the research team catalogued findings from the literature and summarized the results using this research memo.

Background

Managing food waste is a huge challenge and critical to managing organic materials overall in a more sustainable way. According to Ecology, more than one million tons of food waste is generated annually in the state, of which 35% is sent to the landfill. This wasted material has significant environmental, social, and economic impacts.

In 2022, Washington passed the Organics Management Law, which set aggressive goals for the state, including reducing organics waste disposal by 75% by 2030. Directives such as this from both the state and local levels aimed at reducing the amount of material disposed in the landfill have shifted the focus of many municipalities to expand existing yard debris collection programs to include food waste as well as compostable paper and packaging to help drive participation and increase the amount of food diverted from landfill. Along with this change, a new set of challenges have emerged with the rise of compostable products.

Findings

Key findings across research topics

Compost infrastructure

The types of composting methods used by facilities, the materials facilities accept as feedstock, and what jurisdictions include in their composting programs is not universal and varies across the state.

The amount and types of organic materials processed annually is growing as jurisdictions expand food scrap collection programs to allow compostable paper and packaging to achieve ambitious diversion goals. This presents challenges for industrial compost facilities, as operating and upgrading facilities to meet these demands and manage contamination is costly in terms of time and resources.

Consumer confusion

The main drivers of consumer confusion surrounding compostable products are conflicting and

unclear product labeling and inconsistencies in organics programs across and within jurisdictions.

The most prevalent contaminants in compost streams are plastics (most notably plastic film, garbage bags, and rigid plastics), glass, noncompostable paper, and treated wood. These contaminants have varying levels of impact on facilities. While some are more common (such as film plastics), others present greater challenges and risk (such as glass).

Preventing contamination through education and enforcement before collection takes place is more effective than contamination removal during the composting process.

Compostable standards

Under the Plastic Product Degradability Law (RCW 70A.455), Washington has established a set of standards for the types of compostable products that can be sold and distributed in the state, which include third-party certifications that verify products meet ASTM standards. Whether these certified-compostable products fully compost in real life applications in the field is contested.

Current laws and other advisory committee work products

Washington is joining a handful of states introducing legislation to work towards improving management of organic materials and increasing food donation, composting, and anaerobic digestion. Four other states (Colorado, Minnesota, California, and Maryland) have mandated third-party certification for compostable products sold or distributed in their state and prohibited misleading labeling terminology. Like Washington, Colorado and California also have additional color and labeling requirements to distinguish certified compostable products.

Contemporaneous stakeholder advisory committees have produced work products and recommendations on similar organic materials management topics to this advisory group, and most notably address consumer confusion, labeling guidelines, and education. These groups include the Washington State Organics Contamination Reduction Work Group, the US Composting Council + Biodegradable Packaging Institute Compostable Labeling Task Force, and the Closed Loop Partners Composting Consortium. The details of these workgroup outcomes are discussed further in this report section: Work products from contemporaneous stakeholder advisory committees.

It will be important to keep an eye out for information released in 2024 by the newly formed CalRecycle Plastic Pollution Prevention and Packaging Product Responsibility Act Advisory Board as well as Colorado's Department of Public Health and Environment study on the feasibility of mandating organic materials diversion from landfills as directed by SB23-191. This report is set to be published by August 1, 2024.

Findings by research topic

Compostable products and standards related to breakdown of materials

Key findings

Key Finding: The American Society for Testing and Materials (ASTM) has established standards related to compostability, and guiding framework for products seeking compostability certifications. The various frameworks detailed by ASTM play a crucial role in ensuring that products claiming compostability adhere to rigorous criteria.

Notes:

- ASTM D6400: This standard pertains to compostability of products made out of plastic and bioplastics. It outlines the criteria that such products must meet to be considered compostable.
- ASTM D6868: This standard specifically addresses the compostability of plastic films or coatings attached to compostable products.
- ASTM D8410: This standard addresses the evaluation of cellulosic-fiber-based packaging material and products for compostability in municipal or industrial aerobic composting facilities (BPI, 2023).
- ASTM D5338: While not directly related to compostability, ASTM D5338 is a testing method used to determine the aerobic biodegradation of plastic materials under controlled composting conditions, including thermophilic temperatures.

Key Finding: Biodegradable Products Institute (BPI) is a leading third-party certifier on compostable and packaging in North America.

Notes:

- BPI certification requires products to first meet applicable ASTM standards (ASTM D6400 and ASTM D6868 and/or ASTM D8610) then the BPI standards (BPI, 2023).
- BPI conducts lab testing for the breakdown of compostable products, and looks at the following testing requirements:
    - Biodegradation: 90% absolute biodegradation or 90% relative to a suitable positive reference substrate, within 6 months.
    - Disintegration of the final product: Quantitative disintegration of the final product at its maximum thickness, grammage, basis weight, and/or density, according to methods accepted by ASTM standards.

- Compost Quality: Testing to ensure the product does not negatively impact the resulting compost quality, including testing for toxic chemicals and metals.
- BPI certifies for the following types of composting methods: windrow, aerated static piles, and GORE system (In-vessel) (BPI, 2023).

Key Finding: The Compost Manufacturing Alliance (CMA) is another third-party certifier, that builds off ASTM standards for compostability. CMA uses field testing for compostability requirements (Compost Manufacturing Alliance, 2022).

Notes:

- CMA-certified items must meet ASTM requirements and pass a CMA field test to be considered CMA certified compostable.
  - ASTM lab results must include: FTIR analysis, % ash, heavy metals analysis, spectral analysis, phytotoxicity, disintegration results, and biodegradation results.
  - CMA then utilizes the following categories to classify compostable items:
  - CMA-I: certified for covered in-vessel industrial composting systems.
  - CMA-W: certified for Windrow Industrial Composting Systems.
  - CMA-H: CMA's historical list, comprising items that were approved for CMA-I at Cedar Grove Composting, prior to CMA's official establishment.
  - CMA-S: approved as a composting substrate in industrial composting. Exclusively for a narrow set of qualifying items that provide carbon without excessive additives or treatments. Examples include: wood cutlery, clay coated food trays, and paper straws (Compost Manufacturing Alliance , 2022).
- CMA also accepts EN 13432 certified items for mono-layer products such as cutlery and PLA.

Key Finding: There are a variety of standards for industrial compostability outside the US, including government and third- party requirements/ certifications.

Notes:

- EN 13432 tests items for industrial compostability certifications based off the following requirements (European Bioplastics, n.d.):
  - Biodegradation (chemical breakdown of polymer fibers) within 6 months.
  - Disintegration (physical breakdown) within 12 weeks.
  - Test of ecotoxicity (any negative effects on plants).
  - Heavy metals content.

- TUV Austria is a European third-party certifier, offering the OK Compost Industrial certification which requires items to adhere to EN 13432 standards and certifies an item as industrially compostable (TUV Austria, n.d.).
- There are two other large third-party industrial compostability certifiers: Compostable CIC and DIN Certico (European Environment Agency, 2023).

Key Finding: There are no home composting standards in the US, but there are several available outside the US, both third-party certifications and a few government standards.

Notes:

- TUV Austria has OK Compost Home, which outlines requirements for home compostability standards. The certification is not based off any European or international standards, but indicates an item can be broken down in lower heat/ backyard composting (TUV Austria, n.d.).
- The NF T51-800 is a French standard for home compostability describing the procedures and requirements for plastic products to be considered suitable for home composting. Standard is based on EN 13432 and ISO 18606 and ISO 17088
- which establish requirements for compostability in industrial settings. To account for differences in home composting and industrial, NF T51-800 requires testing be performed at lower temperatures and for longer durations (C- Label, n.d.).
- AS 5810-2010 are the Australian standards for biodegradable plastics suitable for home composting. This set of standards is based off the EN 13432 standards for industrially compostable products and has the following requirements (Council of Standards, Australia, 2010).
    - Characterization: determines the constituents of test materials, including element contents.
    - Biodegradability: test samples must degrade by at least 90% in total or equal to the maximum degradation of a suitable reference substance.
    - Disintegration: sufficient disintegration of an item must occur within 180 days.
    - Compost quality: item must not negatively impact resulting compost quality, this includes various ecotoxicological tests.

Key Finding: There are currently no established home compostability standards in the US, however, an article by Washington State University (WSU) outlines how individuals may begin an at-home composting system and best practices surrounding home compost (Cogger, Sullivan, & Bary).

Notes:

- An ideal composting mix is comprised of a balance between bulking agents (low moisture, high porosity, low nitrogen) such as wood chips and sawdust, Energy (green) materials (high moisture, low porosity, high nitrogen) such as food and yard waste, and balanced raw materials (low to medium moisture, medium porosity, low to medium nitrogen) such as deciduous leaves and horse manure.
- Pile size is integral to home composting, as the size of the pile determines the amount of heat able to be created and stored, and hotter piles decay items quicker. A 1-cubic yard pile should be sufficient for home composting needs.

Key Finding: A field study on compostable food service packaging found that packaging does not have a negative impact on resulting feedstock and may perform as an adequate bulking agent compared to wood and other traditional feedstock used in compost production. These findings indicate that foodservice packaging may be considered as a viable feedstock and used as a bulking agent; however, the processing time for this study was extended by three weeks compared to the normal processing time (Compost Manufacturing Alliance, 2018).

Notes:

- The study looked at the following substrates and their effect on feedstock results:
  - Paper/paperboard (including PLA coated)
  - Molded wood pulp
  - Bagasse (sugarcane fiber)
  - Wheat straw
  - Polylactic Acid (PLA)
  - Crystallized polylactic acid (cPLA)
  - Polybutylene succinate (PBS) film
  - Aliphatic co-polymers
- While ultimately the addition of compostable service ware did not negatively affect the resulting compost, both field tests had to extend composting times by 3 weeks to ensure all compostable products were adequately broken down/ disintegrated.

Key Finding: The Compost Manufacturing Alliance (CMA) has an extensive products list which outlines accepted compostable products for partnering compost facilities. There are roughly 400 types of compostable products accepted in the state of WA (Compost Manufacturing Alliance, 2023).

Notes:

- Starting in 2007, Cedar Grove Composting began a compostables field testing program, which expanded into CMA in 2017 through partnerships with Cedar Grove Composting, A 1 Organics, WeCare Denali, St. Louis Composting, New Earh, and Olympic Organics.

- Of the four CMA partner facilities in Washington, three accept CMA-I products (two Cedar Grove Composting facilities and Barr-Tech), and one accepts CMA-H products (Olympic Organics). See page 27 for CMA-H and CMA-I definitions. There are roughly 400 types of compostable products accepted in the state of WA.
- Cedar Grove composting facilities require that all straws and cutlery be brown.
- There are many brands producing compostable packaging, but some to note include:
    - Bambu
    - Better Earth
    - BioBag Americas
    - Eco-Products
    - Greenware
    - Inno-Pak/Stalk market
    - Lollicup USA, Inc.
    - Pactiv Evergreen (Earth Choice)
    - World Centric

Summary of findings

Composting is the natural process of decomposition by which organic substances are broken down into simpler organic matter. Key elements that must be controlled during the composting process include feedstock and nutrient balance, particle size, moisture content, oxygen flow, and temperature. There are four main composting methods:

Aerated (turned) windrow (US EPA, 2023): Involves forming organic waste into long rows called windrows. Piles are periodically aerated by manually or mechanically turning. Large enough to generate enough heat and small enough to allow oxygen flow. Suitable for large volumes of diverse wastes like yard trimmings, grease, liquids, and animal byproducts.

Aerated static pile (ASP) (US EPA, 2023): Produces compost quickly (3-6 months). Suitable for homogenous mixes of organic waste. Works well for larger generators of yard trimmings and compostable municipal solid waste. Involves a large pile with layers of bulking agents for aeration, and air delivery through pipes.

In-Vessel (US EPA, 2023): Processes large amounts of waste efficiently and accommodates various organic waste types. Involves feeding materials into vessels with highly controlled environmental conditions (temperature, moisture, airflow). Produces compost in a few weeks, with additional time for microbial activity balance and cooling.

Turned Mass Beds (Zero Waste Washington, 2021): Elongated piles of materials at a relatively low height. Involves turning the mass beds at specific frequencies for product homogeneity, and mechanical ventilation systems like in-floor aeration. Suitable for indoor outdoor operations.

To determine what compostable products are considered compostable or will breakdown in these

systems, there are established standards both inside and outside of the U.S. that products must meet. Within the U.S. and North America more generally, the American Society for Testing Materials (ASTM) standards D6400 and D6868 are used. Most other countries follow the European standards for compostable products, known as EN 13432 (European Bioplastics, n.d.). Both ASTM and EN standards look at biodegradation, disintegration, ecotoxicity, and heavy metals, however exact items tested in each category and the specific requirements for each category vary slightly.

There are no current standards for home compostability in the U.S., however, these standards exist in other parts of the world. Home composting is conducted at lower temperatures and smaller scale and is therefore unable to process the same types of materials and products as industrial compost facilities. Because of this, certifications for home compostability must alter testing mechanisms. Under the Plastic Product Degradability Law (RCW 70A.455) there is no allowance for being labeled as home compostable.

In North America, the leading third-party certifiers are BPI and CMA. Both third-party certifications utilize ASTM standards as the basis for their certifications, testing for heavy metals, biodegradation, disintegration, and compost quality, and then build upon them. BPI conducts lab-testing to determine the compostability of products, whereas CMA performs field-testing to determine compostability. BPI offers a blanket certification that does not delineate between different composting measures (windrow, in-vessel, etc.) however CMA does categorize items based upon the systems in which they are compostable. Both certifications require a statement that the product contains no added PFAS chemicals, however organic fluorine up to 100ppm is allowed.

In Washington, the Plastic Product Degradability Law requires that products labeled as “compostable” must be certified compostable by a third-party as outlined above. With the certification requirement in mind, there are over 400 different types of products approved by the CMA as compostable (Compost Manufacturing Alliance, 2023) and over 23,000 by BPI (Biodegradable Products Institute, 2023). As such, all of these products are available for sale and distribution in Washington.

While the Advisory Committee is determining a working definition of compostable products, to begin identifying the potential types of products available in Washington, there are three main categories or types of compostable products for consideration:

- Foodservice products (i.e., cups, cutlery, straws, plates, bowls, takeout containers, etc.)
- Food scrap collection bags and bin liners
- Coffee pods/capsules

Materials used in these compostable products include the following primary substrates and what items they are used in (Source: 2018 CMA Feedstock Study):

- **Paper/Paperboard (including PLA-coated):** Uncoated paper plates, beverage cups (hot), food trays, portion cups, napkins
- **Molded wood pulp:** School food trays, plates
- **Bagasse (sugarcane fiber):** Clamshells, plates
- **Wheat straw:** Clamshells
- **Polylactic acid (PLA):** Beverage cups (cold), portion cups
- **Crystallized polylactic acid (cPLA):** Cutlery
- **Polybutylene succinate (PBS) film:** Bags
- **Aliphatic co-polymers:** Bags

As of January 1st, 2024 in accordance with RCW 70A.455, product producers required to meet the labeling requirements must declare the products sold or distributed in Washington that meet these standards. These declarations will be submitted to the Department of Ecology. Once available, Cascadia will present the product registry to the Advisory Committee. The number of products sold or distributed in the state will be difficult to assess, and Cascadia will attempt to estimate quantities by requesting sales data from manufacturers and distributors if the committee feels this information is valuable and will request industry contacts from Advisory Committee members to assist with compiling the data.

When considering compostable products, specifically foodservice packaging, as feedstock, a field study completed in 2018 found that "adding significant levels of diverse foodservice packaging to feedstocks did not appear to change the quality of the finished product positively or negatively, and it appeared to perform as well as traditional feedstocks used in compost production except for requiring extended processing time with a modified moisture and heat profile (Compost Manufacturing Alliance, 2018)." These findings indicate that foodservice packaging may be considered as a viable feedstock and used as a bulking agent, however noting that extended processing times may be required. This is a critical issue for commercial compost facilities as compostable products may require longer processing times than what is used at their facility.

Even with the certifications and standards outlined above, some facilities (such as A1 Organics in Colorado and composters in Oregon) contest that not all certified compostable products actually compost or breakdown as fully or as quickly as certified to do so.

Consumer confusion caused by noncompostable products

Key findings

Key Finding: Consumer confusion surrounding the disposal of compostable products is amplified by unclear and inconsistent product labeling, which leaves consumers unable to distinguish

products, and increasing contamination rates.

Notes:

- In Washington state, biodegradable, degradable, decomposable, oxo-degradable, or any similar form of those terms are banned on plastic products per RCW 70A.455.030.

Key Finding: The terms "biodegradable" and "made from plants" caused the most confusion for consumers, as many could not distinguish these terms from "compostable".

Notes:

- A Composting Consortium study conducted by Loop partners and BPI that surveyed 2,765 individuals found:
    - 31-49% of respondents could not distinguish between items marked as "biodegradable" and "compostable", leading them to dispose of "biodegradable" products incorrectly (Composting Consortium, BPI, 2022).
    - The term "made from plants" also increased consumer confusion and led to between 31-50% of respondents misidentifying these items as compostable (Composting Consortium, BPI, 2022)
- An article from the European Environmental Protection Agency referenced a study in Germany in which 58% of respondents thought that all bioplastics marketed as biodegradable were compostable (European Environment Agency, 2023).

Key Finding: Many studies identify disposal practices as a point for confusion, namely due to jurisdictional variation/ program inconsistency and a general lack of education surrounding disposal practices.

Notes:

- Jurisdictional variation such as lists of accepted organics and inconsistent cart colors leads to increased contamination rates. This confusion is amplified for those who live and work in differing regions (Washington State Organics Contamination Reduction Workgroup, 2017).
- Many studies pointed to a lack of education surrounding the disposal of compostable items.
    - In one study, 28% of respondents noted that they would place compostable products in the recycle bin at the end of use, both contaminating the recycling stream and decreasing organics diversion (Composting Consortium, BPI, 2022).
    - There's also a gap in knowledge on the difference between at-home and industrially compostable items, with 33% of people saying they would dispose of an

industrially compostable item in an at-home or backyard facility (Composting Consortium, BPI, 2022).

- At home facilities, such as backyard compost, do not operate under the same conditions as industrial facilities (namely heat and size of operation), and therefore items will not properly breakdown.

Key Finding: Most common contaminants and key items causing consumer confusion include glass, plastic, noncompostable paper, and wood.

Notes:

- Multiple studies cited glass as a top contaminant in organics collection. Glass is also noted as a problematic contaminant, as it poses a health risk to compost manufacturers handling the finish product, and famers have even noted the ability for glass to incorporate itself root vegetables when applied (BioCycle, 2015)
- There are many types of plastics that contaminate compost streams, including: plastic films (including bags), rigid plastics, produce stickers, and more.
    - A study looking at organics collection contamination in WA state found that out of 103 carts observed, plastic/ plastic bags accounted for 32% of contamination for residential carts, and 30.8% for commercial carts (Washington State Organics Contamination Reduction Workgroup, 2017).
    - Produce stickers are small, sturdy, and water resistant, allowing them to remain intact through the composting process and often making it through the final screening process (BioCycle, 2015).
- Painted and/or treated wood was noted as a key contaminant across multiple sources. While untreated wood is often compostable, painted and treated wood is not.
    - WA organics study found that treated wood comprised 19.4% of all cart contamination (Washington State Organics Contamination Reduction Workgroup, 2017)
    - King County Waste Characterization (2022) found that treated wood was a top 3 contaminant, comprising .4% (824 tons) of all waste surveyed (211,928 tons) (Cascadia Consulting Group, 2023).

Key Finding: In addressing contamination rates and consumer confusion, studies identified the following opportunities: better labeling guidelines and requirements, increased education on disposal, and cohesive policies and regulations on compostable products.

Notes:

- In addressing labeling concerns, there are two main solutions: reconcile confusing terms

and increase labeling requirements.

  - Reconciling conflicting and confusing terms such as “biodegradable” and “made from plants” would decrease consumer confusion.
    - The term “biodegradable” in marketing plastic is prohibited in many states because it leads to increased consumer confusion, including the State of Washington.
  - Individuals prefer compostable products that utilize a “winning” design” incorporating 2-3 design elements signifying an item as compostable (color choice, phrases, logos, etc.) (Composting Consortium, BPI, 2022).

- Dynamic educational programs targeted at specific generating sectors (residential, commercial, multifamily) are essential to reducing contamination rates. Each sector has its own issues surrounding compost contamination, therefore catering education materials to each group will best address those needs (BioCycle, 2015).
- Jurisdictional inconsistency is a leading cause in consumer confusion, regarding the variety of accepted materials in different programs as well as diversity of cart colors. Working towards cart color consistency will reduce confusion and contamination (BioCycle, 2015).

Summary of findings

Existing research shows that consumer confusion caused by noncompostable products is driven by: 1) conflicting and unclear product labeling, and 2) inconsistency in organics programs across and within jurisdictions, including differences in which items compost facilities accept and differences in cart colors for organics collection. The most prevalent contaminants in compost streams include a variety of plastics (most notably plastic film, garbage bags, and rigid plastics), glass, noncompostable paper, and treated wood. Each of these contaminants present their own set of issues and challenges. Film plastics are the most common contaminant and is costly to remove and not always entirely effective. Glass is less common but equally as problematic as it is difficult to identify, remove, and a safety concern for customers using the finished compost (Washington State Organics Contamination Reduction Workgroup, 2017).

The most recent organics waste characterization studies completed in the City of Seatle and King County in 2022 report notably low contamination rates, at 2.1% in Seattle and 6% in King County. The most common contaminant material types in Seattle by weight were potentially compostable paper (0.6%), other non-recoverable waste, which includes non- recyclable glass, hazardous waste, and diapers (0.3%), and pet waste (0.2%) (Cascadia Consulting Group, 2023b). In King County, other miscellaneous and fines (4.3% or 9,143 tons), which includes dirt and soil, was the most prevalent contaminant, followed by other recyclable paper (0.4% or 878 tons) and dimensional lumber/engineered wood (0.4% or 824 tons). The contamination rate by subsector was 7% for the residential substream and 10% for nonresidential (Cascadia Consulting Group, 2023).

In January of 2024, results from the Department of Ecology 2022-2023 statewide recycling and

organics characterization study will be available. This study will provide data on organics composition and contamination across facilities located in all four regions of the state (central, eastern, northwest, and southwest) throughout four seasons (summer, fall, winter, and spring). These results will be shared with the Advisory Committee.

Participant education and outreach are important tools to ensure organics disposal participant accountability and enforcement of organics disposal policies. The following strategies are recommended by the Washington State Organics Contamination Reduction Workgroup to address contamination (Washington State Organics Contamination Reduction Workgroup, 2017):

Terminology and labeling guidelines. Address confusing terms in composting and call for stronger labeling guidelines for compostable products.

Tailored education for different sectors. Advocate for sector-specific education (residential, commercial, multifamily) and emphasize that prevention through education and enforcement before collection is more effective than contamination removal during composting.

Understand contamination management challenges. Highlight the necessity of contamination management, acknowledge the expenses involved for commercial composters, and recognize the need for effective and affordable methods and technologies.

Jurisdictional cooperation for cohesive policies. Advocate for increased cooperation among jurisdictions and propose the implementation of consistent cart colors and accepted materials lists.

Shared accountability through contracts. Stress the importance of contracts between municipalities, haulers, and composter as crucial tools for building shared accountability and minimizing contamination.

Effective cart tagging programs. Recommend cart tagging programs for behavior change and emphasize the need for consistent, audience-focused education in these programs, ultimately minimizing contamination.

Current laws related to compostable products in Washington

Key findings

- Per WAC 173-350-220 (2003), local health departments issue solid waste permits for composting facilities and Ecology regulates permit exempt facilities. Composting facilities with over 25 cubic yards of materials on-site are required to notify and report to their regulating authorities, and comply with reporting, safety, and testing requirements. Organic waste management facilities are required to obtain permits when siting new or expanding facilities if meeting specific volume or operational characteristics.
- In 2009, the legislature passed SB 5797 (codified as 70A.205.290 RCW) that exempts

certain anaerobic digesters from solid waste permitting requirements. The exemptions are conditioned to facilities that process at least 50% livestock manure and no more than 30% waste-derived materials, among other conditions.

- The USDA Organic Compost and Vermicompost in Organic Crop Production guidance (2011) provides clarification on allowed practices for composition, production, and use of compost and vermicompost in organic crop production. This guidance applies to National Organic Program (NOP) certifying agents, all certified and exempt organic producers, and input suppliers.
- In 2012, SB 5343 (codified as 70A.15.2590) extended provisions related to emissions limits for sulfur dioxide from anaerobic digesters under certain circumstances.
- In 2013, the state updated regulatory language regarding the prioritization of organic feedstocks for composting operations. Revised rules in WAC 173.350.220 address feedstock, materials management, odor issues, and conditions for exempt compost facilities to improve organics management
- In 2015, HB 1060 (codified as 70A.200.140) encouraged composting by including it as part of the programs funded by the Waste Reduction, Recycling, and Litter Control Act. These programs are funded by a 0.00015% litter tax on retailer's gross proceeds of consumer products, including food, groceries, beverages and drinks, household paper products, among others.
- In 2016, the legislature passed SB 6605 to prevent the spread of disease, plant pathogens, and pests derived from solid waste facilities operations, including composting.
- Seattle Municipal Code section 21.36.082 (2017) requires that businesses do not put food scraps, compostable paper, yard waste, and recyclables in their garbage.
- Seattle Municipal Code section 21.36.083 (2017) requires that residents do not put food scraps, compostable paper, yard waste, and recyclables in their garbage.
- In 2018, HB 2580 established sales, use, and property tax exemptions for anaerobic digestion and landfill facilities generating biogas.
- In 2019, the legislature passed HB 1114 (codified as 70A.205.715 RCW) to reduce food waste to minimize its environmental impacts and fight food insecurity. The law established a goal of reducing food waste sent to the landfill by 50% by 2030, compared to 2015 levels, and required the development of a state plan for reducing wasted food and improving food waste diversion. The plan will use the following strategies to reach targets:
    - Strategy 1: Prevent and reduce the amount of edible food that is wasted by residents and businesses.
    - Strategy 2: Help match and support the capacity for edible food that would otherwise be wasted with food banks and other distributors that will ensure the food reaches those who need it.
    - Strategy 3: Support productive uses of inedible food materials, including using it for animal feed, energy production through anaerobic digestion, or other commercial

uses, and for off-site or on-site management systems including composting, vermicomposting, or other biological systems. (Zero Waste Washington, 2021)

- In 2019, HB 1569 (codified as 70A.455.050 RCW) addressed marketing language for compostable products. The law prohibits sales or distribution of products that claim biodegradability but do not meet the American Society of Testing and Materials (ASTM) standards as compostable products or packaging. The bill also requires compostable products to be identifiable through coloration, logos, and similar.
- In 2020, the legislature passed HB 2713 (codified as 43.19A.120 RCW), which encourages local governments that provide residential compost collection to buy back at least 50% of the finished products generated by facilities processing their organic materials.
- In 2020, the legislature passed SB 5323 (codified as 70A.530 RCW) banning thin single- use plastic carry home bags. Similarly in 2021, the legislature passed SB 5022 banning certain expanded polystyrene food ware, recreational coolers, and packing peanuts, requiring minimum post-consumer recycled content in beverage and other bottles and jugs and trash bags, and mandating that food establishments only provide utensils, straws, cold cup lids, and condiment packages upon customer request. These two laws aim to reduce plastic contamination in the organic waste stream.
- The 2022 Washington Plastic Product Degradability Law (RCW 70A.455) claims standards for compostable products sold in the state. The law sets labeling requirements and declarations for compostable products. These requirements will reduce misleading, confusing, and deceptive labeling practices. This law applies to these compostable products sold in Washington: film bags and film products, food packaging, and food service products. Further, the law states that environmental marketing claims for plastic products should adhere to uniform and recognized standards for "composability" and "biodegradability," since misleading, confusing, and deceptive labeling can negatively impact local composting programs and compost processors. It also authorizes the department of ecology, cities, and counties to pursue false or misleading environmental claims and "greenwashing" for plastic products claiming to be "compostable" or "biodegradable" when they are not (Zero Waste Washington, 2021).
- In 2022, Washington's Legislature passed HB 1799 requiring diversion of organic materials away from landfill disposal and towards food rescue programs and organics management facilities. These actions will help Washington achieve its 2030 goal to cut landfill-disposed organic material by 75%, compared to 2015. By 2025, the amount of edible food wasted in landfill disposal must be reduced by 20%. Other organic materials will be processed at composting facilities, anaerobic digesters, and used for vermiculture and emerging technologies.
- The 2023 Food Packaging Prohibition (RCW 70A.222.070) states that certain types of food packaging that have per- and polyfluoroalkyl substances (PFAS) intentionally added to them may not be manufactured, sold, or distributed in Washington beginning in 2023.

Summary of findings

Recent legislation addressing organic materials management in Washington has focused on reducing contamination, addressing food waste, and improving permitting and capacity of facilities. Most notably in 2022, the state passed HB 1799 to reduce organic waste disposal 75% by 2030 and widely expand collection. The law defines organic waste as manure, yard debris, food waste, food processing waste, wood waste, and garden waste, and works to change food waste collection and disposal statewide (Zero Waste Washington, 2021).

Before this, the 2022 Washington Plastic Product Degradability Law set labeling requirements and declarations for compostable products to reduce misleading, confusing, and deceptive labeling practices. In addition, Washington's 2019 HB 1114 focuses on reducing food waste to minimize its environmental impacts and fight food insecurity statewide. With these and other recent legislative updates, Washington is joining a handful of states introducing legislation to work towards improving management of organic materials and increasing food donation, composting, and anaerobic digestion.

Four other states (Colorado, Minnesota, California, and Maryland) have also mandated third-party certification for compostable products sold or distributed in their state and prohibited misleading labeling terminology. Colorado and California also have additional color and labeling requirements to distinguish certified compostable products like Washington state.

In May 2023, Colorado also passed SB23-191, which jumpstarts composting infrastructure statewide by evaluating and creating a plan for organics diversion (Karidis, 2023). SB23- 191 calls for the Colorado Department of Public Health and Environment to study the feasibility of mandating organic materials diversion from landfills and report its findings by August 1, 2024.

Further research is needed to assess the success, challenges, and barriers of these laws in other states and jurisdictions, as well as enforcement. Cascadia's research team will interview solid waste planners, commercial composters, and other subject matter experts, as well as research policies implemented in the European Union and Canada to provide a comprehensive, international perspective.

Work products from contemporaneous stakeholder advisory committees

Key findings

Key Finding: U.S. Composting Council and Biodegradable Packaging Institute's Compostable Labeling Task Force

The goal of this Task Force is to ensure that compostable products make it to compost

manufacturers, are easily identifiable, and break down in compost facilities. The Task Force developed a model bill meant to inspire legislation that will create uniformity across states, or national legislation to standardize labeling. This group was convened in response to the challenge of compost infrastructure and compostable product labeling, varying greatly from state to state, and a need for consistent requirements for both producers and receivers of compostable products (The US Composting Council (USCC) and Biodegradable Products Institute (BPI), 2023).

Notes:

- Task Force members agreed on the following guiding principles for successful compostable labeling:
    - Limit composability claims to products that touch, contain or carry food products, scraps or other organic material accepted by compost manufacturers.
    - Prohibit misleading or unsubstantiated terms ("biodegradable," "degradable", "decomposable").
- Recommend field testing to ensure compatible facility conditions.
- Require compostable products such as produce and food collection bags, and other foodservice ware to be labeled "compostable," carry a certification mark, and distinguish themselves with specific coloring.
- Prohibit non-compostable food packaging and food service ware from using identical compostable colors, labeling, or marks.
- Exempt compostable products from using resin ID codes to reduce consumer confusion.

Key Finding: Washington State Organics Contamination Reduction Workgroup Report and Toolkit

The goal of this work group is to respond to the challenge of an increase in the types and amounts of physical contaminants mixed with incoming loads of organics. The increased volume and variability of contamination contributes to increased labor and equipment costs and, in some cases, makes the finished product more difficult to market. (Washington State Organics Contamination Reduction Workgroup, 2017).

Specifically:

- The Contractual Policies subcommittee was formed to research and recommend policy options and contractual best management practices to contribute toward the elimination of contaminants in the residential and commercial organics streams.
- The Participant Education and Outreach subcommittee was formed to identify gaps in perceived versus actual contaminants and develop an Organics Educator Toolkit to aid in bridging those gaps.

- The Upstream Systems subcommittee was formed to seek opportunities to connect the dots between known approaches while exploring new strategies across the entire product manufacturing supply chain, including but not limited to packaging design and related participant sorting behavior.
- The Processing subcommittee was formed to identify and recommend contaminant removal best management practices at processing facilities.

The work group believes Washington can lead organics contamination reduction efforts by:

- Advocating for funding and resources, promoting regional collaboration, and building education, outreach, and assistance tools.
- Building consensus around best management practices for packaging design and labeling.
- Partnering with solid waste agencies, haulers, and composters.
- Helping to develop implementation guidelines and best practices with solid waste jurisdictions.

Notes:

To reduce contamination of organics in Washington, the work group developed the following key takeaways:

Shared accountability. All members of the composting industry must share accountability for maintaining compost quality by working together to reduce contamination. Contracts between municipalities, haulers, and composters are a crucial tool for building shared accountability and minimizing contamination.

Jurisdictional inconsistencies contribute to confusion. Variability within and between jurisdictions regarding cart design, accepted items, and audience creates participant confusion about what can and cannot be composted.

Prevention should be the focus. Contamination prevention through education and enforcement prior to collection is more effective than contamination removal during the composting process.

Contamination management is important but costly. Commercial composters need effective technologies to help them identify, remove, and dispose of contaminants. These methods are typically expensive and their effectiveness varies widely.

There are a wide range of contaminants. The four most common contaminants in the organics stream are plastic film, plastic garbage bags, rigid plastics, and glass, and some contaminants (like glass), present more challenges than others.

Growth of compostable packaging presents both opportunities and challenges. Compostable foodservice packaging may lead to an increase in food scrap diversion but can also present

challenges for composters, including: Difficulty in knowing the difference between compostable and non-compostable items that look alike; Non-compostable products that are mislabeled; Requirements that food distributors and vendors apply stickers to pre-packaged food containing nutrition and allergen information.

Key Finding: Closed Loop Partners Composting Consortium (Composting Consortium, 2022)

The Composting Consortium, managed by the Center for the Circular Economy at Closed Loop Partners, is a multi-year collaboration across the entire compostable packaging value chain to pilot industry-wide solutions and build a roadmap for investment in technologies and infrastructure that enable the recovery of compostable food packaging and food scraps.

The Consortium works to identify best practices for consumer understanding of compostable packaging labeling and collection; establishes when compostable versus reusable or recyclable packaging applications are most appropriate; collaborates on best practices to inform policy making; and aims to expand composting infrastructure to recover compostable packaging and food scraps.

Notes:

The demand for compostable packaging as an alternative to traditional plastics has surged, with a projected 17% annual growth between 2020 and 2027. However, despite its popularity, only 2% of composting facilities in the U.S. currently accept and process compostable packaging, revealing a significant gap between demand and the capacity to manage these materials effectively (Composting Consortium, 2022).

To achieve a more resilient composting industry in the US, the Consortium outlined four steps:

Economic incentives for composting facilities. To address the increasing complexity and costs associated with diverse feedstocks, including food scraps and compostable packaging, there is a need to enhance economic incentives for composting facilities.

Contamination management. It is crucial for industry players, including product manufacturers and government agencies, to establish consistent communications and labels to mitigate physical and chemical contamination, particularly from non- compostable plastic packaging. Certification and packaging regulations defining labeling and food- contact requirements can play a key role in reducing confusion.

Infrastructure transition and expansion. Supporting the transition and expansion of composting infrastructure includes upgrading existing facilities to accept diverse feedstocks and developing new projects and facilities capable of processing a range of materials, such as certified compostable packaging and food scraps.

Local, state, and federal legislation to incentivize organics diversion. Recent developments highlight a shift in legislation addressing organics recycling, with California passing comprehensive laws such as SB-54 for plastic pollution prevention and Extended Producer Responsibility (EPR), along with SB-1383 mandating a 75% reduction in organic waste disposal by 2025. Colorado has also passed an EPR bill, along with other states, and major consumer goods brands have pledged to transition to recyclable, compostable, and reusable materials by 2030. Tools such as organics disposal bans, curbside and drop-off recycling services, and pay-as- you-throw schemes are crucial for improving the system. Policymakers must consider operational realities of composting facilities and provide economic incentives for necessary infrastructure upgrades.

Key Finding: Eco-Cycle released the annual State of Recycling & Composting in Colorado report (Eco-Cycle, 2023). The report aims to convey the following findings related to composting in Colorado:

- Highlight the importance of composting to reduce climate pollution, reduce waste and strengthen local economies.
- Make recommendations on needed composting infrastructure and policies at the state and local levels.

Eco-Cycle summarized five key composting legislation and acceptance updates in Colorado:

- SB23-253 (May 2023) - Sets strict labeling requirements on products sold as compostable and certain requirements around third-party certification (Karidis, 2023).
- SB23-191 (May 2023) - Jumpstarts composting infrastructure statewide by evaluating and creating a plan for organics diversion (Karidis, 2023).
- A1 Organics Material Acceptance Update (March 2023) - A1 Organics, Colorado's largest composter, changed its accepted materials list to only accept food scraps and yard and plant trimmings (Pyzyk, 2023).
- Producer Responsibility Policy HB22-1355 (2022) - An extended producer responsibility law for packaging passed in Colorado and included measures related to composting.
- Updates to Colorado solid waste regulations Section 14 pertaining to compost facilities (2023) - addresses Colorado's compost infrastructure, processing capacity, and hauling of materials (Eco- Cycle, 2023).

Notes:

SB23-253 (May 2023) - Sets strict labeling requirements on products sold as compostable and certain requirements around third-party certification (Karidis, 2023).

- Producers can only represent products as compostable if they are certified as such by an independent, third-party verification body.
- Products must comply with labeling standards that ensure they are easily distinguishable

as certified compostable at point of sale, point of use, in public sorting areas, and processing facilities.

- Makers of products that are not certified compostable cannot use tinting, colors, labeling, images, or words that are required for products with compost certification. Nor can they use similar visuals to imply the product will eventually break down.

SB23-191 (May 2023) - jumpstart composting infrastructure statewide by evaluating and creating a plan for organics diversion (Karidis, 2023).

The Colorado Department of Public Health and Environment must study the feasibility of mandating organic materials diversion from landfills and report its findings by August 1, 2024. The study must:

- Identify needed organics diversion infrastructure and create an infrastructure development plan.
- Recommend policies and regulations to enable diversion.
- Identify opportunities for end-market development of organic materials.

A1 Organics Material Acceptance Update (March 2023) (Pyzyk, 2023)

A1 Organics, Colorado's largest composter, changed its accepted materials list to only accept food scraps and yard and plant trimmings. The goal is to reduce the amount of material they receive that is too contaminated to effectively process (currently at 10%).

- Materials like paper towels, coffee filters, packaging or service ware will no longer be accepted — even if it is labeled "compostable."

Producer Responsibility Policy HB22-1355 (2022)

An extended producer responsibility law for packaging passed in Colorado and included measures related to composting, including clarifying funding to support contamination reduction in composting and to support the processing of compostable packaging (Pyzyk, 2023). These changes include:

- Clarified funding for composting to reduce contamination and support processing of compostable packaging.
- Added definition of compostable.
- Included capacity of composting facilities to process compostable packaging in needs assessment to inform funding.

Updates to Colorado solid waste regulations Section 14 pertaining to compost facilities (2023)

- The updates will be considered for formal adoption by the state's Solid Hazardous Waste Commission in February 2024 (Eco-Cycle, 2023).

- Responds to Colorado's lack of compost infrastructure, lack of processing capacity, and reliance on long-distance hauling of materials.
- Updates regulations for permitting smaller and mid-sized compost infrastructure that will reduce costs to start-up businesses and smaller public facilities and enable expansion of compost infrastructure.

Key Finding: California has implemented several legislative measures to transform its compost industry (Biodegradable Products Institute, 2023):

In 2016, the state set a goal to reduce organic waste landfill disposal by 75%, targeting short- term climate pollutants like methane from food waste.

In 2018, a law mandated that disposable food packaging at state facilities must be recyclable or compostable. This includes bowls, cups, plates, containers, and trays, with CalRecycle maintaining a list of compliant materials.

The 2021 passage of AB 1201 requires compostable products to be certified by third-party organizations, while also prohibiting misleading terms on plastic products. This aligns with similar measures in Washington and Maryland.

In early 2022, after years of consideration, the state passed SB 54, a comprehensive bill establishing a statewide Extended Producer Responsibility (EPR) program. It includes specific targets for product and packaging reduction, recyclability, and compostability.

Most recently, Governor Newsom signed a bill mandating that pre- checkout bags for produce and bulk items must be certified compostable, reusable, or made from recycled paper. Non-compostable alternatives are prohibited from being tinted green, brown, or beige."

Key Finding: **The Minnesota Composting Council is the MN State Chapter of the United States Composting Council (Minnesota Composting Council, 2023).**

The MNCC's Legislative Committee is very active and worked to pass the Compostable product labeling bill in the 2023 Legislative Session (HF 1315/SN 1321).

The MNCC has been working with composters, product manufacturers, local units of government and the Minnesota Pollution Control Agency (MPCA) to amend MN Stat. 325E.046 Standards for Labeling Plastics Bags to apply to food service products and other packaging claiming composability.

The goal of HF 1315/SF 1321 is to reduce contamination received at composting facilities and microplastics in soils. Washington, Maryland and California have also adopted similar bills

The MNCC also developed a Compostable Products web page to make it easy for buyers, businesses, and residents to determine if a product is truly certified compostable and will be accepted by a compost facility in Minnesota.

Notes:

Key components of the new bill include (Minnesota Composting Council, 2023):

- Products can be labeled as 'compostable' if they:
    - Are made solely of wood without coatings or additives.
    - Are made solely of paper without coatings or additives, or
    - Meet ASTM D6400 (bags/films) or ASTM D6868 (plastic or plastic- lined items) standard specifications for composting in an industrial compost facility.
    - By January 1, 2026, all products must be certified by a non-profit third party whose is capable of performing product analysis.
- Products cannot be labeled 'biodegradable' until an industry adopted standard ASTM specification is developed and approved by the State Legislature.
- Retailers must not knowingly sell misleading products. All retailers are given an additional year over manufacturers, distributors and wholesalers to come into compliance.

Adoption of this bill will:

- Reduce misleading product claims
- Reduce resident, food establishment, etc. confusion on what products are accepted for composting
- Reduce contamination at compost facilities resulting in them manufacturing a cleaner more sellable product

Summary of findings

Contemporaneous stakeholder advisory committees have produced work products and recommendations on similar organic materials management topics to this advisory group. These groups include but are not limited to the Washington State Organics Contamination Reduction Work Group, the US Composting Council + BPI Compostable Labeling Task Force, and the Closed Loop Partners Composting Consortium.

The Washington State Organics Contamination Reduction Work Group responds to the challenge of an increase in the types and amounts of physical contaminants mixed with incoming loads of

organics and developed key takeaways for meeting theOther se challenges through regional collaboration and partnerships, consensus building around standards and best practices, and streamlining implementation guidance for jurisdictions (Washington State Organics Contamination Reduction Workgroup, 2017). Results from their 2017 report and toolkit are highlighted in the consumer confusion summary.

The U.S. Composting Council and Biodegradable Packaging Institute's Compostable Labeling Task Force developed a model bill to guide legislation that will create uniformity to standardize compostable labeling. This group was convened in response to the need for consistent requirements for both producers and receivers of compostable products (The US Composting Council (USCC) and Biodegradable Products Institute (BPI) , 2023).

The Closed Loop Partners Composting Consortium, a group of national collaborators, studies best practices for consumer understanding of compostable packaging labeling and collection; collaborates on best practices to inform policy making; and aims to expand composting infrastructure to recover compostable packaging and food scraps. The Consortium provided recommendations on economic incentives for composting facilities, contamination management, infrastructure expansion, and legislation to incentivize organics diversion (Composting Consortium, 2022).

It is also important to note that in 2019, composters in Oregon signed a letter listing several reasons why they do not want "compostable" packaging and food service ware delivered to their facilities (Oregon Composters, 2019). These reasons include: 1) It does not always compost, 2) It introduces contamination, 3) It hurts re-sale quality, 4) The composters cannot sell to organic farmers, 5) It may impact human and environmental health, 6) It increases compost operators' costs and makes our jobs harder, 7) Just because something can be composted does not mean that is necessarily better for the environment, 8) In some cases, the benefits of recycling surpass those of composting, and 9) Good intentions are not being realized. These signatories emphasized that Oregon needs to focus on recycling food and yard trimmings into high-quality compost products, and that compostable packaging does not help them to achieve this goal.

CalRecycle has also recently convened the Plastic Pollution Prevention and Packaging Product Responsibility Act Advisory Board, which aims to identify barriers and solutions to creating a circular economy and to advise the department, producers, and producer responsibility organizations on implementation of this new Act (CalRecycle, 2023). The board consists of both voting and non-voting representatives of local government, environmental and environmental justice organizations, manufacturers, recycling and solid waste enterprises, and retail and grocery associations. Specifically, the board will include members from the composting industry in California and a producer of third-party certified compostable products. The advisory board has not yet produced work products for review.

Downstream impacts of compost

Key findings

Key Finding: Compostable packaging does not always result in better environmental outcomes when compared to non-compostable packaging that is either landfilled, incinerated, or recycled (Oregon DEQ, 2018).

Notes:

A study by Oregon DEQ comparing the GWP of compostable packaging and non-compostable packaging found that on average, compostable packaging that is composted had a 46% higher negative environmental impact than products that were either landfilled, incinerated, or recycled. This is in large part due to the alternative benefits perceived through alternative means of disposal such as recycling.

Key Finding: The Department of Ecology is currently partnering with WSU to measure and study compost emission factors which will ultimately be used in the design of a statewide study of emissions from commercial compost facilities in Washington (Karie Boone, 2023).

Notes:

During 2021-2023, research efforts between Ecology and WSU focused on improving understanding and control of air emissions in state compost facilities, alongside advancements in solid waste-to-energy technologies. This research comes in response to the Climate Commitment Act and ongoing actions to address climate change and reduce greenhouse gas emissions.

One of the specific research objectives of the partnership was to understand volatile organic compound (VOC) emission factors for Title V air emissions permitting for commercial compost facilities in WA. The study utilized a small-scale continuously aerated static pile (CASP) system at WSU Pullman for VOC measurements from green waste/food waste composting. The study also developed continuous VOC testing methods to determine emission rates for negatively aerated piles.

The study concluded that modern CASP systems may exhibit significantly lower VOC emission rates compared to those determined in a California study 15 years ago for windrow composting. These results will ultimately be used in the design of a statewide study of emissions from commercial compost facilities in Washington (Karie Boone, 2023).

Key Finding: All certifications for compostable products require toxicity screenings, and many call out PFAS chemicals directly (Department of Ecology, 2021).

Notes:

- BPI and CMA certified compostable products require that items contain 100 ppm or less of PFAS chemicals, and that any resulting fluorine is naturally found and not added in.
- While not a direct requirement, compostable items were used in the Department of Ecology's AA study and were found to be an adequate replacement to PFAS containing service ware.

Key Finding: Preliminary data show that levels of PFAS chemicals in commercial organic residual products, including biosolids and non- biosolids compost, may be elevated when compostable serviceware is included in the feedstock (BioCycle, 2018).

Notes:

Concentrations of 17 PFAS compounds in food scraps compost, including compostable serviceware, ranged from 30-75 ppb, whereas composts made from just yard and leaf waste showed concentrations totaling up to 5 ppb (BioCycle, 2018).

A study by the U.S. EPA also found that food waste streams are a source of PFAS containing materials, with kitchen waste compost resulting in higher levels of PFAS compared to yard waste compost (U.S. EPA, 2021).

It's important to note that due to growing concern over PFAS contamination in composting streams, BPI initiated a strict policy that limits total fluorine content of 110 mg/kg (parts per million) for all compostable serviceware products. This requirement went into effect in 2019.

Summary of findings

Greenhouse gas emissions

In 2017, the Oregon Department of Environmental Quality (DEQ) conducted a life-cycle analysis (LCA) of compostable packaging and other foodservice ware that evaluated raw materials used, manufacturing processes, transportation systems, and what happens to the waste. The results showed that in most comparisons, the production and use of compostable materials (and composting them) resulted in higher environmental impacts than that of either non-compostable materials, or compostable materials treated via recycling, landfilling, or incineration (Oregon DEQ, 2017). In response to this report, BPI members with expertise in LCA methodology found that the study did not account for how compostable products are linked to value compost and the composting process which is essential for understanding the true environmental footprint of compostable materials.

Flaws in the methodologies, such as outdated or misleading inputs were also noted (BPI, 2021).

The Department of Ecology is currently partnering with WSU to measure and study compost

emission factors in response to the Climate Commitment Act and ongoing actions to address climate change and reduce greenhouse gas emissions. During 2021-2023, research efforts focused on improving understanding and control of air emissions in state compost facilities, alongside advancements in solid waste-to-energy technologies. One of the specific research objectives the partnership undertook was to understand volatile organic compound (VOC) emission factors for commercial compost facilities in Washington which will ultimately be used in the design of a statewide study of emissions from commercial compost facilities in Washington (Karie Boone, 2023).

Toxic chemical contamination

Per and polyfluoroalkyl substances (PFAS) chemicals have traditionally been used in foodservice ware and packaging as they provide oil and grease resistance, water repellency, and leak resistance (Department of Ecology, 2021). It is likely that finished compost from commercial compost facilities that accept food scraps and/or compostable foodservice packaging contain PFAS, however data is limited, and more research is needed. Preliminary data presented by Purdue University in 2018 showed levels of PFAS in a wide variety of commercial organic residual products, including biosolids and nonbiosolids compost. “It is important to note that the measurements were of the <2 millimeters (mm) fraction removed from materials with moisture contents of 5 to 55 percent (relatively dry materials), creating a high bias in the values in comparison to the actual materials. The combined total concentrations of 17 PFAS compounds ranged from about 35 to 200 ppb in biosolids-based products (including composts). In comparison, concentrations in food scraps composts (which included compostable serviceware as a feedstock) ranged from 30 to 75 ppb.

Composts made from just yard and leaf waste showed concentrations of the same 17 PFAS totaling up to ~5 ppb” (BioCycle, 2018).

Similarly, the EPA released a paper in August of 2021 noting that the agency must “better understand the contribution of food waste streams to persistent chemical contamination in compost and digestate, the potential risks to human health and the environment posed by land applying compost and digestate made from food waste, and the most effective strategies to prevent or mitigate the risks and communicate these findings to affected stakeholders” (U.S. EPA, 2021). The paper also noted that while data on PFAS in food waste is limited, referenced several studies that revealed the presence of PFAS in food waste and compost, that PFAS concentrations were higher in kitchen waste compost than green (yard) waste compost, PFAS concentrations were higher in composts with compostable food packaging, and compostable food contact materials have higher PFAS concentrations than non-compostable samples (U.S. EPA, 2021).

It is also challenging to test for PFAS in compost as the EPA-approved laboratory procedures used are intended for drinking water. While the ASTM does have a standard (D7968-17a), commercial labs have developed their own modified method for testing and results vary from one lab to another and may not be comparable (BioCycle, 2020).

The good news is that over the past 15 years PFAS have been largely phased out of use in the U.S. and Canada, and concentrations should start diminishing. Washington State Department of Health (DOH) and Department of Ecology (ECY) established the Alternatives Assessment (AA) in accordance with legislation RCW 70A.222.070 which restricts the manufacture, distribution, and sale in WA of "food packaging in which PFAS chemicals have been additionally added in any amount". The AA will evaluate less toxic chemicals and non- chemical alternatives for food packaging that comes in direct contact with food. While compostable products and compostability were not a direct concern in the AA, some of the alternative products tested were compostable. Certified compostable products, as certified by BPI or CMA, contain 100 ppm or less of PFAS chemicals (Department of Ecology, 2021).

Current infrastructure related to compostable products management

Key findings

Key Finding: A quarter of the 56 compost facilities reporting composting feedstock data to the Department of Ecology accept both yard debris and food scraps. Yard debris is the most common feedstock, as it is being collected in 28 of 30 counties with composting facilities (Zero Waste Washington, 2021). These composting facilities processed a total of 1.27 million tons of feedstock in 2022. Most of this weight came from yard debris and food scraps (~910,000 tons) (Ecology, 2022).

Notes:

- Manure and agricultural organic material are accepted at facilities located in counties with significant agricultural activity in Puget Sound and central and eastern Washington. In addition, counties with high levels of forestry industry process wood waste.
- A total of 10 counties accept more than five types of feedstock in their facilities: Snohomish, King, Whatcom, Pierce, Yakima, Klickitat, Lincoln, Thurston, Walla Walla, and Whitman ((Zero Waste Washington, 2021).

Key Finding: There are 56 composting facilities in Washington state, which include exempt and permitted composting facilities, and biosolids management facilities (Ecology, 2022; Ecology, 2022).

Notes:

- A compost facility may be exempt from permitting if it meets the conditions listed in Table 220-A and (a) through (e) of legislation WAC 173-350-220 (WA State Legislature, 2018).
- Facilities accepting all organic feedstocks and operating at a volume no more than 5,000 gallons or 25 cubic yards of material on-site at any time, may be granted permit exemption

with no additional testing/reporting.

- Facilities accepting all organic feedstocks and operating at a volume greater than 25 but no more than 250 cubic yards of material on-site at any one time, not to exceed 1,000 cubic yards in a calendar year must provide notice 30 days prior to operation.
- A compost facility accepting all organic feedstocks and is larger than 250 cubic yards of material on-site at one time/1,000 cubic yards of material in a calendar year must attain a permit. Permitting requirements are detailed in sections (3)-(11) of WAC 173-350-220 (WA State Legislature, 2018).
- Of these 56 composting facilities, 38% are in the Northwest region, 30% in the southwest region, 16% in the eastern region, and 16% in the central region (Ecology, 2022)

Key Finding: More research is needed to confirm what composting facilities accept compostable products and how many use a pick line to remove inbound compostable products.

Notes:

The information will be requested in organic materials management interviews completed by the Cascadia research team in January and February 2024.

Key Finding: In the US, nearly 50% of food waste facilities are located in California (35), New York (14), Colorado (13), Pennsylvania (10), Washington (9), Texas (9) and North Carolina (9) (BioCycle, 2023).

Notes:

In the US, smaller-scale, independent operations are important players in establishing organic waste processing across the country, with the West Coast leading in number of full-scale facilities (BioCycle, 2023).

Of the 200 US facilities surveyed by BioCycle, 151 are commercially owned, 43 are owned by a municipality, four are run by nonprofits and two are employee-owned (BioCycle, 2023). More than half self- finance, over a quarter receive bank loans, and just under a quarter are financed through state or federal grants (BioCycle, 2023).

Key Finding: 2022 waste characterization data from the City of Seattle and King County reveal that yard debris comprises a majority of the organics stream. Detailed statewide organics characterization data will be available in January 2024 and will provide more insights into the composition of inbound organics by specific material types and region.

Notes:

2022 waste characterization data for the City of Seattle reveals that 69.1% of the organics stream is yard waste, 20.3% is food waste, 8.6% is other accepted compostable material, and the remaining 2.1% is contamination (Cascadia Consulting Group, 2023b).

Similarly, 2022 King County organics composition data show that 69% of the organics stream is yard waste, 10% is food waste, 6% is contaminants, 3% is compostable paper, and 0.3% is compostable plastic (Cascadia Consulting Group, 2023).

Key Finding: In the US, the majority of composting facilities reporting are permitted to accept yard waste and food waste, similar to WA.

Of all 200 facilities reporting in 2023, 142 (71%) accept compostable food contact packaging and 58 (29%) do not (BioCycle, 2023).

Notes:

In the food waste category, over 90% of facilities in the US accept pre-consumer vegetative food waste (e.g., from supermarkets, restaurants); close to 80% accept commercial and institutional source separated pre and postconsumer food waste (BioCycle, 2023).

The largest generators of organic waste are commercial landscapers and tree trimmers, followed by commercial food waste generators.

Key Finding: In WA, the most common composting methods are aerated static pile and turned windrow. Aerated static pile is most common in western WA, while turned windrow method is most common in central and eastern WA. This difference is most likely due to the larger volumes of compost material needing to be processed in western WA (see Figure 2) (Zero Waste Washington, 2021).

Notes:

In the US, the majority of the 200 facilities surveyed use the windrow composting method (75), 46 use aerated static piles (ASP), and 11 use both windrow and ASP (BioCycle, 2023).

Key Finding: During 2016-2018, post-consumer food scraps feedstocks increased across WA, with Lincoln and Walla Walla counties increasing the most (Zero Waste Washington, 2021).

Notes:

Snohomish and King counties recorded the highest increase of mixed composting streams that included yard debris and food scraps (70.1 and 65.5 thousand tons, respectively) (Zero Waste

Washington, 2021).

In WA, feedstock is generally processed locally (within the County where it was produced), but significant inter-county material transport occurs in the Puget Sound and inter-state transport between Oregon and Idaho.

Key Finding: WA has a total of 43 anaerobic digesters producing biogas from organic materials, which can be used to process various types of organic waste, including manure, food scraps, sewage sludge and industrial organic residues (Zero Waste Washington, 2021).

WA also uses vermiculture and black soldier fly, land application, and incineration and energy recovery methods to process organic waste.

Notes:

- Most of these facilities (33) are related to wastewater treatment facilities and nine are farm-based, which aligns with national distribution (only 255 out of 1500 anaerobic digestion facilities in the US are farm-based).
- There are five units in the Monroe Correctional Complex which use vermiculture and black soldier fly methods, processing nearly 15 tons of food waste a month (Zero Waste Washington, 2021).
- There are 15 land application sites holding a solid waste permit in WA.
- Energy recovery facilities processed between 334 and 876 thousand tons of organic materials per year during the period of 2006 to 2017.

Key Finding: A study completed by Zero Waste Washington in 2021 found that the barriers to expanding organic materials management facilities in WA include:

- Logistical challenges (cost of transportation, physical space needs for siting or expanding facilities, unclear zoning)
- Financial burden and risks from relying on government incentives and competition with landfills.
- Regulatory challenges, and variability in application of state regulations, reflecting overburdened staff and lack of needed data.
- Operational issues, including seasonal variation of feedstock types and quantities, nutrient loads of certain organic materials like food waste to composting operations (low-quality products and nuisance odors), and high maintenance costs (anaerobic digesters).
- Physical contamination from municipal sources and chemical contamination from herbicides.
- Moderate to weak demand for end products results from highly competitive prices of standardized chemical soil amendments and fertilizers.

- Under current regulations by the U.S. Department of Agriculture regulations for the National Organic Program, compostable products cannot be accepted as feedstock for certified organic compost.
- Knowledge gaps and local governments hampered by limited budgets and staff to regulate the industry (Zero Waste Washington, 2021).

Notes:

WA state organic materials management barriers align with those reported nationally:

Operational: In the US, 26 facilities noted that improvements or upgrades to their systems were needed – through an improved composting pad and/or working surface. 51/127 facilities have no plans to expand, 48 plan to expand their existing site, and 28 said they will be opening additional food waste composting facilities.

Retrofits: Most composting operations in the U.S. accept yard trimmings only, processing leaves, grass clippings, and woody debris. Many of these sites may be candidates to upgrade to process food waste. Retrofitting existing yard trimmings- only facilities is one path forward to close the infrastructure gap for food waste and food-contact compostable packaging in the U.S (BioCycle, 2023).

Permitting: The permitting process to transition to also accepting food waste can be costly and challenging, creating a meaningful barrier to scaling food waste composting in the U.S. Similar to yard trimmings composting, the permitting requirements vary by state, in some cases quite dramatically. Retrofitting existing facilities may be challenging because of the cost to upgrades, ease of permitting process, time needed to upgrade, and state food waste disposal bans (BioCycle, 2023).

Contamination: Contamination thresholds vary across facilities; some have zero tolerance (45 out of 145 facilities); some report less than 5% (66); less than 10% (15); less than 15% (2); and other reported no set threshold (17) (BioCycle, 2023).

Summary of Findings

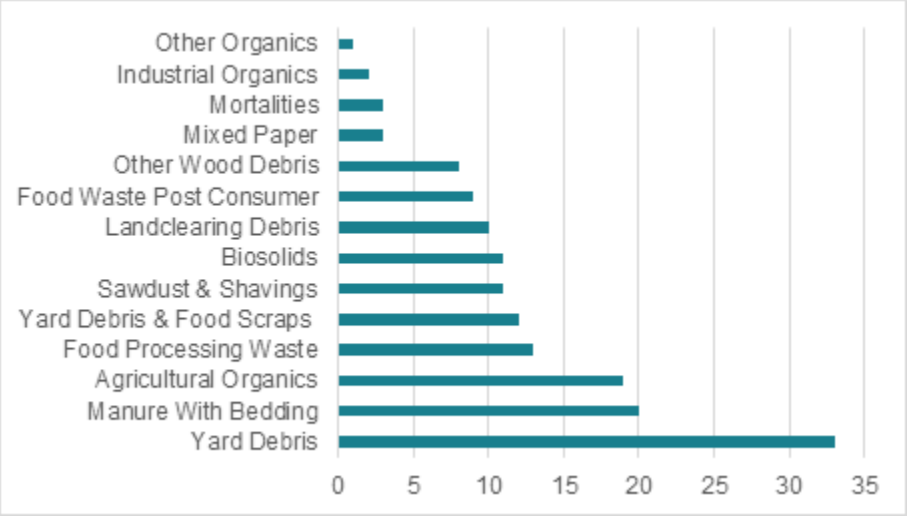
To understand how compostable products are currently managed in Washington state, it is helpful to know what organic materials management facilities are operating across the state and related infrastructure information, such as accepted feedstocks and the amount and types of material processed. In 2022, there were 56 permitted and permit-exempt industrial organic materials management facilities in Washington. Of those facilities, the majority were in the western half of the state, with 21 facilities located in the northwest region and 17 facilities in the southwest. These facilities account for 72% of processed organic material across the state, with nearly half (49%) processed by facilities in the northwest region alone (see Table 1).

Table 1: Washington organic materials management facilities (number & percentage of total facilities) and materials processed annually (tons & percentage of total tons)

Region	Number of facilities	Annual feedstock total tons
Central	9 (16%)	170,512 (13%)
Eastern	9 (16%)	180,851 (14%)
Northwest	21 (38%)	626,322 (49%)
Southwest	17 (30%)	291,443 (23%)
Total	**56**	**1,269,127**

In terms of accepted feedstocks, 21% of facilities reported that they accept yard debris and food scraps,16% reported that they accept post-consumer food waste, and 5% reported that they accept mixed paper (Figure 1 for detailed breakdown).

Figure 1: Number of facilities accepting feedstock types



By weight, yard debris and food scraps represent nearly half (41%) of all processed material at 525,075 tons annually. This information is provided by Ecology's annual report data from organic materials management facilities, and yard debris and food scraps tonnages are reported together. Post-consumer food waste represents less than 5% of all material processed annually at 53,367 tons and mixed paper at 22,367 tons. Appendix A provides the Department of Ecology's annual report data for organic materials management facilities in the state from 2022.

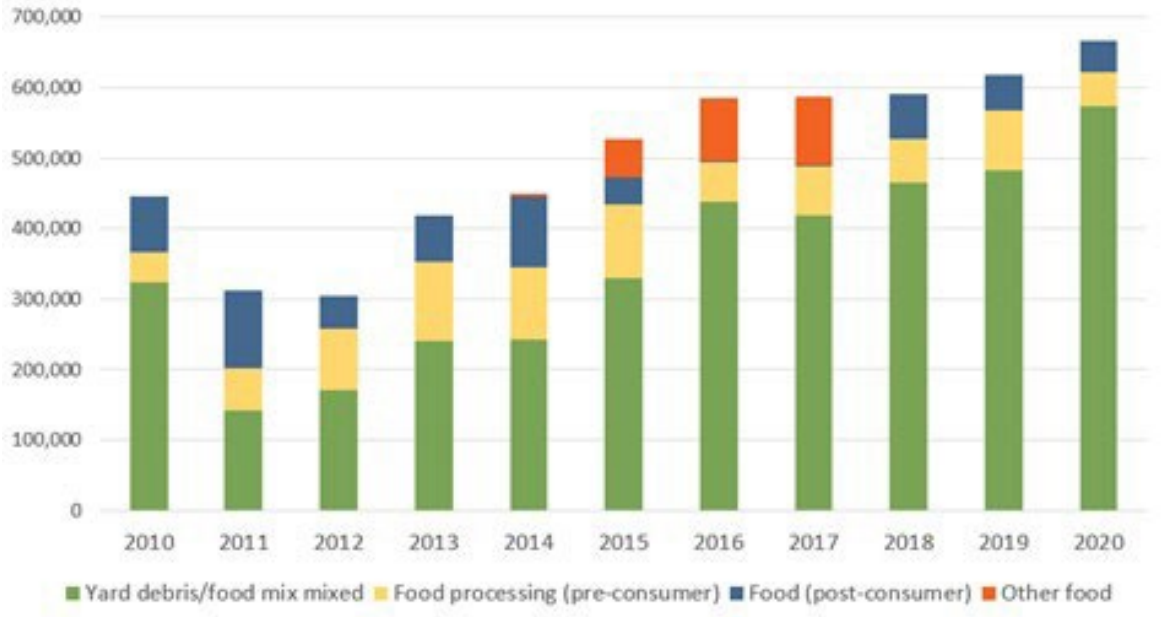
Detailed statewide organics characterization data will be available in January 2024 and will provide more insights into the composition of inbound organics by specific material types and region.

2022 waste characterization data for the City of Seattle reveals that 69.1% of the organics stream is yard waste, 20.3% is food waste, 8.6% is other accepted compostable material, and the remaining 2.1% is contamination (Cascadia Consulting Group, 2023b). Similarly, 2022 King County

organics composition data show that 69% of the organics stream is yard waste, 10% is food waste, 6% is contaminants, 3% is compostable paper, and 0.3% is compostable plastic (Cascadia Consulting Group, 2023).

The amount of food composted in Washington has steadily increased over the past decade, with tons increasing by over 200,000 annually. This increase is directly driven by mixed yard debris and food waste (which does not include post-consumer food waste only). This trend continued in 2022 with mixed yard debris and yard debris and food scraps representing 71% of all processed material at 909,781 tons annually (Ecology, 2022).

Figure 2: Food composted in Washington state (tons), by type



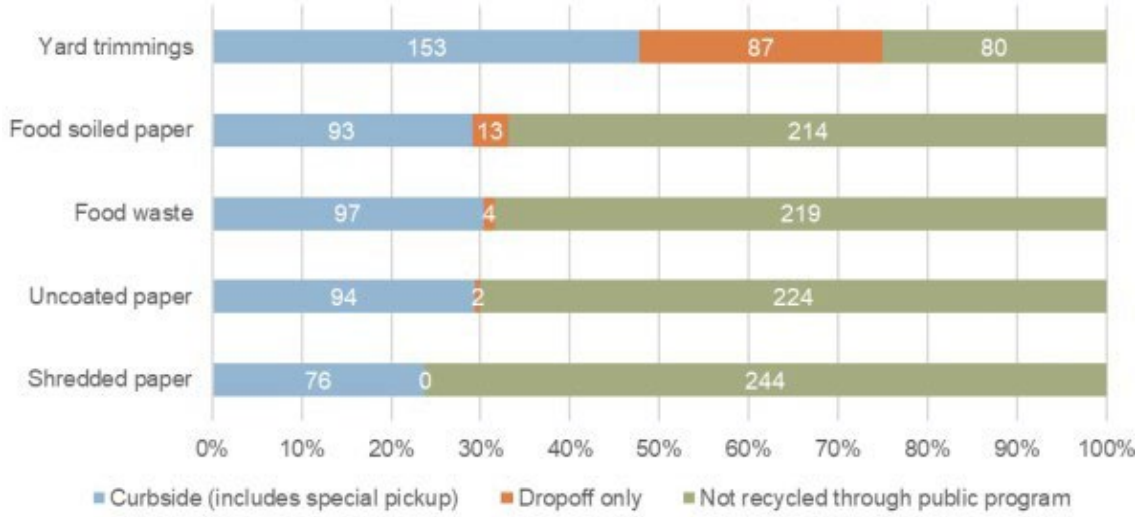
Food processing (pre-consumer): From 2010 through 2016 the amounts shown were Food Processing + pre-consumer veg categories. In 2017 "pre-consumer" was moved to "Other Food" category. Then in 2018 began calling this "Food Process (pre-consumer)."

Other Food: Some compost facilities may have used this category for their food that had compostable packaging.

Source: Washington State Department of Ecology

The type of local organics collection programs available varies across the state. In 2019, 75% of jurisdictions had access to yard trimmings collection through either curbside collection or drop-off, while between 23% and 33% of jurisdictions had access to expanded organics collection including food soiled paper, food waste and food soiled paper. Please refer to Figure 3 for details (Zero Waste Washington, 2021).

Figure 3: Availability of organics collection by jurisdiction (count & percentage of jurisdictions)



Source: Zero Waste Washington

The most common composting methods in the state are actively aerated static piles and turned windrow. Aerated static piles is the most common system in Western Washington and turned windrow is most common in the Central and Eastern regions (Zero Waste Washington, 2021). Eleven out of Washington's 39 counties do not have a commercial organics facility (Ecology, 2022).

Noted barriers for expanding organic materials management facilities in Washington include logistical challenges, such as cost to transport materials, lack of space for expanding facilities, or unclear zoning; competition with landfills and financial burden; regulatory barriers and overburdened staff; operational issues like variation in feedstock quantity and type; physical contamination; and weak demand for end product (Zero Waste Washington, 2021). Similarly, these challenges echo those reported at composting facilities nationally, who note difficulties operating and upgrading facilities due to the cost and time to upgrade, lack of ease of permitting process, high contamination levels, and state food waste disposal bans (BioCycle, 2023).

At the national level, a reported 2% of composting facilities in the U.S. accept and process compostable packaging (Composting Consortium, BPI, 2022). Of facilities that accept food waste, 71% (142 out of 200) report that they also take compostable food-contact packaging. In terms of the types of compostable products accepted, the majority take soiled paper and pizza boxes (83%) followed by certified compostable bag liners (66%) and compostable food-contact bioplastics packaging, such as foodservice ware (62%).

Acceptance of these products is a growing trend, which is up 13% from five years ago.

What is currently missing from the literature is information on the status of acceptance of

compostable products and the development of pick lines for removing compostable products at commercial compost facilities in Washington state. The research team will be conducting facility interviews to gather this information to present to the Advisory Committee.

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An Assessment of the barriers and Needs of Organic Waste Management Facilities in Washington State.

Appendix D. Organic Materials Management Facility Interviews Summary

Memorandum

To: Compostable Products Advisory Committee From: Cascadia Consulting Group

Date: April 2, 2024

Subj: Organic Materials Management Facility Interviews Summary

Purpose & Methodology

The research topics detailed in HB 1033 that are addressed in this memo include:

> (c) Consumer confusion caused by non-compostable products that can lead to contamination issues;
>
> (d) Compostable standards related to the breakdown of products in facilities and home composting;
>
> (e) The status of acceptance of compostable products by organic materials management facilities in Washington, including consideration of organic certifications;
>
> (g) Financial incentives for organic materials management facilities accepting compostable products;

The intent of this memo is to provide the Advisory Committee with information about the presence and impact of compostable products in the organics stream from the perspective and experience of organic materials management facilities throughout the state.

Discussion Questions for Consideration

- What does this research tell us about what is working to achieve "*the state's goal of managing organic materials, including food waste, in an environmentally sustainable way that increases food waste diversion and ensure that finished compost is clean and marketable?*"
- What does the research tell us about what is not working to achieve the state's goal?
- Where do we see opportunities and barriers to improve compostable products management in Washington state?

Methodology

Overview of Research Methods

To gather information about compostable product management, specifically facility operations, production capacity, feedstocks, contamination challenges, and end markets in Washington, Department of Ecology staff provided the Cascadia team with a list of 56 organic materials management facilities operating in the state that are permitted under WAC 173-350-220, WAC 173-308, both, or are exempt but are still required to report annual tonnages to Ecology.

With Ecology's input, Cascadia then selected 27 of these facilities to contact for interviews. The selected facilities span all four regions of the state (Northwest, Southwest, Eastern, and Central), accept a range of materials as feedstock, and use different composting methods. Anaerobic digesters and biosolids-only management facilities were excluded.

Fourteen out of the 27 facilities responded to information requests either through written responses or interviews (52% response rate), shown in Table 1 below. Interview questions are included in Appendix A: Organic Materials Management Facility Interview Guide, and responses are summarized in the following sections. Note that not all facilities responded to all questions, and responses to some questions varied significantly in specificity and consistency between facilities. Where possible, the team has aggregated quantitative responses to protect confidentiality. While composting processes and operations varied widely across facilities interviewed, there were several common considerations and concerns shared, which are summarized in the overarching findings section below.

Table 1. Organic materials management facilities interviewed

Facility	Location	Region
Barr-Tech Composting Facility	Sprague	Eastern
Cedar Grove Composting Co. Maple Valley	Maple Valley	Northwest
Cedar Grove Composting, Inc.	Everett	Northwest
City of Richland Horn Rapids Composting Operation	Richland	Central
Dirt Hugger LLC	Dallesport	Central
Green Earth Technology	Lynden	Northwest
Kittitas County Compost Facility	Ellensburg	Central
Lenz Enterprises, Inc.	Stanwood	Northwest
LRI Compost Factory (Hidden Valley Compost Factory)	Puyallup	Southwest
Natural Selection Farms Composting Facility	Sunnyside	Central
Pierce County (Purdy) Composting Facility	Gig Harbor	Southwest
Port Townsend Biosolids Compost Facility	Port Townsend	Southwest
Silver Springs Organics Composting LLC	Rainier	Southwest
Sudbury Landfill Compost Facility	Walla Walla	Eastern

Findings

Summary

Overarching Findings

While organic materials management facilities are located throughout the state, most of the available existing processing capacity is located in western Washington. All facilities interviewed accept yard waste and some also accept food waste (generally pre-consumer). The five interviewed facilities that accept post-consumer food waste and compostable products are located near larger population centers. All facilities that accept compostable products require them to be certified by either the Biodegradable Products Institute (BPI) or the Compost Manufacturing Alliance (CMA).

While all facilities noted multiple key barriers and challenges associated with accepting compostable products (below), facilities did not indicate any clear incentives, financial or otherwise, for accepting compostable products.

Increased contamination: at facilities that accept compostable products, the products themselves do not appear to cause major problems in the composting process. The main concern with compostable products reported by facilities (from both facilities that accept them and those that do not) was that they are accompanied by an increase in overall levels and variety of contamination. At least one facility interviewed noted that they had begun accepting compostable products in the past but reverted back to excluding them due to the associated contamination challenges they caused. Several interviewees noted that expanding accepted materials to include compostable products causes confusion among residents and businesses, partially due to lookalike products and partially due to misunderstandings about what material is acceptable. A few facilities noted that most of the obvious contamination comes from the residential sector.

Disproportionately higher labor, equipment, and disposal costs: organic materials management facilities (both facilities that accept compostable products and those that do not) reported that compostable products do not add any nutrient value to finished compost. While the compostable products themselves comprise a tiny proportion of feedstock by weight and volume, the associated contamination that comes with these products disproportionately increases the cost of processing material due to additional equipment and staff needed to manage contamination, greater wear and tear on existing equipment, and increased disposal fees for contaminant materials.

Processing capacity: while most facilities reported processing fewer tons of feedstock than their permitted production capacity annually, some noted that production fluctuates significantly over the course of the year. Their production may fall below their capacity for much of the year (and they may even need to occasionally buy material to maintain necessary input ratios), but during peak season they reach or exceed full capacity. Some facilities also noted concerns about space

constraints if they were required to begin accepting additional feedstock from new sources or generators (e.g., adding food waste to yard waste-only facilities).

Feedstock ratios: some facilities noted that while compostable products currently make up a very small percentage of feedstock, substantially higher levels relative to other feedstocks could cause problems in their composting process, requiring them to amend their recipes with higher nitrogen feedstocks or distribute compostable products across loads.

Potential future mandates: several facilities who currently do not accept food waste and/or compostable products expressed concerns about being required to accept this material and potential changes it would necessitate in their operations and business model. A few facilities specifically noted that they are first and foremost compost manufacturers focused on producing a quality end product, not waste management facilities.

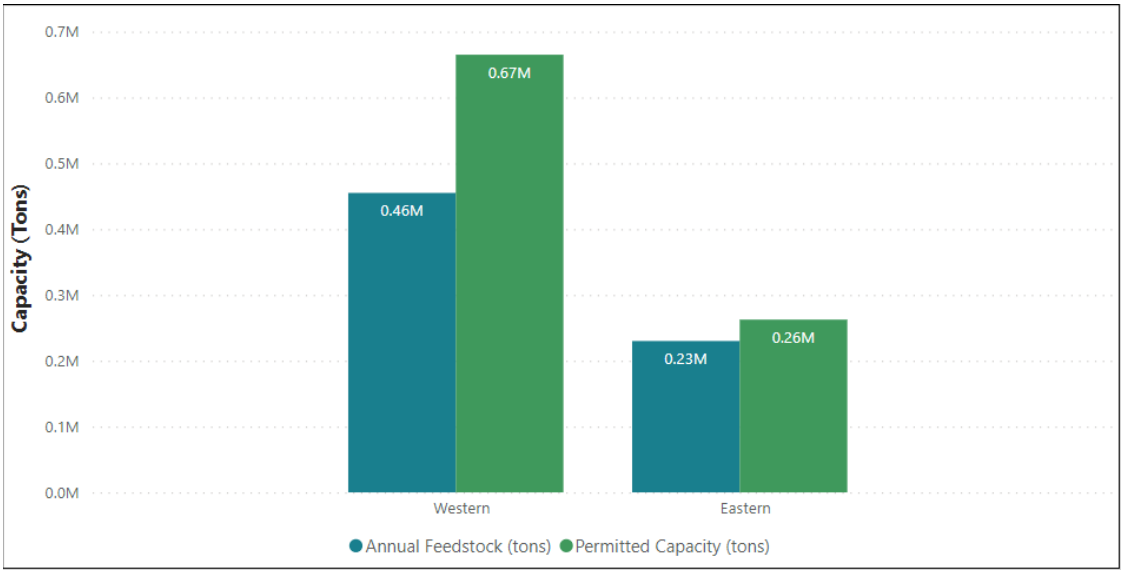
Composting Methods

The composting methods and processing times used by organic materials management facilities vary across the state. Aerated static pile composting was the most common technology used, with six facilities only using this method and another three using a combination of aerated static pile, aerated windrow, and in-vessel composting. Three facilities reported using only aerated windrow composting, and two reported using in-vessel technology only. Composting process length varied by type of composting method and even between facilities using the same type of composting process. Facilities reported processing times of as little as 35 days to as long as six months depending on the time of year and curing needs.

Capacity

Facilities' permitted capacity and tons of feedstock processed annually are shown in Figure 1 (grouped by region to preserve confidentiality).[1] Note that this figure only includes facilities who responded to this question and does not present a full picture of actual capacity or production in the state. While there appears to be additional processing capacity in western Washington, several facilities noted that production fluctuates significantly over the course of the year, and they can reach or exceed their full production capacity during peak season.

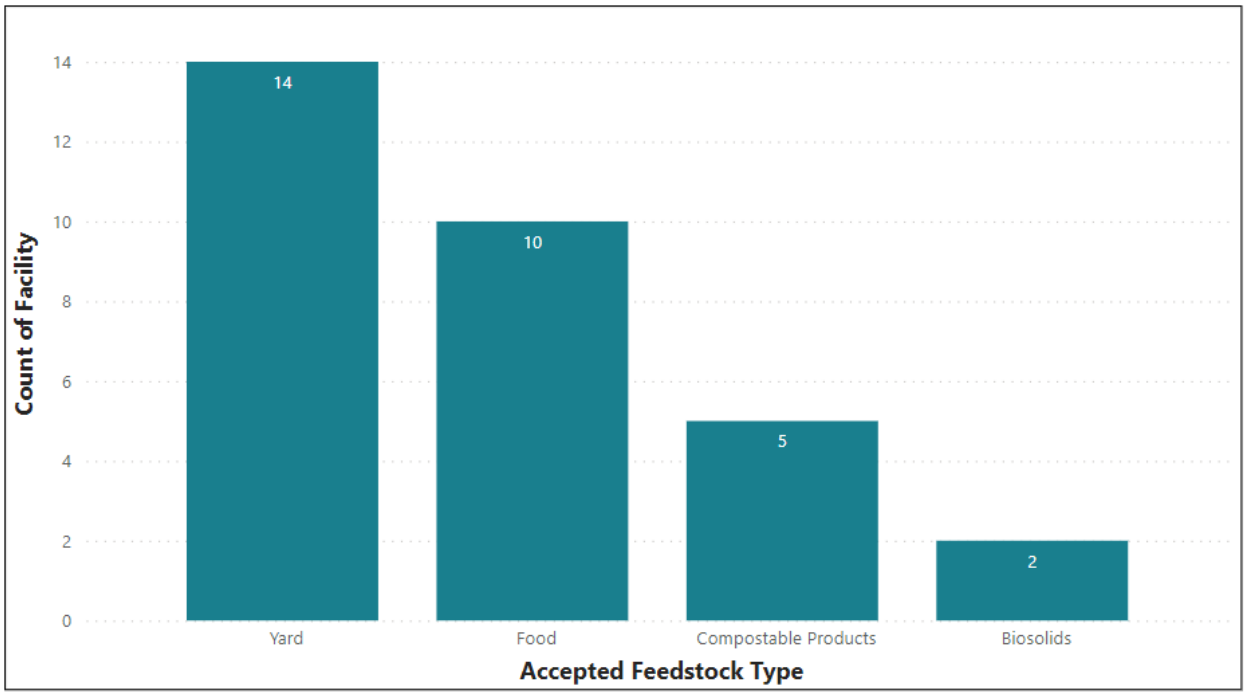
Figure 1. Organic materials management facility capacity (tons)



Accepted Feedstocks

All organic materials management facilities interviewed reported that they accept organics from commercial and residential generators, and most facilities reported accepting organics from agricultural generators. Facilities in eastern Washington closer to agricultural production areas of the state reported higher proportions of agricultural waste as a feedstock. All facilities interviewed accept yard waste, ten facilities accept food waste, five accept compostable products, and two accept biosolids.

Figure 2. Accepted feedstocks by number of facilities



Facilities That Do Not Accept Compostable Products

Nine out of the 14 facilities reported that they do not accept compostable products citing the following reasons:

- Accepting compostable products leads to increased contamination levels and types, which increase the time, labor, equipment, and associated costs required for quality control and processing. One facility noted that they used to accept compostable materials but had to stop due to the contamination and other issues they were causing in their process.

A few facilities reported that they do not accept compostable products because they produce organic compost and need to maintain their Washington State Department of Agriculture (WSDA) or Organic Materials Review Institute (OMRI) certification. If compostable products were approved as feedstock for organic compost, these facilities noted that they would be more inclined to accept them, as organic certification improves the marketability of their compost. Facilities would also not need additional space or processing equipment to separate piles of compost with compostable products from those without (which is currently the practice for any facilities who produce both an organic and a conventional compost product).

To accept compostable products in the future, these facilities stated that significant infrastructure changes would be required, specifically citing:

- Updated equipment
- More staff

- Increased space
- Additional screening equipment

According to the facilities interviewed, high contamination levels demand more labor and time spent removing contaminants before and after processing feedstock. Given that accepting compostable products can lead to contamination via non-compostable lookalike products, additional staff and screening equipment are needed to distinguish between the two. Due to these necessary changes, most of facilities (six out of nine) that do not accept compostable products are not planning to change the types of feedstocks they currently accept.

Facilities That Accept Compostable Products

All facilities that accept compostable products require them to be certified by either the Biodegradable Products Institute (BPI) or the Compost Manufacturing Alliance (CMA). Only two of the five facilities reported the specific types of compostables products accepted, and those two facilities accept both compostable paper and plastic products and packaging.

None of these facilities reported that they screen out or remove compostable products before the feedstock is processed, nor did they report that there were any issues with the disintegration of compostable products themselves. While the compostable products themselves comprise a tiny proportion of feedstock by weight and volume, the associated contamination that comes with these products disproportionately increases the cost of processing material due to additional equipment and staff needed to manage contamination, greater wear and tear on existing equipment, and increased disposal fees for contaminant materials. Additionally, all these facilities noted that—despite anecdotally increasing feedstock volume—compostable products do not add any nutrient value to their finished compost.

According to four out of the five facilities that accept them, compostable products do not directly impact the marketability of their finished compost. One facility noted that accepting compostable products has led to hesitancy among food growers to use their compost.

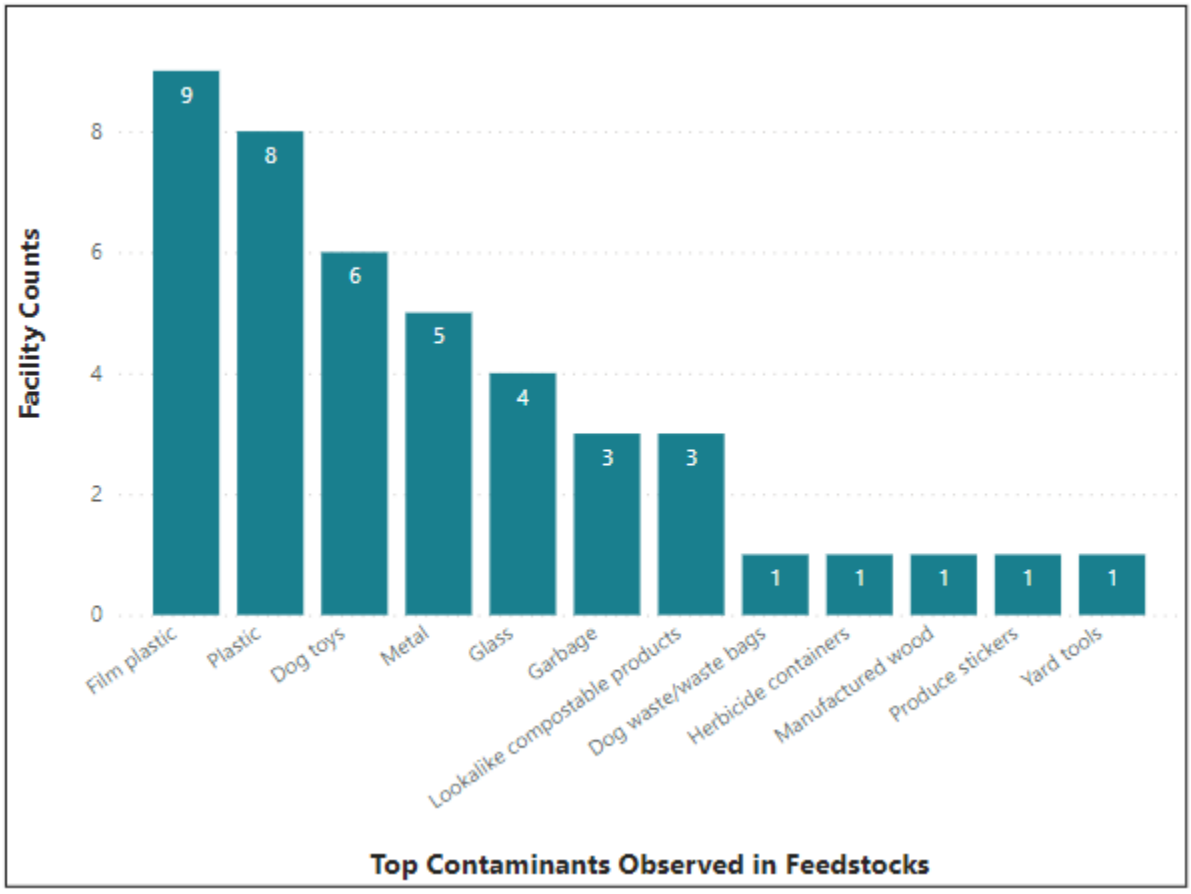
Overall, compostable products comprise a very small amount of incoming feedstock (by weight and volume) and do not pose visible issues in finished compost. Several facilities, however, expressed concerns about heightened levels of incoming compostable products in the future and the contamination issues that they may bring.

Consumer Confusion and Contamination

Contamination is a major issue reported across all facilities interviewed. The top five most commonly reported contaminants include film plastic (including garbage bags, non- compostable plastic bags, and other types of plastic film), other plastic (including beverage containers, condiment packets, single-use food serviceware, etc.), dog toys, metal (including utensils), and glass. Other specific contaminants mentioned include garbage (including “malicious

contamination," or bags of residential garbage deliberately put into the organics stream), compostable product lookalikes, herbicide containers (from landscaping operations), manufactured wood, produce stickers, and yard tools. Over half the facilities that accept compostable products named compostable product lookalikes as a common contaminant.

Figure 3. Contamination by number of facilities



To address contamination, most facilities reported having a sorting process including both manual sorting and multiple screening processes. Contamination issues have resulted in some facilities needing to use smaller screens or screen compost multiple times. Some facilities also use specialized equipment like vacuum airlift separation units and specialized screens. Despite the extra time and equipment needed to address these contaminants, remnants of contamination can still be visible in finished compost. For example, some facilities noted that stickers and plastic film shreds can be visible in finished compost which can deter customers, despite the contamination levels still being below legally allowable thresholds.

In addition to needing staff to inspect incoming loads and remove obvious contamination, some facilities who do their own hauling also noted higher labor costs required for training drivers to evaluate contamination levels as well as customer service representatives to engage with and

educate customers to try and keep their feedstock streams as clean as possible. Facilities also noted higher costs for existing equipment and machinery due to additional wear and tear from contaminant materials, as well as increased disposal fees for non-compostable residual material.

Financial Incentives

Nearly half the facilities interviewed reported having contracts with municipalities to accept feedstocks from various sectors. Several facilities reported having contracts directly with haulers, and some facilities are publicly owned operations affiliated with a city or county.

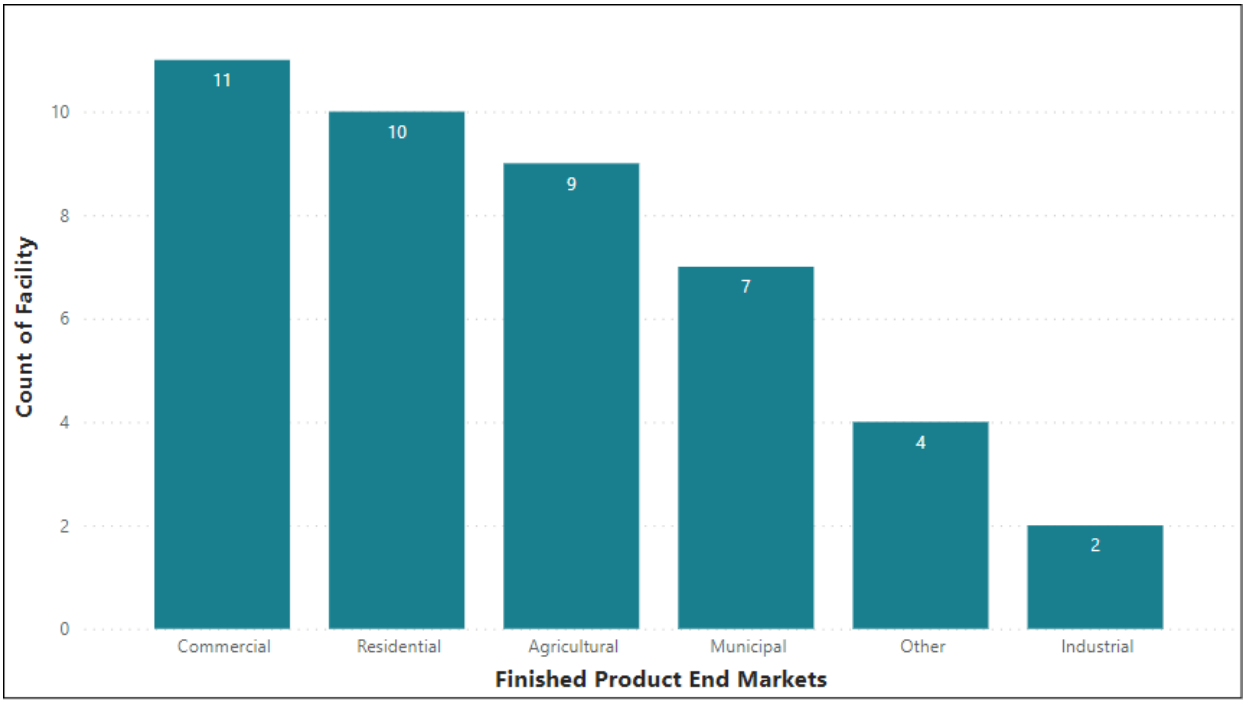
Several of the facilities with municipal contracts accept compostable products. No facilities interviewed reported receiving any type of financial or other incentive to accept compostable products, though they would be interested in incentives to help offset the additional costs associated with accepting them.

Accepting compostable products as feedstock typically requires adjustments to the composting process used by facilities. When asked what equipment and facility upgrades would be needed to accept compostable products, facilities indicated they would need more space, new/updated equipment, and more staff to handle them. Facilities did not provide cost estimates for necessary facilities upgrades, however one facility shared that they would need to build an entirely new facility to accommodate compostable products, with a cost estimate of around $4 million.

End Markets for Compost

Facilities sell their finished compost to a variety of end markets. The majority sell to a mix of end markets mostly focused on the commercial and residential sectors, and a few have a direct relationship with a wholesaler who purchases 100% of their compost product. Several facilities sell to agricultural users, especially those that accept large amounts of agricultural feedstock. Several facilities also sell their compost to municipal or other public sector users, for example, erosion control or biofiltration projects as part of new development or transportation projects.

Figure 4. Finished compost end markets by number of facilities



Composting Consortium Contamination Report

In March of this year, the Composting Consortium published a new report on contamination at compost facilities. The report found that:

- Facilities spend about a fifth of their operating costs on addressing contamination.
- 85% of the contamination detected at composting facilities was conventional plastic.
- Accepting compostable packaging did not necessarily lead to greater levels of contamination, and that "most composters had contamination irrespective of whether or not they accept compostable packaging."
- Every facility implemented hand-sorting for contamination at some point in their process, but that facilities with sort lines and other mechanical processes spent half as much time decontaminating feedstock as those without machinery
- Compostable packaging was largely performing as advertised, as eight out of nine participating facilities had no detectable amounts of the material in their finished compost.
- Composters surveyed spent an average of 21% of their operating costs on contamination removal and in some cases tip fees did not cover these costs. Even still, 40% of the composters surveyed still had some plastic in their finished product.

Based on the findings from the study, the Composting Consortium encourages advocating for legislation that makes compostable packaging more uniform and chastises lookalikes. They also noted that growing extended producer responsibility programs could provide an opportunity for

composters, such as allocating available revenue for educational campaigns and other efforts to reduce contamination.

Next Research Steps

The Cascadia research team will address the remaining research questions below in the final research summary to the Advisory Committee:

- Current laws related to compostable products and the enforcement of these laws;
- Any work product from other contemporaneous stakeholder advisory committees currently discussing similar topics in other jurisdictions or nationwide; and
- Policy options addressing contamination of organic waste streams and to increase the use of reusable and refillable items.

Organic Materials Management Facility Interview Guide Interview Questions

General operations

- What composting method(s) does your facility currently use? Please describe your operations in more detail.
    a. Aerated windrow composting
    b. Aerated static pile composting
    c. In-vessel composting
    d. Vermicomposting
    e. Other methods

How long does your composting process take?

How many tons of compost do you produce annually? What is your annual production capacity?

What are your total annual operating costs? Feedstock

From which sources/generators do you currently accept feedstock?

    f. Residential
    g. Commercial
    h. Industrial
    i. Agricultural

What percentage are located in Washington?

Which types of feedstock do you currently accept? Are they pre- or post-consumer or both?

    j. Agricultural waste (edible and inedible crop waste)

k. Yard waste only
l. Food and yard waste only
m. Food, yard waste, and compostable products
n. Do you accept both compostable fiber and compostable plastic products, or just fiber?

Do you have contracts with any municipalities to accept feedstock? From which sectors? Are there any incentives built into those contracts to accept compostable products?

Do you have a USDA/WSDA organic certification?

[If yard or yard/food waste only]

Why don't you currently accept compostable products as feedstock?

What equipment upgrades or other infrastructure would you need to accept food waste or compostable products? Have you looked into how much this would cost?

[if facility has an organic certification and therefore doesn't currently accept compostable products]

How much would you need to be compensated for the loss of your organic certification to begin accepting compostable products in your feedstock?

[If compostable products are accepted]

Do you have any standards or requirements for compostable products (i.e., required certifications, etc.)?

Do you remove compostable products prior to composting (i.e., are they actually composted or are they screened out)?

Have you observed any issues with these products in your process (e.g., do they fully break down in your facility, do you have thresholds above which you cannot accept more compostable products, etc.)?

Do compostable products add any benefits to the resulting finished compost product? Please describe.

How has expanding operations to accept compostable products affected your operations (e.g., has it increased feedstock volume and led to more production and revenue, has it increased contamination levels, has it resulted in higher costs for labor, time, and equipment required to remove contaminants, etc.)?

Would you be willing to share photos of your finished compost product?

Contamination

- What are the top contaminants you observe in feedstocks? How do they differ by generator/sector?

What processes or equipment do you use to address contamination? What issues do these contaminants cause in processing or marketing your finished product? Have you quantified the financial impacts of these issues?

Do you conduct any quality testing or testing related to amounts or types of contamination in your feedstock and/or finished compost product? Any testing related specifically to compostable products (e.g, microplastics, PFAS or other chemicals of concern, etc.)?

How do compostable products impact the marketability of your final product?

Do you have any plans to change which types of feedstock you will accept in the future?

Incentives and End Markets

- Do you receive any financial or other incentives to accept compostable products as feedstock? Do you know of any other models or programs that incentivize accepting compostable products?

What end markets do you sell your finished product to? Please be as specific as possible.

a. Residential
b. Commercial
c. Municipal
d. Agricultural
e. Industrial
f. Other

Other

- Is there anything else you'd like us to know?

Do you know of any other large organics management facilities in the state we should be talking to? If so, can you share contact information for relevant facilities?

Full List of Permitted Organic Materials Management Facilities in Washington Contacted for Interviews

#	Facility	City	County
1	Bailand Farms Yardwaste (Bailey) Compost	Snohomish	Snohomish
2	Barr-Tech Composting Facility	Sprague	Lincoln
3	Brown to Green Composting	Winthrop	Okanogan
4	Cedar Grove Composting Co. Maple Valley	Maple Valley	King
5	Cedar Grove Composting, Inc.	Everett	Snohomish
6	Centralia Wastewater Treatment Plant	Centralia	Lewis
7	Cheney Wastewater Treatment Plant	Cheney	Spokane
8	City of Richland Horn Rapids Composting Operation	Richland	Benton
9	Cowlitz Valley Compost	Longview	Cowlitz

10	Dirt Hugger LLC	Dallesport	Klickitat
11	Green Earth Technology (Compost)	Lynden	Whatcom
12	Kittitas County Compost Facility	Ellensburg	Kittitas
13	La Conner Wastewater Treatment Plant	La Conner	Skagit
14	Lenz Enterprises Inc	Stanwood	Snohomish
15	LRI Compost Factory (Hidden Valley Compost Factory)	Puyallup	Pierce
16	Natural Selection Farms Composting Facility	Sunnyside	Yakima
17	North Mason Fiber Co	Belfair	Mason
18	Olympic Organics LLC	Kingston	Kitsap
19	Pacific Topsoils - Maltby	Woodinville	Snohomish
20	Pierce County (Purdy) Composting Facility	Gig Harbor	Pierce
21	Port Townsend Biosolids Compost Facility	Port Townsend	Jefferson
22	Quincy Compost	Quincy	Grant
23	Silver Springs Organics Composting LLC	Rainier	Thurston
24	Skagit Soils Inc	Mount Vernon	Skagit
25	Stemilt World Famous Compost Facility	Wenatchee	Chelan
26	Sudbury Landfill Compost Facility	Walla Walla	Walla Walla
27	Winton Compost Facility	Leavenworth	Chelan

Appendix E. Types of Compostable Products Produced and Disposed in Washington, Based On 2024 Product Registry And 2022-2023 Statewide Organics Characterization Study

Memorandum

To: Compostable Products Advisory Committee From: Cascadia Consulting Group, Inc.

Date: January 3, 2024

Subj: Types of compostable products produced and disposed in Washington, based on 2024 product registry and 2022-2023 statewide organics characterization study

Purpose & Methodology

The research topics detailed in HB 1033 that are addressed in this memo include:

> (b) The types of compostable products, and amounts if known, sold or distributed in Washington
>
> (f) Estimates of the percentage of compostable products used in Washington that are disposed[1] of at organic materials management facilities.

The intent of this memo is to provide the Advisory Committee with data on upstream (types and amounts of compostable products distributed) and downstream (percentage of compostable products disposed at commercial compost facilities) compostable products data. In other words, we are aiming to answer the question: Out of the amount and types of compostable products generated, how much of each type are ending up at commercial compost facilities?

The Cascadia research team is currently attempting to compile data on the amount of compostable products sold or distributed in Washington, and as such, it is likely that a future research memo will continue to answer the research questions outlined above.

Discussion Questions for Consideration

- What does this research tell us about what is working to achieve "the state's goal of managing organic materials, including food waste, in an environmentally sustainable way that increases food waste diversion and ensure that finished compost is clean and marketable?"

- What does the research tell us about what is not working to achieve the state's goal?
- Where do we see opportunities and barriers to improve compostable products management in Washington state?
- Are there findings that do not align with your experience? If so, what is the difference?

Methodology

Overview of Research Methods

The Cascadia team used the following research methods to understand data points related to compostable products' sales, distribution, and disposal in Washington state.

Types of compostable products produced in Washington: The Cascadia research team analyzed the list of compostable products declared by producers with Ecology as of January 1, 2024, as required by Washington's Plastic Product Degradability Law (RCW 70A.455). The analysis looks at the number of declared products by product type, material type, brand, and producer.

Amount of compostable products (specifically film bags and film products, food packaging, and food service products) sold or distributed in Washington: The research team is requesting data from producers that have declared products through Ecology as well as other distributors and manufacturers recommended by Advisory Committee members. We anticipate that this information will be challenging to receive, and the research team will make multiple requests to receive this information. It may not be possible to present a complete picture of the number of products sold or distributed in Washington to the Advisory Committee.

Amount of compostable products disposed at organic materials management facilities: Cascadia analyzed preliminary results from the 2022-2023 statewide organics and recycling characterization study, which Cascadia conducted for the Washington State Department of Ecology.[2] The study is not yet final and the results have not been published. Cascadia also referenced the 2020 – 2021 Waste Characterization Study completed for the Washington State Department of Ecology to compare estimated annual tonnages of compostable products and food waste disposed in the landfill, recycling and organics.

Waste Characterization Study Methodology

The data presented includes the composition of inbound residential organics broken out by material types and classes, such as single-use food service compostable paper, PLA compostable food packaging, yard debris, and food. The complete statewide study report is available here.

The study was completed across four regions of the state (Central, Eastern, Northwest, and Southwest) during four separate seasons (fall, winter, spring, and summer), and included

commercial and residential (single-family and multifamily) generators. For detailed information on the study definitions, such as the recoverability groups (widely accepted, limited accepted, potentially recoverable, non- recoverable) and material list and definitions, please refer to Appendix C and D.

Findings

Summary

Overarching Findings

By weight, compostable products are a small fraction of the material disposed in residential organics. However, this metric may not accurately reflect the impact of the presence of compostable products in the organics stream for three reasons:

- These products are lightweight, much more so than food and yard debris.
- The commercial sector is a notable gap in the available data, and compostable products likely represent a bigger piece of the organics stream than reported.
- Garbage data from the most recent 2020-2021 statewide waste characterization shows that there is the potential for many more compostable products to enter the organics stream if diversion rates increase.

The statewide organics characterization study and the state's list of producer-declared compostable products provide insightful data into the upstream and downstream impacts of compostable products. However, more information is needed to truly understand the percentage of compostable products used in Washington that are disposed of at organic materials management facilities. While comparing statewide waste characterization study data from 2020-2021 to statewide organics characterization study data from 2022-2023 suggests that significantly more compostable products (and food) are disposed into the landfill than to organics facilities, obtaining data on the amount of products sold or distributed in the state has the potential to provide a more complete picture.

Depending on response rates and completeness of the sales data the Cascadia research team receives from manufacturers and distributors, it may be possible to compare the estimated number of units (or weight of material) sold or distributed in the state to the number of units or weight of products disposed at compost facilities.

Producer Declared Compostable Products

As of January 1, 2024, there are 168 compostable products that producers have declared to Ecology. Of these, there are 21 different product types, 10 material types, and 43 brands

manufactured by 26 producers. Top level findings include:

- Bags make up a significant portion of the types of declared products, with 51 different types of bags, followed by 24 different cups, and 10 other food service products.
- PLA (polylactic acid) is the most common material type and is used in 54 different product types (which includes containers with lids and no lids, cups, mixed cutlery, bags, forks, knives, spoons, clam shells, portion cups, other food service products, food wraps, wrapped straws, and lids for food containers). PBAT (polybutylene adipate terephthalate) is used in 47 different products, namely bags, followed by wood/other fiber that is lined which is used in 26 different products.

Please refer to Appendix A: Producer Declared Compostable Products Data for more information.

Statewide Organics Characterization Study

Findings

- An estimated 897,700 tons of organics are collected annually statewide. Residential organics account for an estimated 71% (637,000 tons), and commercial organics account for the remaining 29% (260,700 tons). Nearly 90% of all organics are collected and disposed from the Northwest (60%) and Southwest (29%) regions.
- Statewide, an estimated 97.6% of the residential organics consisted of materials that are widely accepted in curbside organics programs. The total organics disposed by all regions consisted of 97% or more widely accepted compostable materials, and the central region had the greatest proportion of widely accepted compostable materials (nearly 100%). All other materials accounted for the remaining 2.4% (15,256 tons).
- Yard debris made up the majority of residential organics (88% or 562,476 tons), while food only comprised 6% (39,748 tons) and compostable food service products and packaging accounted for less than 2% as follows:
    - Single-use Food Service Compostable Paper and Compostable Paper Products accounted for 1.2% (7,322 tons)
    - PLA compostable materials accounted for 0.1% (899 tons). Most of the PLA products were plastic bags and film (818 tons).
- More tons of compostable food service products and packaging were disposed in residential organics than in residential recycling. An estimated 2.6% (4,508 tons) of residential recycling consisted of widely and limited accepted compostable materials. Of that material, roughly half consisted of compostable food service products and packaging (2,287 tons) and half consisted of food (2,050 tons). Most of the compostable food service products and packaging was Single-use Food Service Compostable Paper (1,389 tons).
- Comparison against other studies indicates that significantly more food and compostable food service products and packaging are collected and disposed in landfills than compost

facilities. Data from the 2020 - 2021 Statewide Waste Characterization Study revealed that 18.9% (446,436 tons) of residential garbage consisted of food waste, and compostable products and packaging (which includes paper and PLA) made up 7.5% (178,473 tons).3 Please note that this study should not be used as a direct comparison with the 2022-2023 statewide organics study.

- Materials that contaminate the organics stream comprise just over 2% of residential organics. The three most prevalent potentially recoverable or non-recoverable materials were: animal manure & litter (0.3%); construction & demolition waste (0.1%); and remainder composite paper products (0.1%). While these tonnages are small compared to the other material types, this data does not necessarily reflect the full impact of non-compostable materials present in the organics stream. We hope to gain more information through interviews with the compost facilities to understand how these materials impact operations and quality of finished compost.

Please refer to Appendix B: Statewide Organics Study Figures and Composition Tables for more information.

Data Limitations

The following limitations should be considered when reviewing the data:

- Collection programs vary widely throughout the state and no single recoverability framework will fully depict which materials are accepted in each program and what end markets are available. As a result, applications of these statewide results should carefully consider regional recoverability and market differences.
- Waste characterization studies do not account for the potential use of pick lines at compost facilities to remove materials from the stream before the composting process. If compostable products are removed by facilities during this process, this data is not captured in the information presented.
- The sampling plan for the study resulted in some data limitations, such as low sample counts for the commercial sector, which does not allow for providing estimated tonnages and composition for commercial generators.
- Composition estimates provided in the composition tables are rounded such that 0.0% indicates a composition estimate of less than 0.5% and a dash (“-”) indicates a true zero.
- Material types with large confidence intervals (or error ranges) for non-compostable products (relative to the estimated composition) means that one should not adhere too closely to specific estimates. For example, instead of saying with certainty that mixed paper products account for 0.1% of the residential organics stream in the central region, it would be more accurate to say that mixed paper products are present in a very small amount in the organics stream, and potentially more so than other non-compostable products like packaging film plastic, plastic garbage bags, etc.

Key Findings

Statewide Organics Characterization Study

Key Finding: Widely accepted compostable materials comprised 97.6% (621,744 tons annually) of residential inbound organics.

Notes:

- Yard Debris accounted for 88.3% (562,476 tons)
- Food accounted for 6.2% (39,748 tons)
- Other Organics accounted for 1.9% (12,197 tons)
    - Clean Wood accounted for 1.9% (12,131 tons)
    - Other Compostables accounted for 0.0% (66 tons)
- Paper accounted for 1.2% (7,322 tons)
    - Compostable Paper Products accounted 0.8% (4,782 tons)
    - Single-use Food Service Compostable Paper accounted for 0.4% (2,540 tons)

Key Finding: Limited accepted compostable materials comprised 0.2% (1,434 tons) of residential inbound organics.

Notes:

- PLA compostable materials accounted for 0.1% (899 tons):
    - PLA Compostable Plastic Bags & Film accounted for 0.1% (818 tons)
    - PLA Compostable Food Packaging accounted for 0.0% (58 tons)
    - PLA Compostable Plastic Utensils accounted for 0.0% (23 tons)
    - Other Compostable Paper Packaging accounted for 0.1% (535 tons)

Key Finding: Other materials (which includes potentially recoverable, non- recoverable, widely accepted recyclable and limited accepted recyclable) comprised 2.2% (13,822 tons) of residential inbound organics.

Notes:

The three most prevalent potentially recoverable or non-recoverable materials were: Animal Manure & Litter (0.3%); Construction & Demolition Waste (0.1%); and Remainder Composite Paper Products (0.1%).

The three most prevalent widely or limited accepted recyclable materials were: Cardboard & Kraft Packaging (0.7%); Mixed Paper Packaging (0.2%); and Other Polycoated Packaging (0.1%). Some of these materials may be accepted in the organics stream.

Key Finding: The residential organics composition by material class was similar across all four regions. The Northwest and Southwest regions did have an increased presence of food, paper, and other organics. Note that the paper material class is a combination of Paper Packaging and Paper Products classes which include some non-compostable materials such as Aseptic and Gable Top Containers. See Figure 3.

Notes:

As the data indicates, programs in the Central and Eastern regions do not accept much food waste in their organics collection.

- Central: 0% paper, 0% food, 98% yard debris, and 1% other organics.
- Eastern: 0% paper, 1% food, 98% yard debris, and 1% other organics.
- Northwest: 3% paper, 8% food, 87% yard debris, and 2% other organics.
- Southwest: 2% paper, 5% food, 88% yard debris and 5% other organics.

Key Finding: Nearly 90% of all estimated annual organics tons in the state are generated by the northwest (60%) and by the southwest (29%) regions. See Figure 5 and Figure 6.

Notes:

The overall statewide per capita rate of organics collection is estimated at 0.12 tons per year.

The Northwest and Southwest regions generate roughly double the tons per capita than the Central and Eastern regions.

- Central generates 0.05 tons per capita.
- Eastern generates 0.07 tons per capita.
- Northwest generates 0.14 tons per capita.
- Southwest generates 0.12 tons per capita.

The Northwest and Southwest regions also generate significantly more commercial organics tons than the Central and Eastern regions. However, it is important to note that Not all haulers report tons to Ecology, especially open- market commercial organics haulers, and the tons reported only represent a portion of all recycling and organics waste generated in Washington State.

- Central: 49% (17,100 tons) commercial, 51% (17,900 tons) residential
- Eastern: 11% (6,800 tons) commercial, 89% (57,800 tons) residential
- Northwest: 19% (101,500 tons) commercial, 81% (434,700 tons) residential
- Southwest: 52% (135,300 tons) commercial, 48% (126,600 tons) residential

Key Finding: There was minimal variation in the composition of inbound residential organics substreams (food & yard debris vs. yard debris only), with a 3% increase in food for residential substreams that accept food & yard debris. See Figure 7.

Notes:

In the food and yard debris substream, 2% of the materials consisted of paper, 4% consisted of food, 92% consisted of yard debris, and 2% consisted of other organics.

In the yard debris only substream, 1% of materials consisted of paper, 1% consisted of food, 97% consisted of yard debris, and 1% consisted of other organics.

Producer Declared Compostable Products

Key Finding: There are 168 producer declared compostable products that consist of 21 different product types, 10 material types, and 43 brands manufactured by 23 producers in Washington. The compliance rate of producers for declaring compostable products is unknown.

Notes:

The top five most common product types are bags (51), cups (24), Other food service products (10), unwrapped straws (9), and plates (9).

The top five most frequently used material types are:

- PLA (polylactic acid): used in 54 declared products and 14 different product types.
- PBAT (polybutylene adipate terephthalate): used in 47 declared products and only two product types (bags and other food service products).

- Wood/other fiber (lined): used in 26 declared products and 8 different product types.
- Sugarcane (bagasse): used in 14 declared products and 9 different product types.
- Wood/other fiber (mixed materials): used in seven declared products and four different product types.

Key Finding: The 10 material types used in compostable products include: Bamboo, cellulose bioplastic, other bioplastics, other materials, PBAT (polybutylene adipate terephthalate), PLA (polylactic acid), wood/other fiber (lined), wood/other fiber (mixed materials), sugarcane (bagasse), and starch-based bioplastic.

Notes:

Bamboo: Six declared products and three different product types (forks, knives, and spoons).

Cellulose bioplastic: Six declared products and two different product types (wrapped and unwrapped straws).

Other bioplastic: One declared product and one product type (bags)

Other materials: Five declared products and four different product types (Containers no lids, bags, unwrapped straws, and other sheet film products).

PBAT (polybutylene adipate terephthalate): 47 declared products and two different product types (bags and other food service products).

PLA (polylactic acid): 54 declared products and 14 different product types (containers no lids, cups, mixed cutlery, bags, forks, knives, spoons, clam shells, portion cups, other food service products, containers with lids, food wraps, unwrapped straws, and lids for food containers).

Wood/other fiber (lined): 26 declared products and eight different product types (bowls, cups, portion cups, plates, boxes for food, containers no lids, lids for food containers, and other food service products).

Wood/other fiber (mixed materials): Seven declared products and four different product types (wrapped straws, unwrapped straws, other food service products, and plates).

Sugarcane (bagasse): 14 declared products and nine different product types (bowls, clam shells, containers no lids, plates, trays, hinged containers, containers with lids, cups, and lids for food containers).

Starch-based bioplastic: Two declared products and one product type (bags).

Next Research Steps

To continue answering the research questions posed in this memo, the Cascadia research team will:

- Conduct interviews with organic materials management facilities to help evaluate the presence and impact of compostable products in the organics stream.

Research if organics (specifically food) diverted from landfill increases through the use of compostable products. The research team will answer this question by reviewing past statewide waste characterization studies to see if the amount of organics and food has decreased over time as well as gather more insight during facility interviews and policy-related interviews with jurisdictions.

Attempt to compile data on the amount of compostable products sold or distributed in Washington. Based on the response rate and data received, the research team will compare this data with the amount of compostable products disposed downstream as a way to estimate the percentage of compostable products disposed at compost facilities.

Review the 2022-2023 statewide recycling study to determine the amount of single- use plastics disposed through inbound recycling programs and compare to the amount of compostable plastics disposed in organics reported in this memo.

Producer Declared Compostable Products Data

Item	Quantity
Number of Declared Products	168
Number of Product Types	21
Number of Material Types	10
Brands	43
Producers	26

Material Types	Product Types	Number of Products	Product Types Material is Used for
Bamboo	3	6	Forks, Knives, Spoons
Cellulose bioplastic	2	6	Straws (unwrapped), Straws (wrapped)
Other bioplastic	1	1	Bags
Other materials	4	5	Containers (no lids), Bags, Straws (unwrapped), Other sheet film product
PBAT (polybutylene adipate terephthalate)	2	47	Bags, other food service product
PLA (polylactic acid)	14	54	Containers (no lids), Cups, Mixed cutlery, Bags, Forks, Knives, Spoons, Clam shells,

Appendix E. Types of Compostable Products Produced and Disposed in Washington, Based On 2024 Product Registry And 2022-2023 Statewide Organics Characterization Study

Material Types	Product Types	Number of Products	Product Types Material is Used for
			Portion cups, Other food service products, Containers (with lids), Food wraps, Straws (unwrapped), Lids (for food containers)
Wood/Other Fiber (lined)	8	26	Bowls, Cups, Portion cups, Plates, Boxes (food), Containers (no lids), Lids (for food containers), Other food service product
Wood/Other Fiber (mixed materials)	4	7	Straws (wrapped), other food service product, Plates, Straws (unwrapped)
Sugarcane (Bagasse)	9	14	Bowls, Clam shells, Containers (no lids), Plates, Trays, Containers (hinged), Containers (with lids), Cups, Lids (for food containers)
Starch-based bioplastic	1	2	Bags

Product Category	Number of Product Types Declared
Bags	51
Bowls	7
Boxes (Food)	4
Clam shells	3
Containers (hinged)	1
Containers (no lids)	8
Containers (with lids)	3
Cups	24
Food Wrap	1
Forks	5
Knives	5
Lids (for food containers)	4
Mixed cutlery	7
Other food service products	10
Other sheet film product	1
Plates	9
Portion Cups	6
Spoons	5
Straws (unwrapped)	9
Straws (wrapped)	4
Trays	1
Total	168

Statewide Organics Study Figures and Draft Composition Tables

Figure 1. Tons by Recoverability: Residential Inbound Organics

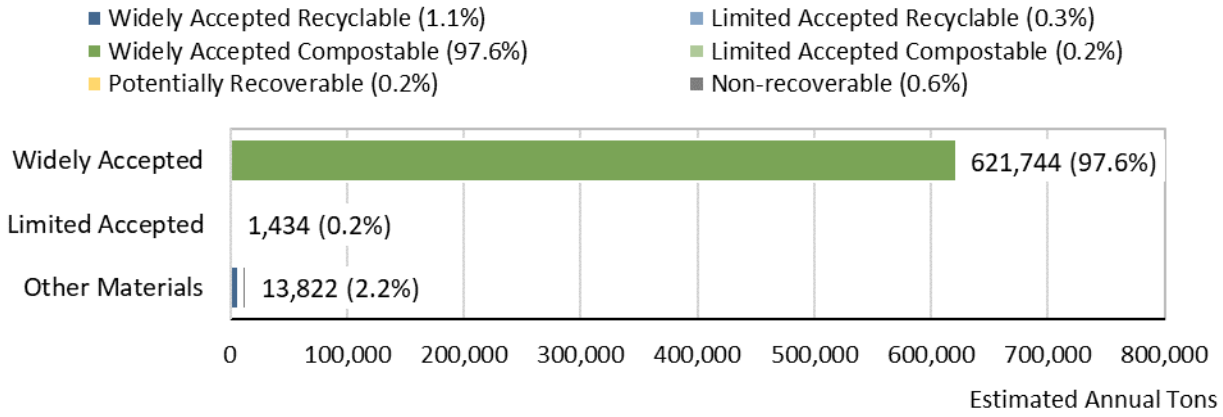


Figure 2. Tons by Material Class: Residential Inbound Organics

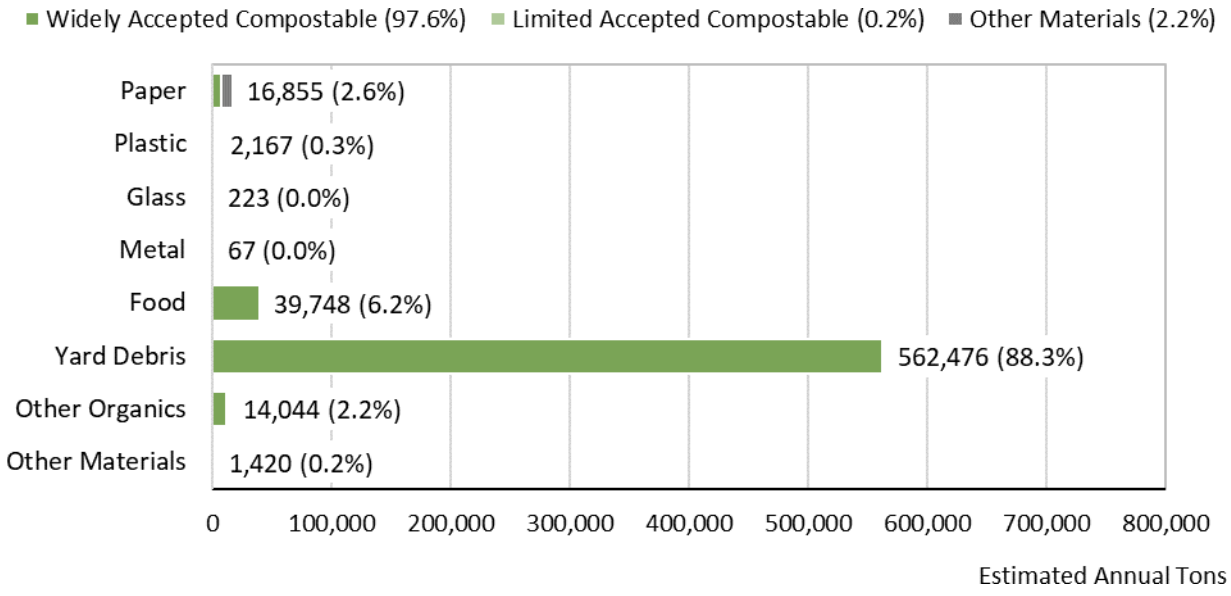


Figure 3. Composition by Recoverability: Overall Inbound Organics by Region

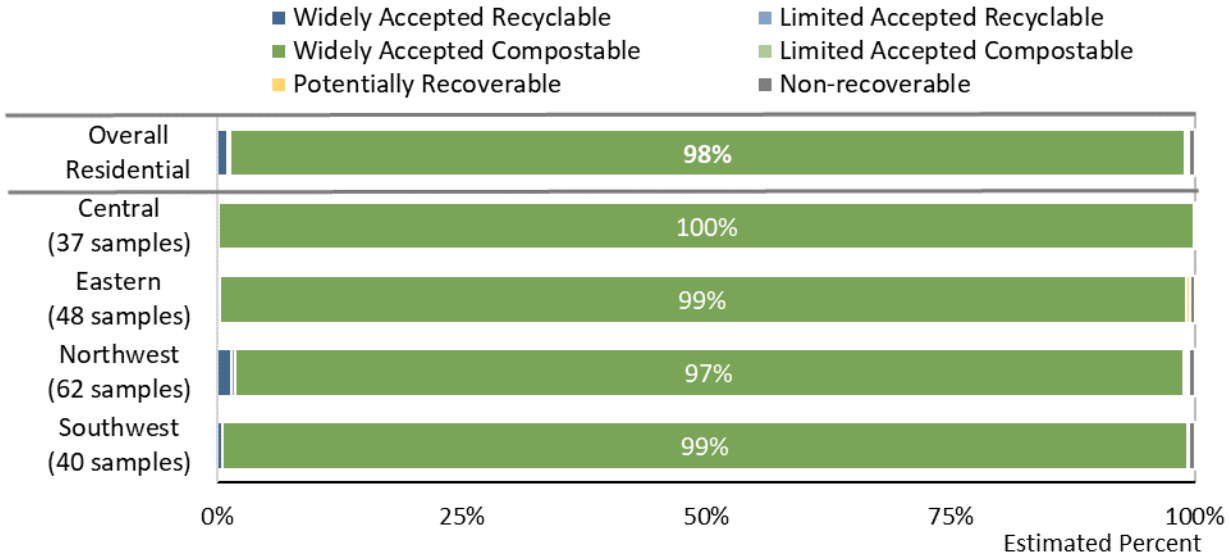


Figure 4. Composition by Material Class and Region: Residential Organics

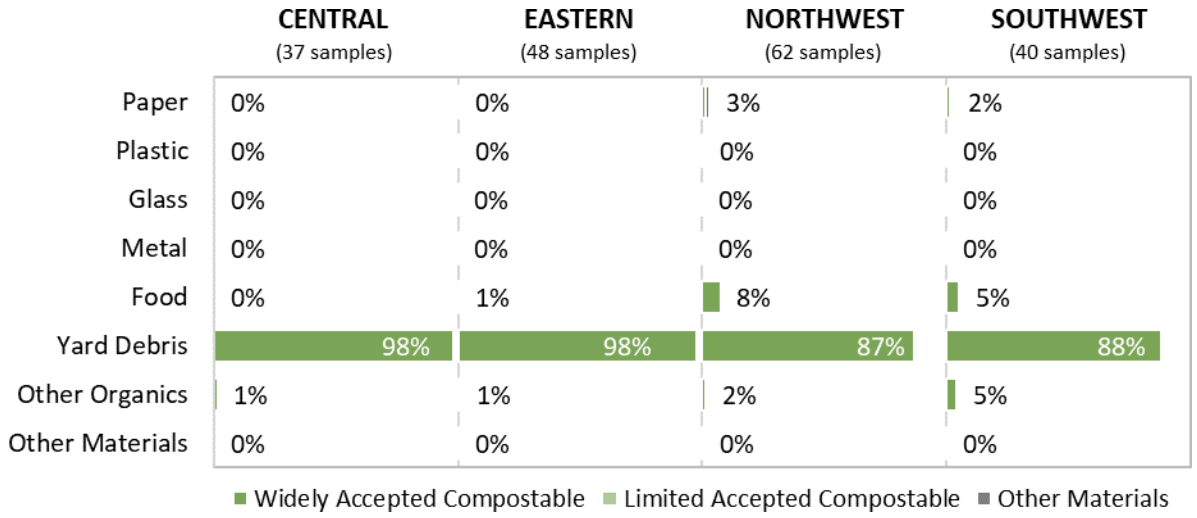


Figure 5. Estimated Annual Organic Tons

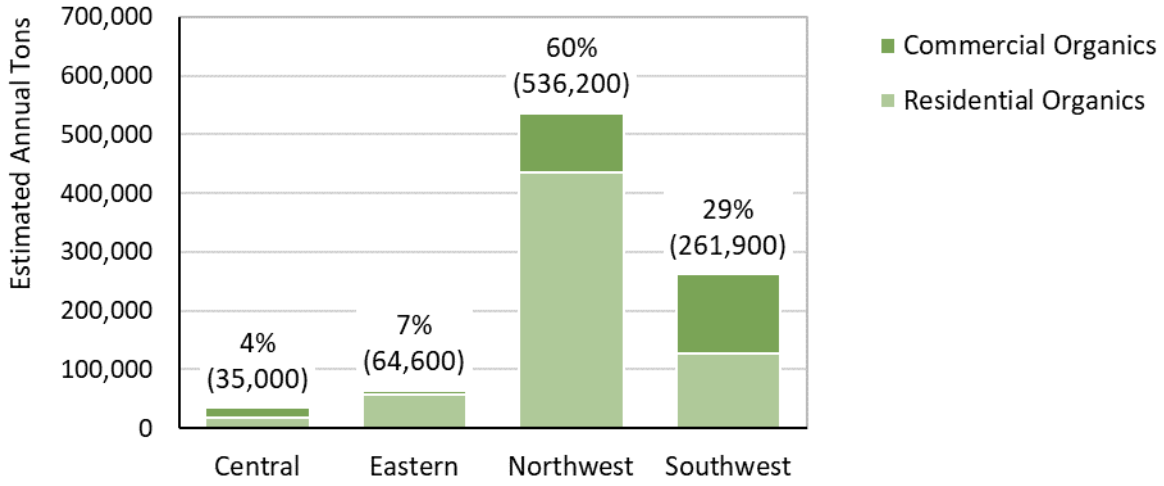


Figure 6. Estimated Organics Collected per Capita

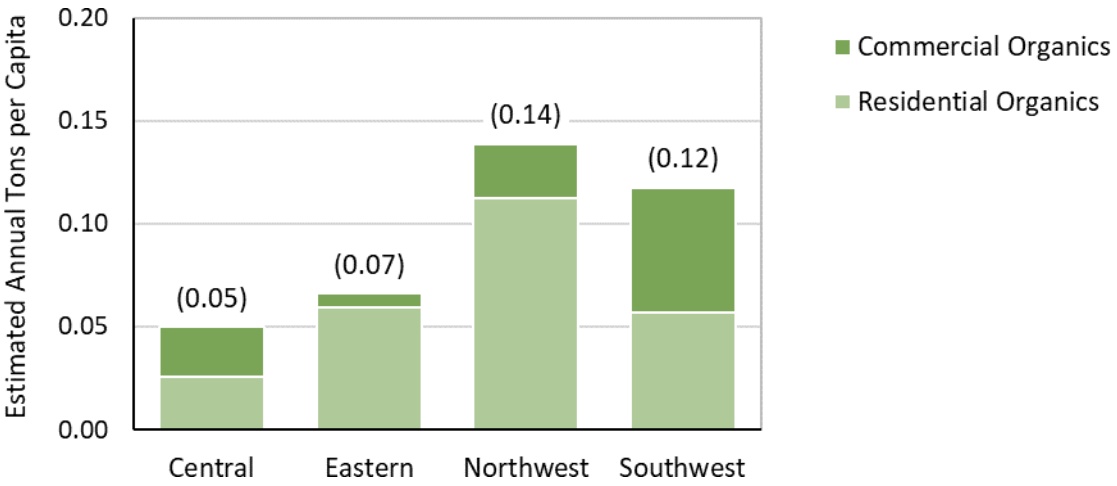


Figure 7. Material Class: Residential Organics Substreams

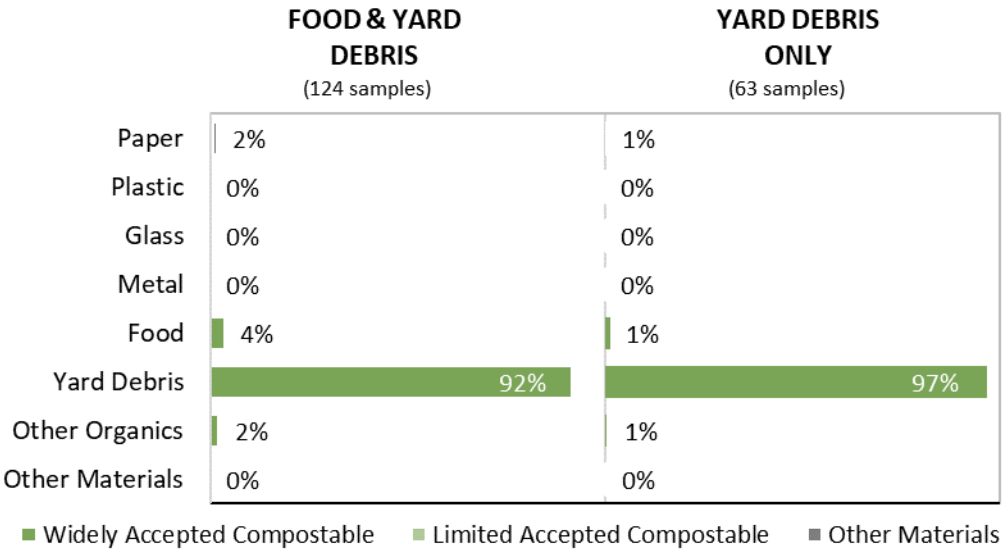


Table 1. Detailed Composition Table: Residential Organics

Material	Est. %	+/-	Est. Tons
Widely Accepted Recyclable	**1.1%**	**0.3%**	**7,172**
Limited Accepted Recyclable	**0.3%**	**0.1%**	**1,845**
Widely Accepted Compostable	**97.6%**	**0.6%**	**621,744**
Limited Accepted Compostable	**0.2%**	**0.1%**	**1,434**
Potentially Recoverable	**0.2%**	**0.1%**	**1,055**
Non-recoverable	**0.6%**	**0.2%**	**3,749**
Paper Packaging	**1.7%**	**0.5%**	**10,564**
Cardboard & Kraft Packaging	0.7%	0.2%	4,488
Mixed Paper Packaging	0.2%	0.1%	1,304
Packaging Paper Cups	0.0%	0.0%	2
Aseptic Containers	0.0%	0.0%	44
Gable Top Containers	0.1%	0.1%	582
Other Polycoated Packaging	0.1%	0.1%	780
Single-use Food Service Compostable Paper	0.4%	0.1%	2,540
Other Compostable Paper Packaging	0.1%	0.1%	535
Newspaper Packaging	0.0%	0.0%	-
Remainder/Composite Paper Packaging	0.0%	0.0%	288
Plastic Packaging	**0.1%**	**0.0%**	**570**
#1 PETE Bottles	0.0%	0.0%	67
#1 PETE Non-bottles	0.0%	0.0%	59
#2 HDPE Natural Bottles	0.0%	0.0%	21
#2 HDPE Colored Bottles	0.0%	0.0%	54
#2 HDPE Jars & Tubs	0.0%	0.0%	6
#3 PVC Packaging	0.0%	0.0%	-
#4 LDPE Packaging	0.0%	0.0%	-
#5 PP Packaging	0.0%	0.0%	88
#6 PS Packaging	0.0%	0.0%	19
#7 Other/Unknown Packaging	0.0%	0.0%	20
PLA Compostable Food Packaging	0.0%	0.0%	58
EPS Expanded Polystyrene Packaging	0.0%	0.0%	12
Plastic Merchandise Bags	0.0%	0.0%	27
Transportation Packaging Film Plastic	0.0%	0.0%	12
Packaging Film Plastic	0.0%	0.0%	110
Flexible Plastic Packaging	0.0%	0.0%	5
Remainder/Composite Plastic	0.0%	0.0%	11
Metal	**0.0%**	**0.0%**	**67**
Aluminum Beverage Cans	0.0%	0.0%	33
Food Cans-Tinned	0.0%	0.0%	13
Aluminum Foil/Containers	0.0%	0.0%	10
Other Aluminum	0.0%	0.0%	-
Empty Aerosol Cans	0.0%	0.0%	-
Other Metal	0.0%	0.0%	11
Glass	**0.0%**	**0.0%**	**223**
Clear Glass Containers	0.0%	0.0%	84
Green Glass Containers	0.0%	0.0%	63
Other Colored Glass Containers	0.0%	0.0%	39
Plate Glass	0.0%	0.0%	-
Non-glass Ceramics	0.0%	0.0%	22
Remainder/Composite Glass	0.0%	0.0%	15
Paper Products	**1.0%**	**0.3%**	**6,291**
Newspaper Products	0.0%	0.0%	61
Cardboard & Kraft Paper Products	0.0%	0.0%	97
Magazines	0.0%	0.0%	50
High-grade Paper Products	0.1%	0.1%	500
Other Groundwood Paper Products	0.0%	0.0%	-
Mixed Paper Products	0.0%	0.0%	115
Product Paper Cups	0.0%	0.0%	-
Compostable Paper Products	0.8%	0.3%	4,782
Remainder/Composite Paper Products	0.1%	0.1%	685
Plastic Products	**0.3%**	**0.1%**	**1,597**
#1 PETE Products	0.0%	0.0%	-
#2 HDPE Products	0.0%	0.0%	230
#3 PVC Products	0.0%	0.0%	0
#4 LDPE Products	0.0%	0.0%	-
#5 PP Products	0.0%	0.0%	13
#6 PS Products	0.0%	0.0%	3
Bulky Rigid Plastic Products	0.0%	0.0%	169
PLA Compostable Plastic Bags & Film	0.1%	0.1%	818
PLA Compostable Plastic Utensils	0.0%	0.0%	23
#7 Other/Unknown Products	0.0%	0.0%	210
Plastic Garbage Bags	0.0%	0.0%	70
Plastic Non-bag Film Products	0.0%	0.0%	36
Remainder/Composite Plastic Products	0.0%	0.0%	24
Organics	**96.7%**	**0.8%**	**616,268**
Fruits & Vegetables, Edible	1.9%	0.7%	12,108
Fruits & Vegetables, Non-edible	2.0%	0.9%	13,023
Homegrown Fruits & Vegetables	0.6%	0.2%	3,811
Meat, Edible	0.2%	0.1%	967
Meat, Non-edible	0.1%	0.1%	879
Mixed/Other Food Waste, Edible	1.4%	0.7%	8,798
Mixed/Other Food Waste, Non-edible	0.6%	0.4%	3,971
Yard Debris	87.7%	2.4%	558,665
Food Processing Wastes	0.0%	0.0%	-
Other Compostables	0.0%	0.0%	66
Clean Wood	1.9%	0.8%	12,131
Animal Manure & Litter	0.3%	0.2%	1,626
Remainder/Composite Organics	0.0%	0.0%	221
Other Materials	**0.2%**	**0.1%**	**1,420**
Electronics & Small Appliances	0.0%	0.0%	0
Textiles (synthetic) & Shoes	0.0%	0.0%	49
Construction & Demolition Waste	0.1%	0.1%	944
Tanglers (non-plastic)	0.0%	0.0%	6
HHW/Special Waste	0.0%	0.0%	3
Diapers	0.0%	0.0%	14
Furniture/Bulky	0.0%	0.0%	-
Mixed Residue	0.1%	0.0%	404
Estimated Tons	**100.0%**		**637,000**
Sample Count			**187**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 2. Detailed Composition Table: Residential Inbound Recycling

Material	Est. %	+/-	Est. Tons	Material	Est. %	+/-	Est. Tons
Widely Accepted Recyclable	**74.9%**	**2.3%**	**132,945**	**Paper Products**	**17.7%**	**3.0%**	**31,401**
Limited Accepted Recyclable	**14.4%**	**1.9%**	**25,553**	Newspaper Products	2.7%	0.6%	4,830
Widely Accepted Compostable	**2.5%**	**0.5%**	**4,375**	Cardboard & Kraft Paper Products	0.9%	0.8%	1,558
Limited Accepted Compostable	**0.1%**	**0.0%**	**133**	Magazines	4.9%	1.0%	8,759
Potentially Recoverable	**2.8%**	**0.6%**	**5,021**	High-grade Paper Products	1.5%	0.4%	2,604
Non-recoverable	**5.3%**	**0.7%**	**9,373**	Other Groundwood Paper Products	0.6%	0.2%	1,066
				Mixed Paper Products	5.9%	1.1%	10,507
Paper Packaging	**47.8%**	**4.8%**	**84,828**	Product Paper Cups	0.0%	0.0%	1
Cardboard & Kraft Packaging	34.8%	4.5%	61,763	Compostable Paper Products	0.4%	0.2%	764
Mixed Paper Packaging	5.7%	0.8%	10,042	Remainder Composite Paper Products	0.7%	0.2%	1,313
Packaging Paper Cups	0.0%	0.0%	7	**Plastic Products**	**1.6%**	**0.3%**	**2,912**
Aseptic Containers	0.2%	0.0%	354	#1 PETE Products	0.1%	0.2%	257
Gable Top Containers	0.5%	0.1%	901	#2 HDPE Products	0.0%	0.0%	20
Other Polycoated Packaging	5.1%	1.1%	8,969	#3 PVC Products	0.0%	0.0%	4
Single-use Food Service Compostable Paper	0.8%	0.2%	1,389	#4 LDPE Products	0.0%	0.0%	-
Other Compostable Paper Packaging	0.1%	0.0%	106	#5 PP Products	0.0%	0.0%	58
Newspaper Packaging	0.2%	0.3%	440	#6 PS Products	0.0%	0.0%	19
Remainder/Composite Paper Packaging	0.5%	0.1%	857	Bulky Rigid Plastic Products	0.4%	0.2%	710
Plastic Packaging	**10.0%**	**1.6%**	**17,759**	PLA Compostable Plastic Bags & Film	0.0%	0.0%	19
#1 PETE Bottles	3.6%	0.5%	6,367	PLA Compostable Plastic Utensils	0.0%	0.0%	4
#1 PETE Non-bottles	1.4%	0.3%	2,533	#7 Other/Unknown Products	0.5%	0.2%	958
#2 HDPE Natural Bottles	1.2%	0.4%	2,041	Plastic Garbage Bags	0.1%	0.1%	264
#2 HDPE Colored Bottles	1.0%	0.2%	1,709	Plastic Non-bag Film Products	0.0%	0.0%	77
#2 HDPE Jars & Tubs	0.3%	0.1%	581	Remainder/Composite Plastic Products	0.3%	0.1%	521
#3 PVC Packaging	0.0%	0.0%	16	**Organics**	**1.4%**	**0.4%**	**2,488**
#4 LDPE Packaging	0.0%	0.0%	21	Fruits & Vegetables, Edible	0.1%	0.1%	189
#5 PP Packaging	0.8%	0.1%	1,494	Fruits & Vegetables, Non-edible	0.1%	0.0%	112
#6 PS Packaging	0.1%	0.0%	105	Homegrown Fruits & Vegetables	0.0%	0.0%	-
#7 Other/Unknown Packaging	0.4%	0.1%	758	Meat, Edible	0.0%	0.0%	69
PLA Compostable Food Packaging	0.0%	0.0%	5	Meat, Non-edible	0.1%	0.1%	189
EPS Expanded Polystyrene Packaging	0.1%	0.0%	187	Mixed/Other Food Waste, Edible	0.6%	0.2%	1,111
Plastic Merchandise Bags	0.2%	0.0%	360	Mixed/Other Food Waste, Non-edible	0.2%	0.2%	377
Transportation Packaging Film Plastic	0.2%	0.1%	433	Yard Debris	0.0%	0.0%	32
Packaging Film Plastic	0.5%	0.1%	883	Food Processing Wastes	0.0%	0.0%	3
Flexible Plastic Packaging	0.1%	0.0%	145	Other Compostables	0.0%	0.0%	15
Remainder/Composite Plastic	0.1%	0.0%	121	Clean Wood	0.1%	0.1%	125
Metal	**5.1%**	**0.8%**	**9,011**	Animal Manure & Litter	0.0%	0.0%	56
Aluminum Beverage Cans	2.3%	0.5%	4,130	Remainder/Composite Organics	0.1%	0.1%	210
Food Cans-Tinned	1.5%	0.2%	2,586	**Other Materials**	**3.2%**	**0.6%**	**5,681**
Aluminum Foil/Containers	0.1%	0.0%	130	Electronics & Small Appliances	0.3%	0.3%	575
Other Aluminum	0.2%	0.1%	343	Textiles (synthetic) & Shoes	0.6%	0.3%	1,013
Empty Aerosol Cans	0.1%	0.0%	96	Construction & Demolition Waste	0.2%	0.1%	288
Other Metal	1.0%	0.3%	1,726	Tanglers (non-plastic)	0.1%	0.1%	142
Glass	**13.1%**	**3.5%**	**23,319**	HHW/Special Waste	0.1%	0.1%	237
Clear Glass Containers	6.0%	1.8%	10,684	Diapers	0.3%	0.2%	619
Green Glass Containers	4.6%	1.2%	8,240	Furniture/Bulky	0.0%	0.0%	-
Other Colored Glass Containers	2.4%	0.9%	4,233	Mixed Residue	1.6%	0.4%	2,807
Plate Glass	0.0%	0.0%	17				
Non-glass Ceramics	0.1%	0.1%	94	**Estimated Tons**	**100%**		**177,400**
Remainder/Composite Glass	0.0%	0.0%	50	**Sample Count**			**112**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 3. Top 10 Most Prevalent Non-widely or Limited Accepted Compostables: Residential Organics

Material	Est. %	+ / -	Est. Tons
Cardboard & Kraft Packaging	0.7%	0.2%	4,488
Animal Manure & Litter	0.3%	0.2%	1,626
Mixed Paper Packaging	0.2%	0.1%	1,304
Construction & Demolition Waste	0.1%	0.1%	944
Other Polycoated Packaging	0.1%	0.1%	780
Remainder Composite Paper Products	0.1%	0.1%	685
Gable Top Containers	0.1%	0.1%	582
High-grade Paper Products	0.1%	0.1%	500
Mixed Residue	0.1%	0.0%	404
Remainder/Composite Paper Packaging	0.0%	0.0%	288
Total for Top Non-widely or Limited Accepted Compostables	1.8%		11,601
Other Non-widely or Limited Accepted Compostables	0.3%		2,220
Total Non-widely or Limited Accepted Compostables	**2.2%**		**13,822**

Percentages for material types may not total 100% due to rounding.

Recoverability Groups

Materials were divided into six recoverability groups, which consider potential methods of recovery and how availability may vary throughout Washington. The definitions below align with the recoverability potential of each material in the majority of curbside diversion programs statewide. See Appendix B: Material List and Definitions for detail on how specific materials were categorized.

Widely accepted compostable: Materials accepted in a majority of the state's curbside composting programs.

Limited accepted compostable: Materials accepted in some of the state's curbside composting programs.

Widely accepted recyclable: Materials that have consistently available recycling markets and are accepted in a majority of the state's curbside recycling programs.

Limited accepted recyclable: Materials that have inconsistent recycling markets and/or are accepted in some of the state's curbside recycling programs.

Potentially recoverable: Materials that can be recovered for beneficial uses through specialty recycling programs or other recovery programs designed for solid waste. Markets may exist for these materials but may be underdeveloped or not currently utilized.

Non-recoverable: Materials that are not readily recyclable or compostable or face other market-

related barriers.

Material List and Definitions

There were 82 material types evaluated in this analysis, organized into six classes.

Widely accepted recyclable

Paper Packaging

- Cardboard & Kraft Packaging: unwaxed Kraft paper corrugated containers and boxes, unless poly- or foil-laminated. Includes cardboard boxes and brown Kraft paper bags and packaging paper.
- Mixed Paper Packaging: low-grade recyclable papers, including non-corrugated paperboard packaging, and other packaging made from groundwood paper. Includes egg cartons, and cereal and cracker boxes.
- Packaging Paper Cups: cups made of uncoated paper material used to contain a beverage purchased from an establishment (e.g., soda purchased from a fast food restaurant). Does not include plastic-coated paper cups.

Paper Products

- Newspaper Products: printed groundwood newsprint, including glossy ads and Sunday edition magazines that are delivered with the newspaper (unless these are found separately during sorting).
- Cardboard & Kraft Paper Products: unwaxed Kraft paper and corrugated products, unless poly- or foil-laminated. Could include cat scratching pads.
- Magazines: magazines, catalogs, and similar products with glossy paper. Includes Sunday edition news magazines, if found separate from the newspaper.
- High-grade Paper Products: high-grade white or light-colored bond and copy machine papers and envelopes, and continuous-feed computer printouts and forms of all types, except multiple copy carbonless paper.

Plastic Packaging

- #1 PETE Bottles: includes plastic bottles bearing the #1, such as carbonated drink bottles and water bottles. Lids and caps are left attached to containers when feasible.
- #1 PETE Non-bottles: includes plastic non-bottle packaging bearing the #1, and would include oven-ready meal trays and other packaging.
- #2 HDPE Natural Bottles: includes milk jugs and water jugs and any natural bottle bearing the #2. Lids and caps are left attached to containers when feasible.
- #2 HDPE Colored Bottles: includes detergent bottles, some personal care product bottles,

and any opaque plastic bottle bearing the #2. Lids and caps are left attached to containers when feasible.

- #2 HDPE Jars & Tubs: yogurt and margarine tubs and any packaging jar or tub bearing the #2. Lids and caps are left attached to containers when feasible. This category includes 5-gallon plastic pails (with or without handles) and lids.

Plastic Products

- #1 PETE Products: includes any PET product bearing the #1 and used in a non- packaging application.
- #2 HDPE Products: includes any other non-packaging product bearing the #2.

Metal

- Aluminum Beverage Cans: aluminum beverage cans.
- Food Cans-Tinned: including zinc or tin-coated steel food containers. This material includes bi-metal beverage cans, but not paint cans or other types of cans.

Glass

- Clear Glass Containers: bottles and jars made from clear glass.
- Green Glass Containers: bottles and jars made from green glass.
- Other Colored Glass Containers: bottles and jars made from brown glass. Note that blue glass was included with brown glass.

Limited accepted recyclable

Paper Packaging

- Aseptic Containers: multi-layer paper packaging designed to keep food and other putrescible contents fresh. Includes items like paper soup cartons and paper juice cartons.
- Gable Top Containers: polycoated paper packaging often used for liquid products such as milk, plant-based beverages, and juice. Most are opened by pushing open with a screw top closure or the gables at the top back and pulling the top (spout) out.
- Other Polycoated Packaging: other polycoated paper packaging. Includes ice cream cartons and frozen food boxes. Does not include aseptic and gable top containers.

Paper Products

- Other Groundwood Paper Products: non-packing products made from groundwood paper, including phone books, some tablet paper, and paperback books.
- Mixed Paper Products: low-grade recyclable papers, including colored papers, notebook or other lined paper, envelopes with plastic windows, non-corrugated paperboard, carbonless copy paper, and junk mail. This includes shredded paper.

- Product Paper Cups: cups made of paper material purchased with the intent of future use (e.g., a package of paper cups purchased for a birthday party). Does not include plastic-coated paper cups.

Plastic Packaging

- #3 PVC Packaging: includes any plastic bottle or container marked with a # 3. Lids and caps are left attached to containers when feasible.
- #4 LDPE Packaging: includes any plastic bottle or container marked with the #4. Lids and caps are left attached to containers when feasible.
- #5 PP Packaging: includes any plastic packaging marked with the #5 as well as plastic straws. Lids and caps are left attached to containers when feasible.
- #6 PS Packaging: includes any plastic packaging marked with the #6 such as compact disc cases, some plastic to-go beverage cups, and any other rigid PS packaging. Lids and caps are left attached to containers when feasible.
- #7 Other/Unknown Packaging: includes all non-numbered plastic packaging and any other plastic packaging product not listed in another category. Lids and caps are left attached to containers when feasible. This includes plastic strapping.

Plastic Products

- #3 PVC Products: includes any non-packaging product bearing the #3 but also including plastic piping, and some toys.
- #4 LDPE Products: includes any other non-packaging product bearing the #4.
- #5 PP Products: includes any plastic non-packaging product bearing the #5 but also includes some reusable food containers.
- #6 PS Products: includes any plastic non-packaging product bearing the #6 but also includes plastic tableware.
- Bulky Rigid Plastic Products: large (larger than a five-gallon bucket), wholly plastic products intended to be used multiple times over a long period. Examples include garbage cans, some large children's toys, and plastic furniture.

Metal

- Aluminum Foil/Containers: aluminum foil, food trays, and similar items.
- Other Aluminum: aluminum scrap and products that do not fit into the above two materials.
- Empty Aerosol Cans: EMPTY, mixed material/metal aerosol cans.

Appendix E. Types of Compostable Products Produced and Disposed in Washington, Based On 2024 Product Registry And 2022-2023 Statewide Organics Characterization Study

Widely accepted compostable

Paper Packaging

- Single-use Food Service Compostable Paper: includes paper or paper packaging soiled with food that was used in a "single-use food service" capacity. Examples include paper plates, compostable paper cups (no plastic coating), pizza boxes, french-fry containers. Does not include napkins or paper towels.

Paper Products

- Compostable Paper Products: non-packaging papers that can be composted. Includes paper soiled with food that was not used in a "food service" capacity. Examples include napkins, paper towels, plates (if purchased empty), coffee filters, and tissue. Also includes shredded paper and newspapers used to contain food waste.

Organics

- Fruits & Vegetables, Edible: the edible portion of food that comes from a plant but does not appear to have grown on the customer's property. Includes fruits and vegetables in the original or another container when the container weight is less than 10% of the total weight.
- Fruits & Vegetables, Non-edible: the non-edible portions of food that comes from plants. Examples include fruit peels, vegetable peelings, potato skins, pits, cores, and juiced oranges.
- Homegrown Fruits & Vegetables: food that comes from a plant growing on or cleared from the customer's property. Examples include fruits and vegetables disposed of because of falling or pruning from trees and gardens.
- Meat, Edible: the edible portion of non-dairy food that comes from an animal. Examples include eggs and eggs in shell, fresh meat, cooked meat, and meat scraps. Does not include dairy products such as cheese and milk. Includes meat in the original or another container when the container weight is less than 10% of the total weight.
- Meat, Non-edible: the non-edible portions of food that comes from an animal. Examples include eggshells, bones, gristle and meat trimmings, fish skins, and seafood shells.
- Mixed/Other Food Waste, Edible: any food that cannot be put in the above categories BUT deemed edible. Examples include food items that are a combination of the above categories, as well as unused tea packets, grains, crackers, bread, dairy, and cereal. Includes food in the original or another container when the container weight is less than 10% of the total weight.
- Mixed/Other Food Waste, Non-edible: any food that cannot be put in the above categories AND deemed non-edible. Examples include food items that are a combination of the above categories, as well as coffee grounds, used tea packets, and visibly non-edible grains, crackers, bread, dairy, and cereal.

- Yard Debris: includes leaves, grass clippings, sod, garden wastes, brush, prunings, logs under 6", and clumped soil and rocks associated with yard debris.
- Food Processing Wastes: processing wastes that are left over from growing and processing fruit, vegetables, meat, seafood, or other foods and that are treated as a waste (for example, meat packing plant waste, fish processing waste). Does not include food residuals from restaurants or grocery stores or food purchased as groceries. Does not include food from home gardens, fishing, hunting, or other home food processing.
- Other Compostables: other compostable organic materials not included above, such as hair, popsicle sticks, chopsticks, and toothpicks.
- Clean Wood: wood that has not been processed, including stumps of trees and shrubs, with the adhering soil (if any), and other natural woods, such as logs and branches in excess of six inches in diameter. Also includes dimensional lumber (wood commonly used in construction for framing and related uses), wood pallets, crates, and similar shipping containers, other untreated wood products, and wood by- products such as sawdust and shavings.

Limited accepted compostable

Paper Packaging

- Other Compostable Paper Packaging: non-food service packaging paper that may be composted such as waxed cardboard boxes, and all containers except cups from fast food establishments.

Plastic Packaging

- PLA Compostable Food Packaging: any compostable plastic packaging or food containers made from corn, potato, sugarcane, or any other compostable resin that are marked with the words "compostable" or "#7 PLA" in the plastic identifier. Lids and caps are left attached to containers when feasible. Includes materials from food service providers (e.g., restaurants, food trucks, food vendors), grocery stores, and other retailers. Examples include takeout containers, produce packaging, meat/produce trays IF compostable. Does not include utensils and straws.

Plastic Products

- PLA Compostable Plastic Bags & Film: bags and film made of PLA designed to compost. Includes compostable plastic items, such as film "plastic" bags made of materials such as corn starch, potato, or soy (e.g., BioBag, EcoSafe).
- PLA Compostable Plastic Utensils: includes utensils (e.g., cups/lids, bowls, clamshells, plates, trays, cutlery, and straws that are not from food service providers) marked with the words "compostable" or "#7 PLA" in the plastic identifier.

Potentially recoverable

Paper Packaging

- Newspaper Packaging: shredded newspaper packing material.

Plastic Packaging

- EPS Expanded Polystyrene Packaging: includes packing peanuts, coolers, egg cartons, meat trays, take out containers, and other polystyrene foam packaging.
- Plastic Merchandise Bags: will include all grocery, shopping, and merchandise bags.
- Transportation Packaging Film Plastic: includes bubble wrap and shrink wrap and any other packaging film used in a typically industrial manner.

Metal

- Other Metal: mixed metal items such as motors, metal window blinds, metal tableware and utensils. Other metal that are too contaminated to be marketed. Includes large electronics that are predominantly metal (e.g., washer and dryer), and other bulky metal items (e.g., patio furniture).

Other Materials

- Electronics & Small Appliances: computer monitors, television sets, and other electronics including cell phones, answering machines, electronic toys, stereos, radios, tape decks, other audio/visual equipment, VCRs, DVD players, computer processors, mice, keyboards, disk drives, printers, scanners, gaming systems, tablet computers, e-readers, and laptops. Also includes small electric appliances such as toasters, blenders, microwave ovens, power tools, curling irons, and light fixtures.
- Textiles (synthetic) & Shoes: clothing, rags, and accessories made of synthetic textiles such as woven nylon, rayon, polyester, and other materials. Examples include pants, shirts, fabric purses, bed sheets, towels, and shoes.
- Construction & Demolition Waste: treated/contaminated wood, gypsum, insulation, rock/concrete/bricks, loose soil and rocks, asphalt shingles/roofing, other construction debris, and mixed fine building material scraps.

Non-recoverable

Paper Packaging

- Remainder/Composite Paper Packaging: non-recyclable and non-compostable types of papers such as paper packaging with metal or plastic parts (except aseptic packaging). Examples would include plastic lined or metal handled take-out food containers.

Paper Products

- Remainder/Composite Paper Products: non-recyclable and non-compostable types of paper products such as carbon paper and hardcover books, and composite materials containing paper mixed with metal or plastic parts.

Plastic Packaging

- Packaging Film Plastic: includes other types of packaging film such as cling wrap, bread and food bags, and plastic potato chip bags.
- Flexible Plastic Packaging: means plastic pouches made of thicker, multi-layer flexible material. May have a flat bottom so that package would stand up on its own, but not always. Material is thicker than potato chip bags and frozen vegetable bags. Includes plastic coffee bags; juice pouches; baby food pouches – may have plastic screw top; soup pouches; salad dressing pouches; wine pouches; backpacking meals in pouches; soap refill pouches; laundry detergent pouches; and other similar items. The following table and figures include examples of flexible plastic packaging.
- Remainder/Composite Plastic: other types of packaging that are not one of the above materials and items that are composites of multiple plastics and plastics mixed with other materials. An example of this material type is some bathroom silicone sealant tubes designed to be used with an applicator gun. These tubes frequently have plastic bodies and tips but metal end caps.

Plastic Products

- #7 Other/Unknown Products: includes all non-numbered plastic packaging and any other plastic packaging product not listed in another category. Lids and caps are left attached to containers when feasible. This includes plastic strapping.
- Plastic Garbage Bags: includes all bags whose primary use is to hold trash or garbage
- Plastic Non-bag Film Products: includes plastic painter's sheeting for drop cloths, other plastic tarps, shower curtains, and any other film product not used for packaging purposes.
- Remainder/Composite Plastic Products: includes all other types of non-packaging plastic that are not one of the above materials and items that are composites of multiple plastics and plastics mixed with other materials. This section also includes plastic sheeting and tarps that are contaminated with other materials such as paint or concrete residue. Examples would include plastic toys with metal attachments.

Glass

- Plate Glass: flat glass products such as windows, mirrors, and flat products.
- Non-glass Ceramics: ceramics not composed of true glass and not typically used as building materials. Examples include dishes and crockware.
- Remainder/Composite Glass: other types of glass products and scrap that do not fit into the above materials, including light bulbs, glassware, oven-safe baking dishes such as

Pyrex, and non-C&D fiberglass. Note that ceramics (plates and knickknacks) will not be included here but will be placed in "Non-Glass Ceramics" above.

Organics

- Animal Manure & Litter: all animal manures and soiled bedding and litter whether derived from an agricultural or residential origin. Includes kitty litter.
- Remainder/Composite Organics: other organics or composite materials that contain organics that do not easily fit into the above materials. Includes crop residues. Note the identity of anything that is not listed in the examples for this type or anything that is a large quantity. Examples include dryer lint, cigarette butts, candles, and grease. Also includes organic items whose durability makes them hard to compost. Examples include organic textiles such as cotton, wool, and leather, wine corks, burlap sacks, and rope.

Other Materials

- Tanglers (non-plastic): unaccepted, non-plastic items that are long and thin. Examples include electrical cords, garden hoses, caution tape (and similar tape), streamers, and chains. All plastic long, thin items like twine, rope and strapping are in a separate category ("Other Plastics").
- HHW/Special Waste: potentially hazardous products such as radioactive or dangerous waste(s), ammunition, explosives, paints and solvents, old gasoline, solvents, antifreeze, asbestos, glues and adhesives, hot ashes, caulking compounds and grouts, hazardous cleaners and household chemicals, pesticides/herbicides, oil/gas/fuel tanks, any substances or products containing potentially hazardous chemicals. Also includes non-hazardous soaps, cleaners, medicines, cosmetics, fire extinguishers, and other household chemicals. FULL
- Diapers: disposable baby diapers and adult protective undergarments.
- Furniture/Bulky: furniture made of mixed materials and in any condition. Mattresses made of mixed materials and in any condition. General category of flooring applications consisting of various natural or synthetic fibers bonded to some type of backing material.
- Mixed Residue: items not defined in the above categories will be included here. Examples include non-distinguishable fines, Q-tips/cotton swabs, sports equipment (e.g., basketball).

Appendix F. Compostable Products Management Policy Research Summary

Memorandum

To: Compostable Products Advisory Committee From: Cascadia Consulting Group

Date: May 7, 2024

Subj: Compostable Products Management Policy Research Summary

Purpose & Methodology

This memo addresses the following research topics detailed in HB 1033:

> (h) Current laws related to compostable products and the enforcement of these laws;
>
> (j) Policy options addressing contamination of organic waste streams and to increase the use of reusable and refillable items.

The intent of this memo is to provide the Advisory Committee with information about how compostable products are managed in other states as well as in other countries to identify lessons learned from other jurisdictions, as well as models for policies and enforcement and incentive mechanisms that may be applicable to Washington.

Discussion Questions for Consideration

- What does this research tell us about what is working to achieve "the state's goal of managing organic materials, including food waste, in an environmentally sustainable way that increases food waste diversion and ensure that finished compost is clean and marketable?"
- How well do the policies and the enforcement of the policies presented in the research manage compostable products and address contamination?
- What gaps remain, and what solutions could fill them?

Methodology

Overview of Research Methods

To gather information about compostable product management policies and enforcement mechanisms the Cascadia research team conducted a variety of interviews and additional research:

- Eight interviews with Advisory Committee members representing cities and counties in Washington State.
- Ten interviews with jurisdictions and compost facilities outside of Washington State and throughout the U.S. where compostable products are or have been accepted in the organics stream.
- Desktop research on policies and programs for compostable products management with a focus on what is happening in other countries.

Cascadia partnered with Full Circle Environmental to conduct interviews with states, local governments, and additional facilities outside Washington. All interviews completed for this research are outlined in Table 1 below. Interview questions are included in Appendix A: Organic Materials Management Facility & Jurisdictional Interview Guide, and responses are summarized in the following sections. Additional details from the interviews with

jurisdictions and facilities located outside Washington are included in Appendix B: Expanded Summary and Key Findings from Interviews with Jurisdictions and Facilities Outside Washington, and additional information about international organics management programs is included in Appendix C: Composting Standards and Compostable Packaging in the EU, Canada, and Asia. Note that not all interviewees responded to all questions, and responses to some questions varied significantly in specificity and consistency between respondents.

Table 1. Jurisdictions and Facilities Interviewed

Jurisdictions and Facilities	Location
A1 Organics	Eaton, CO
CalRecycle	California
City of Boulder	Boulder, CO
City of Kirkland	Kirkland, WA
City of Olympia	Olympia, WA
City of Richland	Richland, WA
City and County of San Francisco	San Francisco, CA
City of Seattle	Seattle, WA
City of Spokane	Spokane, WA
City of Tacoma	Tacoma, WA
Eastern Sanitary Landfill Organics Facility (Baltimore County)	White Marsh, MD
Maryland Department of the Environment	Baltimore, MD
Minnesota Pollution Control Authority	Saint Paul, MN
Oregon Metro	Portland, OR
Pierce County	Pierce County, WA
Prince George's County	Upper Marlboro, MD
Shakopee Mdewakanton Sioux Community Organics Recycling Facility	Shakopee, MN
Yakima County	Yakima County, WA

Findings

Overarching Findings

Compostable product labeling laws are a policy used by several states, including Washington, to manage compostable products and specifically to remove lookalike products from entering the system and reduce consumer confusion. These laws are relatively new and data on their effectiveness is not yet available as states figure out enforcement strategies. Enforcement is a challenge, and facilities continue to see lookalike products, specifically plastic film and other plastics, coming into their facilities.

Extended Producer Responsibility (EPR) laws that cover compostable products are another strategy employed by states to manage compostable products. Determining and defining what materials are covered under EPR laws as well as conducting a needs assessment are key components of this policy option. Collecting information from composters is also critical in understanding what is needed for collection and investments for infrastructure.

Current contamination reduction strategies (in addition to labeling laws) primarily include outreach, technical assistance, and fees and load rejections applied to haulers and/or generators where contamination is above a certain threshold. In Washington, jurisdictions noted the potential use of truck cameras, AI technology, and automated generator feedback to address contamination.

While some local governments have policies requiring single-use products to be recyclable or compostable, many interviewees noted that they prefer and have or are starting to encourage reusable products over compostable products whenever possible. Moving toward reusables circumvents concerns about compostable products introducing PFAS, microplastics, and other potentially harmful chemicals into runoff from organic materials management facilities and their finished compost products.

Incentives and technical assistance are needed to support the development of reuse programs and required infrastructure in communities, such as partnerships with commercial reusables collection service providers and wash hubs.

Research Summary

This section summarizes findings from the research about existing laws for managing compostable products, as well as policy and other strategies to reduce contamination and increase reuse. It also summarizes additional concerns and considerations around compostable product management shared by interviewees.

Policies For Managing Compostable Products

Relatively few laws exist in the U.S. related explicitly to the management and regulation of

compostable products, though there are laws related to compostable product labeling and contamination reduction. Like Washington, other jurisdictions are grappling with similar questions and challenges around how to manage these products and evolving their policies and standards as new information becomes available. Some jurisdictions interviewed noted that when statewide policies begin to limit compostable products, local governments are put in the position of policing purchasing, creating additional administrative burdens for enforcement, and maintaining accepted material lists amid an ever-changing product landscape.

Compostable Product Labeling Laws

Several states, including Colorado, California, Maryland, Minnesota, and Washington have passed compostable product labeling laws intended to combat deceptive labeling practices, reduce consumer confusion, and reduce contamination levels in organic material feedstocks. These laws, however, are relatively new, and data on compliance and enforcement is not yet available. Anecdotally, San Fransisco noted seeing fewer deceptively labeled single-use food serviceware products since the California statewide labeling law came into effect; however, their organics processor continues to report the same, or even increased, levels of plastic film and other single-use plastic contamination.

In Washington, the Department of Ecology is currently working on enforcement strategies under the degradability packaging labeling requirements and will begin enforcement this July. As outlined in the law, enforcement will primarily be based on complaints received. Additionally, recently passed legislation HB 2301 amends the current labeling requirements in Washington:

- Requires compostable products other than film bags, other film products, and food service products to meet a scientific standard for composting in an industrial setting (non-ASTM standards are allowed). Film bags, other film products, and food service products must still be certified to ASTM D6400, D6868, or have a fiber-based substrate of at least 98 percent fiber (no plastic or polymer additives or coatings).
- Prohibits non-compostable plastic film bags from using botanical motifs (such as brown, green, or beige vines or leaves).
- Allows non-compostable plastic film bags to use green, beige, or brown for stripes smaller than 0.25-inches that are used as visual aids and for logo/brand identity purposes.
- Requires products labeled as “home compostable” to also be certified by ASTM for industrial composting settings, are verified by a third-party certifier, and are backed by valid and reproducible scientific evidence to support a claim of home compostability.
- Specifies protocols for the concurrent enforcement of product degradability labeling requirements in the event that cities and counties choose to enforce labeling requirements, including requiring notification to Ecology.

In 2021, California passed AB 1201, which regulates labeling of all compostable products (not just plastic), and is currently under implementation. Under this law, compostable products must be:

- Distinguishable from non-compostable products
- Certified by a third party
- Be free of PFAS
- Designed to be "associated with the recovery of desirable organic wastes"
- Accepted for use in organic agriculture by January 2026

Additionally, AB 1201 required CalRecycle to determine whether compostable products could be collected separately (bifurcated) from other organics, and through a statewide survey of commercial compost facilities, they determined that bifurcated collection is not feasible. As a result, compostable products will not be accepted for sale or use in California after 2026 unless the timeline is extended or compostable products are considered acceptable feedstock under the USDA's National Organics Program (NOP). The Biodegradable Packaging Institute (BPI) has petitioned NOP for the inclusion of compostable products as feedstocks, and the National Organics Standards Board (NOSB) has a meeting on April 30th at which this topic will be discussed.

Extended Producer Responsibility

Compostable products management is especially relevant in states with new extended producer responsibility (EPR) laws for packaging as they determine which materials will be included on their statewide accepted materials lists. For example, compostable products are excluded from the minimum list of covered products as part of Colorado's packaging EPR law (HB 22-1355) passed in 2022,7and Circular Action Alliance, the designated producer responsibility organization (PRO), is not funding the collection or sortation of compostable products. Conversely, California's packaging EPR law (SB 54) passed in 2022, requires all covered products to be recyclable, compostable, or reusable, while Oregon's EPR policy (SB 582) passed in 2021 covers some but not all compostable products.

For products to be defined as compostable and listed as an accepted product under the SB 54 covered material category (CMC) list in California, they must meet the definition of compostability defined by AB 1201 (see definition above) and be accepted by at least 50% of processing facilities. CalRecycle has not yet finalized the state's CMC list. San Francisco is seeking the inclusion of compostable products as covered materials so they can still be sold and help meet the City's zero

[7] Jurisdiction interviews were completed before the Colorado needs assessment was completed. Colorado's EPR legislation incorporates compost facilities as well as recycling facilities in the waste management system to be covered by EPR and the covered product lists were determined through the needs assessment. It includes some, but not all certified compostable products. The Colorado PRO Plan's proposed investments could improve the ability of the system to accept and process additional compostable products. The minimum recyclable list and additional materials list can be found here: Updated+CO+Needs+Assessment.pdf (squarespace.com).

waste goals.

Additionally, CalRecycle noted that according to a recent statewide study, every compost facility in the state screens out plastics, including compostable plastics, as contamination has been the top issue for composters. The California Department of Food and Agriculture has reported that farmers report receiving finished compost that is unacceptable due to contamination.

While Washington has not yet passed a statewide EPR law, most of the jurisdictions interviewed noted that they support EPR policies, such as the ReWRAP Act proposed in the most recent legislative session (HB 2049/SB 6005). This bill would require covered products in Washington to be recyclable, compostable, or reusable.

Lastly, needs assessments are an important consideration for EPR policies and are used to study critical information on packaging and infrastructure to determine what is needed to support a state's desired waste goals. A report published by the Closed Loop Partners Composting Consortium in January 2024 highlighted three main concepts a needs assessment should include:

- Understand the current landscape of compostable packaging to prevent unintended consequences. Namely, according to Ameripen and the Association of Packaging and Processing Technologies, the compostable packaging industry is expected to grow 16% annually through 2023, which is four times faster than traditional plastic packaging. As such, states that study the impact of this market growth will be better suited to determine and plan for future collection and infrastructure needs.
- Collaborate with composters to measure collection, capacity, equipment, and operating costs so that EPR policies are economically viable for all processors.
- Establish suitable collection and processing infrastructure by identifying gaps in the current system and modeling future scenarios to determine what upgrades are needed for existing composting infrastructure to accept new feedstocks, such as compostable packaging.

Contamination Reduction strategies

Some jurisdictions and organic materials management facilities interviewed use various methods to manage contamination in inbound material ranging from education and technical assistance to fees and load rejection.

Additionally, collection systems vary between jurisdictions, which impacts roles and responsibilities for implementing strategies to reduce contamination. For example, in Washington, several interviewees noted that the municipality hauls organic materials and contracts with organic materials management facilities to process the material. Others reported having contracts only with haulers and not processors. Most jurisdictions have stipulations in their contracts, whether with the haulers or processors, on what materials are accepted. In most cases, interviewees in Washington noted that the materials included in their contracts are determined by what the contracted organic materials management facilities will accept.

In Washington, the majority of jurisdictions interviewed use customer outreach and education as well as cart-tagging ("oops tags"), written notices, and eventual removal of collection containers for repeat offenders to reduce contamination. Several jurisdictions noted the potential for AI technology and tuck cameras designed to detect contamination and automated generator feedback as an opportunity to reduce contamination. Under Washington's HB 2301, fining residents for contamination is not allowed.

Outside of Washington, several interviewees indicated that stringent policies and contract terms to hold haulers and organics generators financially accountable for contaminated loads have helped reduce contamination associated with accepting compostable products. Facilities that track which haulers are depositing loads can then attribute contamination to specific haulers, jurisdictions, or generators and hold them financially accountable. Haulers and jurisdictions are then incentivized to implement outreach programs to decrease contamination.

Some facilities have the authority to reject contaminated loads and force the hauler to take back and pay for disposal of the load, as well as pay a contamination fine. SMSC Organics Recycling Facility in Minnesota has established a 5% contamination limit for incoming loads, enforced by visual inspections and spot checks, which has been helpful in reducing contamination levels. Alternatively, the Maryland Department of the Environment requires that the contamination rate of inbound feedstocks cannot exceed 10% at permitted facilities. Food waste and yard waste are collected separately within Oregon Metro, which allows for more efficient contamination reduction processes applied to the food waste stream before it gets combined with yard waste.

In its most recently negotiated solid waste contract, San Francisco allowed their franchised waste hauler, Recology, to levy contamination charges on organics generators. Recology also operates the processing facilities that receive much of San Francisco's organic materials and has the authority to fine and reject loads from haulers with over 5% contamination.

Generator Audits

Through its Refuse Separation Compliance Ordinance (Ord. No. 300-18), San Francisco requires Recology to audit high volume waste generators every three years, and businesses or multifamily properties that have contamination levels above specific thresholds for each waste stream (5% for the organics stream based on a visual inspection) are required to engage a "Zero Waste Facilitator" to support contamination reduction at their own expense. Some businesses meet this requirement by hiring staff to properly sort through all the waste generated onsite.

Policy Options and Incentives To Increase Reuse

Despite some local governments implementing policies requiring single-use products to be recyclable or compostable, many interviewees (including jurisdictions and facilities) prefer and several actively encourage reusable products over compostable products whenever possible. For food serviceware specifically, many jurisdictions interviewed are working to reduce all single-use items, even if they are compostable or recyclable. Interviewees also noted that moving toward

reusables circumvents concerns about compostable products introducing PFAS, microplastics, and other potentially harmful chemicals into runoff from organic materials management facilities and their finished compost products.

Bans, Fees, and Source Reduction Requirements

Jurisdictions across the country have implemented policies specifically aimed at reducing single-use packaging. The advocacy organization Upstream has compiled several resources and model policies and ordinances to support waste reduction and promote reuse in food service businesses and includes model policies for:

- Providing single-use accessories only upon customer request
- Requiring reusable foodware for dining on premises
- Charging fees for non-reusable beverage cups and food containers
- Requiring reusable beverage cups at events
- Prohibiting non-reusable cups at government facilities
- Prohibiting sale or distribution of non-compliant foodware
- Prohibiting use of non-compliant foodware
- Prohibiting use of expanded polystyrene products
- Source reduction in government purchasing

Several jurisdictions, mostly in California, have passed ordinances to require reusables for onsite dining, including Marin County, the Cities of Berkeley, Truckee, Pacifica, Half Moon Bay, Arcata, and several others in California, and Bainbridge Island and Bellingham in Washington. Multiple jurisdictions in Washington have also implemented food packaging ordinances, including the Cities of Seattle, Burien, and Edmonds. The City of Seattle (Municipal Code 21.36.086) requires dine-in restaurants and food service businesses to use compostable items or durable serviceware for dine-in service, recyclable or compostable packaging for take-out service, compostable single-use straws, utensils, and portion cups, and prohibits plastic coated brown paper packaging. The City of Burien requires all food service businesses to use and provide compostable food service products and packaging (Ordinance 709). Similarly, starting in June of this year, the City of Shoreline will require all food service establishments serving or selling food to use reusable plates, bowls, cups, utensils, and condiment containers for on-site dining and commercially compostable plates, bowls, cups, and utensils for takeout and to-go orders (Ordinance 990). The City of Edmonds has also banned single-use plastic food service items (Ordinance 4139 and 4145).

Washington has already implemented statewide laws banning expanded polystyrene products (RCW 70A.245.070) and requiring businesses to provide certain single-use food serviceware items upon request only (RCW 70A.245.080).

California and Maine's EPR laws also include single-use plastic source reduction provisions to

encourage reuse. Maine's source reduction targets in draft rules are currently under consideration. California's SB 54 requires producers to source reduce single-use plastics by 25% by 2032 relative to a 2023 baseline, and no less than 10% of this reduction can come from refill, reuse, or outright elimination.

Incentives and Assistance

In addition to bans, fees, source reduction, or other regulatory requirements, many jurisdictions, including several interviewees, are also using voluntary incentives and technical assistance to support reuse in their communities. For example, Seattle and San Francisco are encouraging businesses to switch to reusables via current outreach and assistance initiatives as well as providing grants to purchase reusable serviceware. They are also investing in commercial reusables collection and washing infrastructure, with companies such as r.World and Turn, and working with large event venues to explore switching to reusable cups.

Maryland is developing a large-scale pilot program to equip all public facilities and USDA-supported enterprises (e.g., highway rest stops, schools, prisons, and public hospitals) along a major highway corridor with an extensive fleet of reusable serviceware, which would be collected, washed off site, and recirculated. Building the reuse market at scale will help them meet the State's climate, transportation, waste, and workforce development goals.

Boulder is also partnering with Deliver Zero to provide reusable takeout containers for restaurants, and with r.World to equip the jurisdiction's events and large venues with reusable serviceware.

Additional Considerations for Compostable Products Management

Jurisdictions

Jurisdictions outside of Washington noted concerns similar to those raised by organic materials management facilities related to the management of compostable products. However, jurisdictions face unique tensions as compostable products are sometimes seen as a means to help achieve aggressive waste diversion and recovery goals.

Rapid product and marketing changes: jurisdictions and businesses are motivated to use compostable products because they are perceived as more sustainable by residents and consumers, and the appearance of sustainability influences product and packaging design. However, this has caused several problems, including a proliferation in the marketplace of non-compostable lookalike single-use products, which are difficult to differentiate and cause higher contamination levels at organic materials management facilities. Keeping up with rapidly evolving packaging designs and marketing terminology is difficult for local and state governments and facilities and exacerbates consumer confusion. Several interviewees noted the administrative and enforcement burden in identifying acceptable compostable products amid an ever-changing product landscape. San Francisco specifically has worked extensively with CalRecycle to create

better labeling laws for compostable products, though California organic materials management facilities continue to report high rates of contamination from non-compostable lookalike products and screen out compostable and non-compostable plastics prior to processing.

Organics collection program changes: several facilities and jurisdictions interviewed have made the decision to stop accepting compostable products in their programs after previously accepting them, due to the high rates of contamination they experienced. The City of Boulder and its processor, A1 Organics, noted that contaminants used to represent up to 20% of the material by volume arriving at their processing facility[1], but that number has declined substantially since the change to no longer accept compostable products. Notably, this shift can be challenging and costly for jurisdictions to communicate to residents and businesses. Oregon Metro also stopped accepting compostable products in the region's organics streams after having previously accepted them. Metro struggled to find new organics processors when their previous contract ended in 2015, and as a result, they began looking into digesters as a potential processing solution. Ultimately, this caused Metro to stop accepting compostable products, which enabled several organics facilities to begin processing material generated by Metro jurisdictions.

Zero waste goals: jurisdictions and businesses are motivated to use compostable products because they appear sustainable to residents and consumers, regardless of their actual environmental impacts. Several interviewees noted that local governments, large sports facilities, and event venues in their regions are leaning on the use of compostable products as a means of achieving and publicizing their commitments to sustainability without consulting organic materials management facilities about the impacts to their operations.

Lifecycle impacts: in general, interviewees wanted to better understand the lifecycle impacts of compostable products to inform decisions around their use and management and improve environmental outcomes, especially since some lifecycle analyses, like those conducted by Oregon's Department of Environmental Quality (DEQ), show that many common compostable single-use products have greater negative environmental impacts than similar non-compostable alternatives.

Microplastics and chemicals of concern: jurisdictions and organic materials management facilities alike are concerned about the presence of PFAS and other harmful chemicals found in some certified compostable products. PFAS-related drinking water standards and "hazardous waste" designations recently set by the EPA, as well as upcoming federal and state regulations covering consumer products containing PFAS, could also have implications for the management of compostable products. Jurisdictions and facilities interviewed were also concerned about the impacts of microplastics generated via the processing of non-compostable single-use lookalikes.

Organic Materials Management Facilities outside of Washington

Organic materials management facilities interviewed outside of Washington echoed many of the same concerns and experiences as facilities in Washington, especially related to contamination

and the increased costs and challenges associated with accepting compostable products.

Contamination: consumers struggle to distinguish between compostable products and non-compostable lookalikes, and facilities that accept compostable products experience high rates of contamination. According to interviewees, labeling laws have not helped clarify the compostability of products to consumers because of the continued prevalence of greenwashing terms such as "biodegradable" and "plant- based."

Processing time: compostable products often require more time to break down and/or do not always fully break down under site conditions[2]. Multiple facilities noted that different temperature, moisture, and timing conditions are optimal for breaking down compostable plastic versus fiber products, making processing them together a challenge. Additionally, plastics made of PLA break down best under high heat, shorter composting processes. In contrast, molded fiber breaks down best under low heat and longer composting processes that support the necessary microbial and fungal activity needed to break down cellulose.

Processing costs: facilities that provided information about financial impacts of contamination estimated that anywhere from 10 to 25% of operating costs are devoted to removing and disposing of contamination, and one interviewee estimated that some facilities send up to 25% of incoming material to landfill due to high contamination.

Compostability requirements: Government policies and organizational initiatives that require food serviceware and other products to be compostable or recyclable were common across interviewees but are problematic for organics management facilities. Cities often design their solid waste contracts to accept as many items as possible, requiring processors to accept non-recyclable and non-compostable items that hinder facilities' operational efficiency.

No increase in captured food waste or value to finished compost: while compostable liner bags make it easier, and more likely, for residents and businesses to divert food waste, interviewees generally agreed that other compostable products have not demonstrably increased the amount of food waste being recovered, and neither bags nor other products provide any benefits to organics facilities' operations or finished products.

Accepted materials inconsistency: organic materials management facilities usually accept materials from multiple jurisdictions and sectors, and when only some of the jurisdictions they serve accept compostable products, it creates confusion, especially for residents or workers who travel between jurisdictions where accepted materials lists may differ. Facilities also strive to maintain specific material characteristics and produce consistent grades of finished compost, which becomes more difficult and costly when accepted material lists vary across multiple jurisdictions within their wasteshed.

Shifting focus to pre-consumer food waste: several facilities noted interest in depackaging equipment as a means to capture the large volumes of food waste generated at businesses like

grocery stores, distributors, and food manufacturers, where they feel the opportunity is greater than for post-consumer food waste. Some facilities are also looking into adding depackaging machinery to support general contamination reduction.

International Organic Materials and Compostable Products Management Examples

Several countries have had organic materials management policies and programs for many years, however policies and enforcement related to compostable products vary widely and it is unclear in many cases whether compostable products are accepted or what impacts they have on finished compost. Additional information from research about international organics management policies and programs on several European countries, South Korea, and Canada is included in Appendix C.

In Europe, some programs accept all types of certified compostable products (for example some municipalities in Italy, where compostable plastic is widely used). Others do not allow "packaging" or "biodegradable packaging" (for example in the U.K.) but may allow the use of compostable bags for collection (for example in Spain). Others expressly disallow certain types of compostable products such as compostable plastic but are not explicit about whether other types of fiber-based compostable products are acceptable (for example some municipalities in the Netherlands and Germany). There have been some studies conducted on the contamination rates and how well compostable products break down in organic materials management facilities with differing results, but in general definitive data about the impacts of compostable products is lacking.

There has also been debate about compostable products management. In the U.K., a 2021 government "call for evidence" on standards for a range of biodegradable, compostable and bio-based plastics received responses that compostable plastics should only be encouraged in very specific circumstances, and that these plastics should rely on the relevant certification standards for industrial composting (but not home composting).

In Canada, most municipal programs do not accept compostable plastic products, though several accept fiber-based compostable products. Some municipalities allow the use of compostable bags for organic material collection, though some specifically note that they are screened out in the same manner as regular plastic bags. South Korea has banned food waste to landfill since 2005 and has a high rate of food waste recovery with a unique approach to collection. Residents must purchase specific yellow plastic bags to collect their food waste which use RFID technology when disposed in automatic bins to charge residents by weight. It is unclear whether compostable products are accepted in the organics stream, and it appears that these plastic bags are not compostable and used only for collection before being screened out.

Research Memo: Organic Materials Management Facility & Jurisdictional Interview Guide Questions

General Programs & Operations

- What processing facilities receive organic materials from your jurisdiction?

Do you have a contract with a hauler(s)/processor(s)?

How is organic material collected for each sector (i.e., collected directly by the hauler/processor, collected by the City and taken to the processing facility, etc.)?

Are residents and/or businesses required to have organics collection service, or is it optional? If optional, do you have any data on subscription rates?

Is organics collection paid for separately, embedded in overall utility rates, or handled in another way?

From which sectors/generators in your jurisdiction does the facility currently accept organic materials?

a. Residential
b. Commercial
c. Industrial
d. Agricultural
e. Which types of feedstock does the facility currently accept?
f. Yard waste
g. Food waste
h. Agricultural waste
i. Compostable products (please describe material and type: fiber and plastic, bio bags, bowls, clamshells, utensils, straws, etc.)

Do you have stipulations in your contracts about what materials the processing facility must accept? Please describe.

If they do accept compostable products,

- What type(s) of compostable products are accepted (i.e. PLA compostable plastic, collection bags/liners, paper food service ware, etc.) at the facility or included in your residential and/or commercial organics recycling program?

When did you begin accepting compostable products as part of the organics stream?

Why did you decide to accept compostable products?

What feedback have you received from your local processor about accepting compostable products as part of the organics stream?

Why did you decide to stop accepting compostable products?

How has that change impacted City operations or waste management planning, if at all?

Do you have any compost market development efforts, for example, does your jurisdiction or others nearby purchase finished compost from the processor? What is it used for?

Incentives, Laws, & Enforcement

- What existing State and/or local laws and regulations guide the collection and processing of organics?

How do State or local laws govern the management of compostable products? Are there any laws specifically governing the labeling of compostable products?

Do you provide any financial, contractual, regulatory, or other incentives to get your local processor to accept compostable products in the organic materials stream? Are you aware of any other jurisdictions that do?

How are the above laws, as well as any pertinent regulations and policies, enforced? And how are the enforcement mechanisms supported (e.g. budget, staffing, regulatory funding models, etc.)?

Have the enforcement mechanisms been effective? What successes and barriers have they faced?

What are the consequences of being out of compliance? What instances of non- compliance have occurred?

Contamination Reduction & Policy

- What other policies does your jurisdiction utilize to reduce organics contamination? What approaches have been the most / least successful?

Do you have any other programs or policies to encourage reuse/refill? Do you have any data to show whether they have led to overall waste reduction, increased diversion, or reduced contamination?

Are you considering other policy approaches (e.g., EPR) for managing compostable products and their associated challenges?

Are policy goals in other areas (e.g., climate change mitigation, toxics reduction, water quality, etc.) factored into decisions about compostable products? How so?

What local or State policy approach(es) would you employ to reduce organics contamination if barriers such as time, money, and capacity were not issues?

Other

- Is there anything else you'd like us to know?

Do you know of any other jurisdictions we should be talking to? If so, can you share contact information for relevant jurisdictions?

Research Memo: Expanded Summary and Key Findings from Interviews with Jurisdictions and Facilities Outside Washington

Jurisdictions

Lifecycle Impacts

Jurisdictions are interested in better understanding the real-world environmental impacts of compostable products to inform decisions around their use and management and achieve improved environmental outcomes.

Jurisdictions are curious about how the lifecycle impacts of *landfilled* compostable products compare with *landfilled* non-compostable alternatives. Many compostable products end up in the landfill, either directly via municipal solid waste or after being removed as contamination by organic materials management facilities.

Many jurisdictions have been investigating and striving to understand the environmental benefits of compostable products. Some jurisdictions have arrived at conclusions that have informed related policy and programmatic decisions, while others are seeking additional information.

Jurisdictions and facilities alike are worried about the presence of PFAs and other toxins found in some certified compostable products, as well as the pervasiveness of microplastics stemming from processing non-compostable lookalikes.

PFAs-related drinking water standards and "hazardous waste" designations recently set by the EPA—as well as upcoming federal and state regulations covering consumer products containing PFAs—could all have implications on the management of compostable products.

Additional Details from Interviews

- In 2019, San Francisco removed ice cream cartons, gable top cartons, and coffee cups from the approved compost list because of concerns over micro plastics stemming from the processing of these items at organics facilities. When it comes to PFAs, San Francisco is trusting BPI's testing processes to identify PFAs and exclude products that contain them.
- Colorado's packaging EPR law is looking at best management practices for compostable products and how they can support the overall goals of the solid waste system. However, compostable products are not included on the minimum list of covered products, so "the PRO is not funding the collection or sortation of compostables, just their manufacture and processing." – City of Boulder & A1 Organics
- Oregon Metro referenced the lifecycle analyses conducted by the Oregon Department of Environmental Quality, which demonstrated that many common compostable single-use products have a higher negative environmental impact than similar non- compostable alternatives.

- The Minnesota Pollution Control Agency plans to hire a specialist in lifecycle analysis to help the State more accurately assess the role of compostable products in achieving Minnesota's environmental goals, amongst other things.
- All jurisdictions and facilities interviewed are very interested in reviewing the findings of Washington's Compostable Products Advisory Committee.

Prioritizing Reusables

Local jurisdictions, state governments, and organic materials management facilities all actively encourage reusable products over compostable products whenever possible. When it comes to food serviceware, jurisdictions are striving to reduce the need for all single-use items (compostable or otherwise). More than one interviewee acknowledged that moving toward reuse circumvents concerns about compostable products introducing PFAs into the runoff from organics facilities and their finished compost products.

Additional Details from Interviews

- San Francisco is encouraging businesses to switch to reusable dishes via current outreach and assistance initiatives. They also provides grants for businesses to help them procure reusable serviceware, and have ten staff conducting multilingual outreach to recruit and support businesses.
- San Francisco is investing in commercial reusables collection and washing infrastructure, with r.World and Turn as the two main providers, and some of their largest events and venues are exploring the switch to reusable cups.
- "A reuse culture would be much preferable to our facility than a world of compostable single-use products." – SMSC Organics Recycling Facility
- There is a lot of movement around reuse and using more durables, especially in Portland, and Oregon Metro is encouraging it.
- The Bureau Chief for Solid Waste at Baltimore County pushed back on accepting compostable products and compostable liner bags due to potential confusion with lookalikes. They would prefer reusables instead.
- The State of Maryland is developing a large pilot program to equip all public facilities and USDA-supported enterprises (such as highway rest stops, schools, prisons, and public hospitals) along a major highway corridor with reusable serviceware, which would be collected, washed offsite, and recirculated. Building the reuse market at scale would help "meet State goals around climate, transportation, waste, and workforce development."
- The City of Boulder is seeking to leverage the fact that its organics processor (A1 Organics) is no longer accepting compostables as an opportunity to leapfrog single- use entirely and promote reuse.
- The City of Boulder is partnering with Deliver Zero to provide reusable takeout containers for restaurants, and with r.World to equip the jurisdiction's events and large venues with reusable serviceware. An offsite washing facility currently operates in nearby Broomfield,

Colorado.

Public Perception and Non-Compostable Lookalikes

Jurisdictions and businesses are motivated to use compostable products because they *appear* sustainable to residents and consumers, regardless of their actual environmental impacts determined by science-based assessments. This desirable appearance of sustainability also incentivizes the proliferation of non-compostable lookalike single-use products.

The appearance of sustainability is a powerful economic incentive that influences the design of products and packaging in response to consumer preferences.

Compostable products generally cost more than non-compostable alternatives.

The market for compostable products and packaging is dynamic and will continue to shift and evolve with new items, materials, designs, and appearances.

While banning common greenwashing terms might alleviate consumer confusion in the short term, the marketplace could easily adapt to create new product and packaging designs and branding that connote sustainability.

Additional Details from Interviews

- Prince George's Organics Recycling Facility first developed a list of approved compostable products ten years ago but has not been able to keep the list up to date with so many new products on the market.
- "When you start to limit compostables to only certain products, you put local governments in the position of being the purchasing police." The additional enforcement required becomes burdensome, as does maintaining accepted product lists amid an ever-changing product landscape. – Oregon Metro
- "Better labeling requirements will help, but I think [compostable product] manufacturers will just find new loopholes." – SMSC Organics Recycling Facility
- Over the years, San Francisco has worked extensively with the State of California to create better labeling laws for compostable products. At the same time, California organic materials management facilities continue to report high rates of contamination coming in from non-compostable lookalike products, and facilities must screen out compostable and non-compostable plastics. – San Francisco and CalRecycle
- "We have had a lot of bad actors with brands trying to greenwash and market products as compostable in California." – San Francisco
- Cities often design their solid waste contracts to try and recycle everything they possibly can. Local jurisdictions often push for "wishcycling," requiring processors to accept non-recyclable and non-compostable items, which hinders their operational efficiency. – Minnesota Pollution Control Agency

- "We would compromise our Zero Waste goals significantly if we stopped accepting compostable products - I don't think our board would stand for that." – San Francisco
- "Many of our venues and events have been leaning on compostable products to achieve their sustainability goals, and it would take a huge culture shift for them to switch away." For example, Oracle Park (SF Giants) uses all compostables. – San Francisco
- Oregon Metro has received lots of pushback from sports and entertainment venues that want to be seen as sustainable, and "they equate compostable products with sustainability." Metro takes a firm stance against this, and it has created some tensions between venues and event-based businesses and the City of Portland, which is trying to enforce the ban on compostable products in the organics stream.
- "As organics diversion has started to increase, … other types of compostable products and more brands came online, which led to consumer confusion and more contamination. That trend accelerated a lot in 2020." – A1 Organics

Jurisdiction or Organizational Mandates

Government policies and organizational initiatives that require food serviceware, packaging, and other products to be compostable or recyclable create problematic conditions for compost facilities.

It is common for organics processing facilities to accept inbound materials from multiple jurisdictions and sectors. When only some of these jurisdictions accept compostable products, it creates public confusion, especially for residents or workers who frequently travel between these jurisdictions.

Harmonizing lists of accepted feedstocks across the cities, counties, states, and Tribes that comprise an organic materials management facility's wasteshed is difficult when the facility does not have the authority to establish this list.

Facilities strive to maintain specific material characteristics and to produce consistent grades of finished compost, which becomes more difficult and costly when accepted material lists vary across multiple jurisdictions within its wasteshed.

Additional Details from Interviews

- Oregon Metro struggled to find new organics processors when their contract with their processor ended in 2015 and were looking into digesters as a solution. Ultimately, this led them to stop accepting compostable products, which opened the door for a number of processors being willing to accept their organics.
- SB 54, California's extended producer responsibility law for printed paper and packaging, requires all covered products to be recyclable, compostable, or reusable. San Francisco is seeking the inclusion of compostables as covered products, so they can still be "on the shelves" and play a role in meeting the jurisdiction's Zero Waste goals.

- In order for a covered product to be listed as recyclable or compostable under SB 54, it has to be accepted by a specified percentage of processing facilities and there has to be a responsible end market for the material.
- According to a recent statewide study, all organics facilities in California currently screen out compostable plastic products as contamination, including those that officially list them as accepted materials, with compostable plastic bags being the one exception. – CalRecycle
- The City and County of San Francisco passed an ordinance in 2007 requiring commercially provided food serviceware to be recyclable or compostable.
- Recology's organics program isn't technically required to accept compostable products from San Francisco by contract; they have come to an informal agreement to continue accepting them because San Francisco has been a "legacy client."
- A very small number of local jurisdictions in California allow for the collection of compostable products with organics hauling (such as San Francisco and Sacramento). However, the facilities that receive those materials (Recology's Jepsen Prairie and Blossom Valley North facilities for San Francisco) screen out compostable products as contamination. – CalRecycle & San Francisco
- "It's hard when you have a larger city that's requiring the processor to accept large amounts of contamination," in the form of compostable products. "That city is not buying back the compost." – A1 Organics
- Prince George's County Organics Recycling Facility accepts material from across Delaware, Maryland, and Virginia, with other loads coming from Pennsylvania, Ohio, North Carolina, and New York. This geographically large wasteshed means that the composition of inbound feedstocks is quite variable, making it more difficult to establish a standardized list of accepted compostable products across all the organics collection programs that feed into this facility.
- Hennepin County openly accepts compostable products, which are sent to SMSC Organics Recycling Facility. The City of Minneapolis (which is within Hennepin County) particularly encourages their use through their local ordinance requiring serviceware to be compostable or recyclable. – Minnesota Pollution Control Agency
- "Stadiums and events will generate 80% compostables and 20% food." – A1 Organics

U.S. Facilities Outside Washington

Processing Time

Compostable products often require more time to adequately process, and some will not fully break down under site conditions.

Contamination removal methods and composting processes vary by facility, resulting in a wide range of processing pathways and outcomes for PLA and molded fiber compostable products that enter organic materials management facilities.

Compostable products do not represent a uniform material feedstock. Just as food waste, yard waste, manure, and wood waste might all require different processing techniques and conditions to properly break down into finished compost end products, so do different types of compostable products, such as molded fiber and PLA.

Additional Details from Interviews

- "Approved compostable plastics still often require a second pass through the composting process in order to fully break down. With our small list of accepted flatware products - they do break down but take a second cycle to fully compost. Some material is retained, and some goes to landfill." – Prince George's Organics Compost Facility
- Compostable bags are an issue. "They don't break down in 60 days, they get fragmented, and they can hide other contamination." – Oregon Metro
- "Increasing diversion (in the form of compostable products) has slowed down the composting process. – A1 Organics
- While all the facilities interviewed were familiar with CMA, all except for A1 Organics only included BPI certified products on their accepted lists due to the required presence of a logo. A1 went with CMA because they "want the ones that work," but stated, "we need both testing processes."
- Molded fiber products often do not fully compost and create a pulpy mass that gets sent to the landfill, especially items that come in stacked like schools' paper lunch trays, and cups. – SMSC Organics Recycling Facility
- Plastics made of PLA break down best under high heat, shorter composting processes. In contrast, molded fiber breaks down best under low heat and longer composting processes that support the necessary microbial and fungal activity needed to break down cellulose. – Multiple sources
- Facilities in Maryland that operate at lower temperatures do not accept compostable products. – Maryland Department of the Environment
- Each type of material feedstock (manure, natural wood waste, food scraps, yard waste, etc.) has different State requirements that guide its management and processing. It is up to each organic materials management facility to determine what feedstocks they would like to accept and secure the necessary permits. The Maryland Department of the Environment regulates the composting processes at the facilities and provides the permits. Maryland Department of Agriculture regulates the permitted facilities' operators and finished compost end products.

Food Waste Recovery

Compostable liner bags make it easier, and more likely, for residents and businesses to divert food waste. However, other compostable products have not been demonstrated to increase the amount of food waste being recovered, and neither bags nor other products provide any benefits to organics facilities' operations or finished products.

A newly passed bill in California will require all finished compost end products generated in the state to achieve the certification of USDA's National Organics Program (NOP) 2026. If an organics facility does not get NOP certification, they would not be able to sell finished compost end products in California. Notably, compostable products are not currently allowed as feedstocks for NOP certified compost products.

Additional Details from Interviews

- Oregon Metro did not notice any drop in captured food waste volumes after they stopped accepting compostable products across the region in 2015.
- "Compostable hot cups and cold cups are problematic. They aren't breaking down at the facilities and don't help capture food scraps." – Oregon Metro
- "Packaging does not make great compost. It requires other resources at our facility to get it through…. We've got to add all these other organics to [compostable products] to make it happen." – A1 Organics
- According to California's organics bill SB 1383, jurisdictions are allowed to collect organics in compostable plastic bags if the processing facility notifies them to say they can process the bags.
- "We don't need the compostable products, but we see the convenience of compostable bags." – Prince George's Organics Recycling Facility
- Oregon Metro allows liner bags in the compost stream because they enable easier organics management by businesses and keeps their bins clean.
- Many of San Francisco's residents live in multifamily properties, which are required to have compost service like single-family homes. At these multifamily properties, compostable bags greatly increase convenience and drive higher rates of participation in organics diversion, as shown by a San Francisco study conducted by EcoSafe.
- "I don't think compostable food serviceware has a significant Zero Waste value. San Francisco cares less about food serviceware and more about liners."
- "They are a necessary evil. They can be a great tool to help society get food waste out of the landfill. Do compostable products help the composting process? Not even a little bit." – SMSC Organics Recycling Facility
- Compostable products likely work only in a small scale, completely closed system without lookalikes or non-compostable single-use products – "Yes you do get more food waste. However, it really needs to be set up correctly. Everything has to be compostable at the restaurant, because people will not sort." – SMSC Organics Recycling Facility
- "Sometimes a load will come in [from a venue, stadium, casino, etc.] and it will just be compostable products, which is not ideal. It is an issue because it needs to be mixed with food waste to break down." – SMSC Organics Recycling Facility
- "Stadiums and events will generate 80% compostables and 20% food." – A1 Organics

- When accepting compostable products, "it does take longer, it makes inspections harder, there are 2-3 more steps to process it, there are additional disposal costs, there will inevitably be more contamination because of greenwashing." – SMSC Organics Recycling Facility
- Anecdotally, Minnesota Pollution Control Agency feels like there is some truth to the claim that compostable products facilitate the capture of more food waste, "but there are reasons to be skeptical."
- At stadiums, casinos, and other large venues, the organics stream is usually contaminated, and even if it's not, it's mostly compostable serviceware and packaging, which is also problematic for processors when not appropriately mixed in with food and yard waste. "No one throws out a $10 hot dog." – Oregon Metro (Portland Trail Blazers arena), Minnesota Pollution Control Agency, SMSC Organics Recycling Facility (Minnesota Twins stadium and SMSC casinos), & A1 Organics (Colorado)
- "Very little food is being put in front-of-house compost bins at restaurants, particularly fast food chains," so any opportunity to capture more food waste via compostable products is small. – City of Boulder

Contamination Reduction Investments

Investment in contamination removal machinery, such as depackagers, can facilitate the capture and diversion of significant quantities of *source separated* food waste, particularly from groceries, food manufacturers, and food distributors.

Depackaging machinery can be used to support the separate processing of food waste from commercial food processing entities, or as a general contamination reduction tool at commingled organic materials management facilities.

To the extent compostable products are considered a contaminant by some operations, depackagers and other related equipment can be used to screen out both compostable and non-compostable (disposable) packaging.

It is important to also look at where food items are packaged, because large quantities of food still contained within its packaging gets discarded.

Compostable products include many types of food packaging in addition to common food serviceware items.

Additional Details from Interviews

- A company called Divert operates a depackaging machine to process organics from other facilities and large volume food waste generators like groceries, distributors, and food manufacturers. They contract with businesses directly and haul packaged food. – Oregon Metro
- "We're interested in investing in a depackaging machine…. We've already had solicitations

from a number of grocers and food distributors…. We won't need to solicit people to bring us their packaged material because they're already knocking on our door to ask, 'do you have your machine yet?'" – Prince George's County Organics Recycling Facility

- SMSC Organics Recycling Facility owns a Scott Equipment turbo separator depackager – "the Thor" – which started processing pre-consumer packaged foods (expired, recalled, extra, etc.) last fall.
- A prominent local hauler just invested in a "Tiger" depackaging machine and is looking to secure new organics service customers like groceries. – A1 Organics
- "Grocery stores will generate a lot of organics and not many compostable products." This could represent a potential opportunity where compostables can provide convenience to get more organics collected. – A1 Organics
- "30-40% of food scraps by weight comes from grocery stores and food distributors – that's where we need to be looking, where the food is actually being packaged. That's where a lot of food scraps are generated." – OR Metro
- Oregon Metro is also looking at eventually putting in a depackager at their central transfer station and are conducting a study to see how much additional organic material might be captured. The depackager would primarily be aimed at removing BPI certified bags, which are not fully breaking down.

Contamination Reduction Strategies

Facilities can mitigate some of the detrimental impacts associated with accepting compostable products if a significant proportion of operating costs can be spent on contamination removal, *and* stringent policies are established to hold haulers and organics generators financially accountable for contaminated loads.

Facilities that track which haulers are depositing inbound loads have the ability to attribute contamination to specific haulers, jurisdictions, or generators and hold them financially accountable, alleviating some of the cost of higher contamination associated with accepting compostable products.

Accountability measures for the haulers that deliver contaminated loads will not necessarily result in less contamination coming from the original generator. Depending on the data tracking systems used by the haulers and facilities, generators of contaminated organics may or may not be identifiable. Haulers also differ in the level of individualized communications they send to their customers, and jurisdictions have different requirements for the use of "oops tags" and other contamination education tools.

Additional Details from Interviews

- SMSC Organics Recycling Facility has done experimentation and exploration about potential markets for OMRI certified compost end products. They determined that the price markup cannot be that much more than other products, which doesn't make the

extra handling costs and space allocations necessary for certification worth the effort.

- "I know other facilities are spending as much as 20% of their costs on contamination removal." – Prince George's County Organics Recycling Facility
- Oregon Metro found that prior to no longer accepting compostable products, "10- 25% of operating costs for facilities were devoted to removing and disposing of contamination."
- Many facilities in Minnesota report having significant added expenses from needing additional processing time, screening, or other steps in their processes to deal with compostable products and manage contamination. As a result, many facilities are considering a shift to taking food-based materials only and no longer accepting compostable products. – Minnesota Pollution Control Agency
- A1 Organics removes contamination using vacuum machines and screens, which works well when contamination rates are low.
- Prince George's County Organics Recycling Facility pre-processes inbound materials using grinders with magnetic heads that can pull out ferrous metals.
- "Dirt Hugger does a great job at contamination removal, but they devote a significant amount of money to do it. They have been the most successful at getting into the agricultural market and supplying farmers." – Oregon Metro
- Some facilities have the authority to reject or send back contaminated loads. The facilities first try to capture the organics and sort out the contamination, and they then call up the hauler to return, pick up the rejected material, and pay for its disposal. They also assess the hauler or contractor that delivered the load a contamination fine. – Prince George's Organics Processing Facility & SMSC Organics Recycling Facility
- SMSC Organics Recycling Facility has established a 5% contamination limit for incoming loads, enforced by visual inspections and spot check opening of compostable bags. "Contamination was a big issue for us six or seven years ago and we were struggling to find markets for finished products." They then implemented the 5% contamination threshold, inspections/spot checks, and invested in new contamination removal equipment, and contamination levels dropped.
- In its most recently negotiated solid waste contract, San Francisco gave approval for its hauler, Recology, to levy contamination charges on organics generators. Recology also operates the processing facilities that receive much of San Francisco's organics.
- San Francisco audits high volume waste generators every three years, and business or multifamily units that generate contamination above specific set thresholds (5% by volume or the organics stream) are required to hire a Zero Waste facilitator.
- Recology spends considerable efforts and money on contamination reduction, particularly to remove plastic bags, in both pre-screen processes and when sifting out their overs. – San Francisco
- If contamination is too high, the facility can reject the load and charge the hauler as garbage. Oregon Metro then receives information about the contaminated load (hauler,

route, jurisdiction, etc.) and will send a report to that local government. The local government then contacts the hauler to determine responsibility for contamination and address it. Oregon Metro used compliance obligation letters to lay the groundwork for contamination enforcement.

- The Maryland Department of the Environment requires that the contamination rate of inbound feedstocks cannot exceed 10% at permitted facilities.
- The Maryland Department of Agriculture requires that all products sold by permitted organics facilities be lab tested each year for metals, glass, plastics, toxins, large inert materials, and other contaminants. According to these lab tests, "we haven't had any problems with compostable serviceware not breaking down properly in the finished product. At least, not as of yet."
- The inspections and testing of finished products done by the Maryland Department of Agriculture have successfully identified contamination and provided important feedback to organic materials management facilities and jurisdictions. This process has effectively preserved the quality of finished compost products.
- The City of Boulder is one partner among many municipalities up and down the Front Range that send materials to A1 Organics. Sometimes, materials get commingled from multiple haulers at a transfer facility before getting sent to A1, which makes attribution of contaminated loads impossible: "We have to put a lot of trust and faith that everyone is doing well and keeping the stream clean before we can do our inspection to make sure the material is okay. A big challenge is finger pointing around who is responsible for contamination."

Consumer Confusion

All people struggle to distinguish between compostable products and non-compostable lookalikes, and as a result, facilities that accept compostable products experience high rates of contamination from non-compostable lookalikes.

The implementation of labeling laws has not helped clarify the compostability of products to consumers because of the continued prevalence of greenwashing terms such as "biodegradable" and "plant-based."

Especially for businesses and other entities that purchase compostable products and packaging, having a certified compostable logo to look for can help reduce confusion.

Additional Details from Interviews

- "I get questions from customers and cities every day. They are incredibly confused about what can and cannot go into the compost." – SMSC Organics Recycling Facility
- The Minnesota Twins stadium just switched to procuring a whole new suite of products that they thought were compostable. After purchasing a season's supply for all their vendors, they checked with SMSC Organics Recycling Facility to see if they are actually

compostable. It turns out they were misled and the products are non- compostable, so the stadium will not be able to divert any organics this season because the processors will not take their materials.

- While all the facilities interviewed were familiar with CMA, all except for A1 Organics only included BPI certified products on their accepted lists due to the required presence of a logo. A1 went with CMA because they "want the ones that work."
- "The public cannot sort at all, and there is very little food coming out of public bins and front-of-house organic waste." – City of Boulder
- Manufacturers of compostable products have been known to have distribution issues. Subsequently, in order to promptly fill the orders they have received, distributors will sometimes send non-compostable products instead when these supply chain issues occur. That leads to a lot of confusion. – A1 Organics
- Many facilities in Minnesota report having significant added expenses from needing additional processing time, screening, or other steps in their processes to deal with compostable products and manage contamination. As a result, many facilities are considering a shift to taking food-based materials only and no longer accepting compostable products. – Minnesota Pollution Control Agency
- When it comes to commercial organics collection, Duluth County focuses on capturing source separated food waste generated back-of-house. Its program does not accept compostable products because the processor wants a clean stream. – Minnesota Pollution Control Agency
- Recology's facilities that process organic material from San Francisco and Sacramento have a hard time distinguishing between the compostables and the lookalikes and have been vocal about contamination caused by compostable products.
- "As organics diversion has started to increase, … other types of compostable products and more brands came online, which led to consumer confusion and more contamination. That trend accelerated a lot in 2020." – A1 Organics
- "Our inbound materials went up to about 20% contamination by
- volume. Compostable products were partially responsible, but not completely." – A1 Organics
- "I don't think we're ever going back to enforce or encourage front-of-house sorting" of organics, but we really want to focus on back-of-house. – City of Boulder
- Vail Ski Resort stopped their front-of-house organics collection due to contamination. Then, they put in personnel to manage the bins that customers access and help them sort, which was very effective, yet expensive." – A1 Organics

End Markets for Compost

Market feedback and preferences for contamination-free compost have driven facilities and jurisdictions to stop accepting compostable products, which has resulted in notable decreases in contamination rates. Markets for finished compost have slowed down in some areas over the past

several years due to widespread increases in contamination.

Additional Details from Interviews

- The pandemic-driven increase in compostable products and non-compostable lookalikes in the organics stream "affected our finished compost sales. We had full semi truckloads of compost returned to us that were rejected by bulk wholesalers." – A1 Organics
- Due to a lack of marketability, contaminated compost was building up at their facility, leading to increased management costs, space costs, and landfill costs to remove it. The entire composting operation slowed down, which was also expensive. "We were running out of space. We had all this contaminated compost" onsite, and "we were getting pinched." – A1 Organics
- "The quality of our finished product has improved dramatically" since April 2023, when A1 Organics stopped accepting compostable products.
- Oregon Metro struggled to find new organics processors when their contract with their processor ended in 2015 and were looking into digesters as a solution. Ultimately, this led them to stop accepting compostable products, which opened the door for a number of processors willing to accept their organics.
- Oregon Metro found that prior to no longer accepting compostable products, "10- 25% of operating costs for facilities were devoted to removing and disposing of contamination, and as much as 25% of incoming material was being sent to the landfill."
- A study by Oregon Metro, from before the implementation of its Food Scraps Policy in 2022, found that the region's organics facilities experience an 11% average contamination rate, by volume, in their inbound feedstocks.
- The Maryland Department of Agriculture tests finished compost end products and has set a 2% threshold for manmade inert contaminants (overs).

System Bifurcation

Some facilities separate food waste and yard waste streams to increase control over the balance of nutrients, size, and moisture content of feedstocks. Such separation and control enables facilities to create multiple types of compost end products that can better meet market demands. However, this separation requires additional permitting, space, time, labor, and equipment.

Separately collecting food and yard waste makes supplying organic feedstocks to a depackager more efficient. Separated collection allows for greater flexibility in organics processing techniques and technologies, enabling a variety of different types of organic materials management facilities to access the feedstocks most suited to their processing methods.

Additional Details from Interviews

- Prince George's County Organics Recycling Facility operates windrows for yard waste only and processes a mix of food scraps and yard waste in Gore-covered aerated static piles.

Windrows make Leaf Grow compost, while Gore piles make Leaf Grow Gold.

- SMSC Organics Recycling Facility makes a small volume of OMRI certified compost for Scott's Miracle Grow pro performance blends from their yard waste only piles. All their food waste is processed in windrows (food waste is 20-30% of windrows composition), while the rest of their yard waste and wood waste is composted through static piles.
- SMSC Organics Recycling Facility has done experimentation and exploration about potential markets for OMRI certified compost end products. They determined that the price markup can't be that much more than other products, which doesn't make the extra handling costs and space allocations worth it.
- Recology's Jepsen Prairie Organics used to have two piles—one OMRI certified and the other non-OMRI—but they could not maintain bifurcation. – San Francisco
- Baltimore County's organics facility at the Eastern Sanitary Landfill has been taking residential yard waste for ten years, and in January 2024, they added a separate small food waste pile for material collected via the County's residential collection pilot program.
- "A tiny section of our facility is dedicated to a source-separated food waste stream, but the vast majority (of our feedstocks) are commercial fats, oils, and grease (FOG), yard waste, etc. We have our OMRI listed compost separate because we don't want any cross contamination on our site." – A1 Organics
- Food waste and yard waste are collected separately within Oregon Metro, which allows for more efficient contamination reduction processes applied to the food waste stream before it gets combined with yard waste.

Research Memo: Composting Standards and Compostable Packaging in the EU, Canada, and Asia

This section summarizes findings from research to assess international approaches to managing compostable products, including laws, policy frameworks, and enforcement in the European Union and other countries with mature organics collection and management programs.

Italy

Food Waste Composting Programs and Acceptance of Compostable Packaging

Italy is the EU's most extensive example of food waste composting programs offered in tandem with the acceptance of compostable packaging. Italy's composting sector has been around for at least 30 years, and according to the industry group Consorzio Italiano Compostatori (CIC), in the last 15 years, the number of composting facilities has increased by 2-3% each year.

Specifically, Milan serves as a well-documented case study of a food waste collection program that supports the use of compostable packaging. As Italy's second largest city, it has been offering municipal collection since 2012, and is now considered one of the world's leading examples of food waste collection (Novamont). Approximately 95 kilograms of food waste are collected per

inhabitant, with an overall 62.6% waste collection rate (Zero Waste Cities).

Compostable plastic packaging (mostly in the form of flexible plastics) is widely used in Italy and accepted in industrial composting facilities. Municipal programs often encourage the use of compostable bags as bin liners by providing households with a free packet of bags at the start of the program. Because Italy has a ban on non- compostable single-use plastic bags, all single-use bags sold in stores must meet the European standard for compostable packaging, EN13432.

Implications for Compost Quality

The CIC coordinates assessments that examine biodegradation of compostable plastic packaging in a number of Italian biowaste treatment facilities. In 2020, it was reported that about 900 composition analyses on organic waste had been conducted at more than 550 Italian municipalities. The level of contamination from non- compostable materials across these facilities was below 5% (in waste). A significant source of contamination (25% of the total amounts of non-compostable materials) came from traditional plastic bags where they are still used for the collection of material.

When it comes to compostable plastics, studies conducted in 2017 found that at the end of the composting cycle, on average 94.8%-96% of the compostable plastics had degraded. For digestate coming out of anaerobic digestion facilities, further aerobic biological processes were able to completely disintegrate/break down the fragments of both flexible and rigid compostable and biodegradable plastics (compliant with UNI EN 13432).

Spain

Food Waste Composting Programs and Acceptance of Compostable Packaging

Spain has a new nationwide requirement for all municipalities to collect organic (food) waste starting in 2024. Prior to this, the autonomous community of Catalonia (and its capital city, Barcelona) was the leader in the country for offering municipal collection services, usually in the form of street bins or pneumatic bins. Compostable packaging is not accepted, but compostable bags are used for the more "emerging" form of door-to-door collection being piloted in certain neighborhoods. The city's collected material is sent to Zona Franca Ecoparc, where it generates both biogas and finished compost.

Barcelona also offers community composting programs and guidance. One study found that the contamination rate of "domestic" collection of material was 22% (as opposed to about 8% in the commercial stream), and attributed this to residents using non-compostable bags to bring their bio-waste to the collection container.

Implications for Compost Quality

A 2021 study of five composting facilities in Spain looked at microplastic contamination over five months. 94% of microplastic contamination could be attributed to PET, PS, PE, PP, and PVC. No

microplastics from compostable bio-based plastics were detected in any of the samples. In composting facilities where the use of compostable biowaste collection bags was well-documented, no microplastics from compostable plastic items could be retrieved. One of the facilities was an anaerobic digestion plant with a post-composting phase. It also found that plastic contamination in the final compost resulted from conventional plastics, and not compostable bio-based plastics.

Germany

Food Waste Composting Programs and Acceptance of Compostable Packaging

Since 2015, it has been mandatory in Germany for municipalities to offer separate organic waste collection (typically called bio-waste) from households as part of the Law on Closed Cycle Management and Waste Disposal (Kreislaufwirtschaftsgesetz). This law applies to all regions of Germany, designating municipalities as responsible for providing the collection service. While the law mandates separate collection, the specific systems can vary depending on the municipality. For example, some areas use brown bins for organic waste, while others use compostable bags.

Berlin has had a program since 2002, with participation requirements expanded in 2019. Its program does not accept compostable bioplastics, and while instructions do not mention compostable fiber packaging, these are implied to not be accepted due to messaging such as “No plastics, packaging, films, bags, bioplastics.”

Implications for Compost Quality

According to a study commissioned by the UBA titled Aufwand und Nutzen einer optimierten Bioabfallverwertung, in 2008 there were around 1,000 composting plants and 85 anaerobic digestion plants in Germany (UBA).

A field study by the Witzenhausen Institute and the University of Bayreuth concluded that certified compostable bags do not pose any challenges to the quality of compost. The researchers analyzed 10 finished compost streams coming from eight different biowaste treatment plants. They found that 98% of the plastic particles found in these piles were derived from conventional, non-biodegradable plastics - in other words, 446 plastic film particles were detected and only eight were from compostable plastics (TotalCorbion).

Netherlands

Food Waste Composting Programs and Acceptance of Compostable Packaging

The Netherlands has “sector-specific plans” that mandate the collection of organic waste such as food waste from households and businesses. Most municipalities in the Netherlands offer curbside collection of organic waste, including food scraps and garden waste, This is often referred to as "GFT" waste (Groente-, Fruit- en Tuinafval). Most municipalities do not explicitly accept compostable packaging in their collection programs. For example, in the Hague,

"biodegradable packaging" is not allowed in the food waste composting program, and this seems to imply that compostable bioplastics are also not accepted. Compostable fiber-based packaging is not explicitly mentioned.

Implications for Compost Quality

The Netherlands composts material using several large-scale composting facilities. According to a 2019 study conducted by Wageningen University (WUR) found that EN13432-certified compostable plastic products are compatible with the Dutch industrial composting system using shorter composting cycles. Specifically, certified compostable PLA products disintegrated faster than food waste such as orange and banana peels. For example, a PLA plant pot fully disintegrated after 11 days and PLA tea bags fully disintegrated after 22 days, which is significantly below the 12-week disintegration time assumed in the EN 13432 certification for industrially compostable products (TotalCorbion).

United Kingdom

Food Waste Composting Programs and Acceptance of Compostable Packaging

The UK's policies for municipal collection of food waste varies by country. As of legislation passed in 2023, separate municipally run food waste collection in England will be mandatory by March 2026. In Wales, Scotland, and Northern Ireland, there is already weekly curbside organics collection in place, although residents are not usually required to use these services.

The separate collection of compostable plastic packaging is not required under the new legislation, and most municipal programs list "packaging" as a material that is not accepted. There has been considerable debate in the UK over these materials, and the debate has included not just certified compostable packaging but also oxo- degradable plastics, which the government appears to be moving to ban. A 2021 government "call for evidence" on standards for a range of biodegradable, compostable and bio-based plastics received responses that compostable plastics should only be encouraged in very specific circumstances, and that these plastics should rely on the relevant certification standards for industrial composting (but not home composting).

Implications for Compost Quality

A recent study conducted by the Compostable Coalition UK found a five-fold increase in consumers disposing of compostable packaging in their food waste bins when participating households were sent educational resources that encouraged them to check packaging labels, use the food waste bin for disposal of compostable packaging, and explained the composting process. The trial concluded that clear communication and labeling led to correct disposal, with contamination also dropping throughout the trial period.

The study also conducted a trial at EnVar, one of the largest composting sites in the UK, to test how compostable packaging was breaking down. Results from this trial showed that the packaging biodegraded successfully, with the resultant compost passing PAS100 certification

– the standard for compost in the UK.

UK municipalities also use anaerobic digestion facilities to process their collected food waste, and these facilities are not compatible with compostable packaging unless they include a digestate composting phase. Currently, as part of its 2026 goals, the UK government does not intend to require anaerobic digestion plants treating food waste to include a composting phase.

Canada

Food Waste Composting Programs and Acceptance of Compostable Packaging

According to a 2021 EREF study, 91% of all Canadians live in an area that has a residential organic waste management program (which includes food waste collection). Specifically, 71% of the population lives in an area with access to curbside source separated organics programs. Participation in these programs is relatively high - across the country, 65% of households reported composting their food waste in 2021. City programs vary in what types of compostable packaging they accept. Vancouver's municipal collection program allows "food soiled paper" but does not allow plastic bags, cutlery, containers, or packaging labeled as compostable or biodegradable. Similarly, Toronto's municipal collection program does not accept packaging "made of or lined with a bio-based plastic." Calgary's program openly allows the use of compostable bags, while Ottawa's program states that compostable bags can be used but "like all other plastic bags, they are separated from the organic waste and sent to the landfill."

In 2021 57% of households reported they were composting their compostable bioplastics, with 86% of these households reporting that it was done through a city or private collection program as opposed to at a depot or at home. Given that most of Canada's cities do not accept compostable packaging, it is not clear where these households are sending this material; they may be using independently operated collection programs, or there may be a disconnect between what is officially accepted by municipalities and what residents put in their bins.

In 2018, the country's National Zero Waste Council published a case study on compostable packaging in Canada which found that "with an increased focus on organic waste diversion across Canada, certified compostable packaging has circular economy potential that is not being realized." The surveyed stakeholders indicated that a wide variety of certified compostable food packaging is in fact being accepted at compost manufacturing facilities at some locations in Canada. Compostability certification and the use of standardized labeling features were also highlighted as an essential measure to aid in effectively processing compostable packaging.

Implications for Compost Quality

Given the lack of explicit acceptance of compostable packaging across the country, there is little data about the effects of certified compostable packaging on finished compost quality.

South Korea

Food Waste Composting Programs and Acceptance of Compostable Packaging

South Korea reports a 95% diversion rate of food waste across the country. The South Korean government first banned sending organic waste to landfills in 2005, then banned dumping leachate into the ocean in 2013 while also instituting universal curbside composting collection that same year.

Collection is facilitated through the use of special yellow plastic bags, which residents purchase for a small fee (about 20 cents apiece) and use to collect their food scraps. These bags are typically collected multiple days a week (as often as six days a week) from a designated bin on the street. In urban areas like Seoul, the collection bins use scales and RFID technology to weigh food waste and charge residents using an ID card. Residents are encouraged to reduce the weight of the organic waste they deposit by removing moisture first, lowering the fees they pay while also saving on collection costs.

It is unclear whether the collection bags are made from compostable plastics. Some sources refer to them as "biodegradable", but it appears they are typically removed during processing of the food waste, which is a combination of composting and anaerobic digestion.

Implications for Compost Quality

Given the lack of explicit acceptance of compostable packaging across the country, there is little data about the effects of certified compostable packaging on finished compost quality.

Appendix G. Additional Strategies Considered by The Committee

This appendix contains strategies that the Committee raised for consideration, but that did not meet a threshold of 80% Committee support during either the first vote or the final vote on recommendations.

Theme #1: Address consumer confusion around compostable products

Consistent cart and bin colors

- Create clear, visual label standards and templates for compost carts and bins with accepted compostable products.
- Assess costs and effectiveness of transitioning to consistent statewide cart and bin colors to improve likelihood of positive outcomes associated with accepting compostable products.

Committee Support

Based on the research results, this action would reduce consumer confusion and contamination at the bin.

Committee Concerns

- This topic is beyond the scope of this Committee.
- Transitioning to consistent bin colors will be expensive.
- Consumer education may be more effective and less costly than achieving consistent bin colors.

Theme #5: Better align accepted compostable products with facility conditions and processing types

Align accepted compostable products with WA compost facilities

- Establish a list of “accepted compostable” products that includes only products that at least a certain percentage of organics facilities in the state must be able to successfully process and incorporate into their finished compost products. Establish the list of products via dialogue between compost facilities, product certifiers, and others familiar with material types and processing parameters.
- Prohibit local solid waste contracts (municipal) and regulations (e.g. UTC) from requiring

facilities to accept materials or feedstocks that they cannot appropriately process into finished compost products.

Committee support

There is a need to align compostable standards with WA compost facilities.

Committee concerns

- Compost facilities need to be able to decide what products they accept.
- Lists of accepted compostable products have not led to desired impacts in California and other locations.
- It is not clear that this strategy would increase food waste diversion.