Recycling Modernization Act Material List Request for Information: Compilation of Selected Responses – Polypropylene Packaging, PET Thermoform Packaging, and Nursery Container Recycling

Materials Management Program
700 NE Multnomah
Portland, OR 97232
Phone: 503-229-5696
800-452-4011
Fax: 503-229-6124
Contact: David Allaway

www.oregon.gov/DEQ

DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

State of Oregon
Department of Environmental Quality

This document is a compilation of selected responses to DEQ's Request for Information regarding the potential for recycling different materials. As optional background reading materials for members of DEQ's Technical Workgroup on Material Lists, DEQ has selected the following responses that address recycling of polypropylene packaging, PET thermoform packaging, and nursery containers, which will all be discussed at the April 28, 2022 Technical Workgroup meeting.

AMERIPEN™

The power of packaging in balance.™

March 22, 2022

David Allaway
Senior Policy Analyst
Oregon Department of Environmental Quality
Materials Management Program
700 NE Multnomah Avenue, Suite 600
Portland, Oregon 97232

RE: Oregon Statewide Recycling Collection List and Producer-Collected Materials (For Recycling)

Dear Mr. Allaway,

AMERIPEN – the American Institute for Packaging and the Environment – is pleased to submit these comments in response to the Oregon Department of Environmental Quality Request for Information on the implementation of Section 22 of Oregon's Plastic Pollution and Recycling Modernization Act.

AMERIPEN is a coalition of stakeholders dedicated to improving packaging and the environment. We are the only material neutral packaging association in the United States. Our membership represents the entire packaging supply chain, including materials suppliers, packaging producers, consumer packaged goods companies and end-of-life materials managers. We focus on science and data to define and support our public policy positions and our comments are based on this rigorous research rooted in our commitment to achieve sustainable packaging, and effective and efficient recycling policies. We have several member companies with a significant presence in Oregon, and many more who import packaging materials and products into the state. The packaging industry supports more than 18,000 jobs and accounts for $5.45 billion in total economic output in Oregon.

Section 22 of Oregon's Plastic Pollution and Recycling Modernization Act requires the Oregon Environmental Quality Commission to identify two lists of materials by administrative rule – the Statewide Collection Recycling List and the and Producer-Collected Materials List. Our comments will be broken down into recommendations for both.

Additional materials to be considered for the Statewide Collection Recycling List

Oregon defines the Statewide Collection Recycling List as "materials collected to provide the opportunity to recycle". This refers to on-route and drop-off recycling collection opportunities provided by all local governments in the state with populations over 4,000, and requirements for solid waste disposal sites to collect materials for recycling. Using this definition, and access data from the 2020-21 Sustainable Packaging Coalition (SPC) Centralized Study on Availability of Recycling, AMERIPEN

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Phone: +1 651-288-3431

believes that all the following materials (products) can be easily collected and recycled into Oregon's statewide collection recycling system.[1]

Package Type	Access Rate
Aluminum Beverages	89%
Corrugated Boxes	88%
PET Beverage Bottles, Jugs and Jars	87%
HDPE Bottles, Jugs and Jars	87%
Steel Food Cans	87%
Paperboard Boxes	84%
Glass Beverage Bottles and Containers	76%
Aluminum Food Cans	75%
PP Bottles, Jugs and Jars	72%
LDPE Bottles, Jugs and Jars	70%

We note that U.S. Federal Trade Commission (FTC) Green Guides defines recyclable, in part, as material where 60% of the public has access to recycling. As the only quantitative metric defined in the Green Guides, access is believed to be indicative of the recycling systems ability to collect, sort and reprocess materials. While these numbers are related to federal access and not specific to Oregon, all the materials we have listed here exceed the 60% access rate thereby permitting for some flexibility to state specific differences.

While the FTC declares access as the primary means through which companies can make recyclable claims, AMERIPEN recognizes that there is increasing interest in other parameters to ensure that materials that are collected are actually used in end markets. We recognize Section 22 of Oregon's Plastic Pollution and Recycling Modernization Act requests information on additional parameters such as stable and mature end markets, compatibility with existing infrastructure, and practicalities of sorting and storing. Oregon's interest aligns with industry desires to better define recycling as a system of independent but interconnected actions. For that reason, we have identified and offer materials (products) below the 70% national access rate as materials for additional consideration and we provide data on additional parameters to help outline the systemic nature of recyclability and the promise of these materials.

Additional materials not yet widely recycled that we believe should be considered include:

- Aseptic cartons
- Aerosol containers (aluminum and steel)
- Paper-padded mailers
- Pizza boxes and other food contaminated paperboard packaging

[1] Sustainable Packaging Coalition. 2020-21 Centralized Study on Availability of Recycling (2022)

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- Polyethylene terephthalate (PET) cups and thermoforms
- Polycoated paperboard
    - Ice cream containers
    - Cups
    - Foodservice containers
    - Other
- Polypropylene (PP) tubs and other containers

Aseptic Cartons

Curbside and Drop-off Recycling Access

Data from the Carton Council indicates the following access rates for cartons within Oregon. [2]

Package Type	Access Rate
Aseptic Cartons	37% (curbside) 10% (drop off)

Responsible End Markets

Cartons have three different end markets for their products. Cartons can be sold as part of a mixed bale of paperboard, part of polycoated paperboard only bale or sold as Grade #52—a carton-only bale. There are currently five North American mills that accept Grade #52 bales and all still have excess capacity to absorb more. Additionally, West Coast markets are successfully selling grade #52 bales to three international locations in India, South Korea and Thailand. Almost all domestic mills purchase either mixed paper or polycoated paperboard grades.

Collection, Sortation and/or Anticipated Yield Data

With slightly less than half of Oregon consumers having access to carton recycling, we are confident that the process to collect and sort cartons is viable within the state. As the Carton Council continues to work with communities to help invest in technologies and education to help improve the sortation of cartons, we believe volume can continue to increase.

Material yields are dependent upon the final end market, but data from the Carton Council indicates that Grade #52 bales used for building materials can achieve 100% usage. A Grade 52 bale for tissue and toweling captures an estimated 67-70% of the total package with 80-95% of the fiber used. Similar numbers are reflected in Grade 52 bales used for de-inked pulp. Mixed bales sold to tissue and toweling have the smallest yield outcome with 50-60% of the total package used in reprocessing.

If Grade #52 bales can be processed by Oregon material recovery facilities (MRFs), Carton Council data indicates there is still room to increase capacity of these end markets by 50% or more.

[2] Per email from Carton Council 03-19-2022

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Ongoing Activity to Support Recycling of these Materials by Industry

The Carton Council offers education and grants to help increase aseptic recycling across the U.S. Aseptic cartons can either be hand sorted or through automatic by utilizing either optical or robotic sortation. Material recovery facilities (MRFs) that are interested in recycling these materials are offered support both in identifying the best approach for sortation but then also with grants and training to help purchase and implement these new processes with success. Additionally, the Carton Council works with MRFs who have low carton volumes and cannot make an LTL (less than truckload).

Polycoated Paperboard

Curbside and Drop-off Recycling Access

Data from the American Forest and Paper Association (AF&PA) indicate the following access rates for polycoated paper materials within the State or Oregon.[3]

Package Type	Access Rate
Polycoated paperboard	49% (curbside) 36% (drop off)

Responsible End Markets

End markets for paper-based products are expected to continue to grow. Paper-based materials that have not historically been part of the bulk of fiber yields are advancing as mills seek new sources of inputs. AF&PA reports that between 2019 and 2021 U.S. paper, packaging and pulp producers have committed more than $5 billion in new manufacturing capacity specifically designed to use recovered paper. This increased manufacturing capacity is expected to consume an additional 8 million tons of recovered paper per year.

The Food Service Packaging Institute (FPI) notes that currently 33 different mills between the U.S. and Canada accept post-consumer polycoated board. Mills will purchase it either as a unique polycoated board grade or as part of a mixed paper bales. There is a mill in nearby Washington State that sources mixed paper from Oregon. The mill successfully repulps and recycles cups, foodservice packaging, poly-coated paper, and liquid packaging cartons found in mixed paper into new products every day. Its proximity to Oregon indicates less environmental impact in terms of transit

Collection, Sortation and/or Anticipated Yield Data

Polycoated paperboard can be flat or shaped into a 3-dimensional container format such as cups or ice-cream cartons. MRF flow studies undertaken by FPI indicate that on average one quarter of cups will flow to the fiber line as they are crushed during collection and sortation with the reminder three quarters flowing towards container lines where they can either be hand sorted or redirected as a result

[3] AF&PA. 2021 AF&PA Access to Recycling Study (2022)

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of optical or robotic sortation.[4] Since there are two different bale specs for this paperboard (polycoated only) or mixed, direction to either line does not tend to create challenges. Yield varies widely amongst mills based upon their processes and technologies. Based upon information reported by FPI's mill task force yield from polycoated containers is within 70% to 90%.[5]

Ongoing Activity to Support Recycling of these Materials by Industry

Both AF&PA and FPI perform regular studies with mills and communities to access the recyclability of their paper-based products. Most commonly what they have found is that recyclability relies more on the technical equipment and skills of the specific mills rather than as a material specific issue. As the industry continues to support research and best practices, we expect access and recyclability to continue to advance.

Several FPI members have supported cup recovery efforts by offering MRF equipment grants and market development support. Some of their efforts overlap and further support initiatives with the Carton Council to help ensure increased polycoated carton recovery.

Paper-Padded Mailers

Curbside and Drop-off Recycling Access

Paper-padded mailers are a relatively new innovation within the packaging space. As a result, data on access and inclusion into curbside programs has not yet aligned with the adoption of this new packaging format. 2020 and 2021 studies on access rate did not measure paper-based mailers.

Responsible End Markets

To assess the potential for paperboard mailers to be included in curbside programs, in 2021, AF&PA surveyed its members on the recyclability of paper-padded mailers[6]. Mills overwhelmingly agreed that the mailers can be recycled. Per the Institute of Scrap Recycling Industries (ISRI), paper-based mailers are considered acceptable input for either old corrugated cardboard (OCC) or mixed paper bales. These are two widely purchased bales in mills across the US. The AF&PA study concludes: "*We encourage communities to include paper padded mailers among the paper-based packaging items accepted in their residential recycling programs*."[7]

As more curbside programs begin to recognize the benefits and pulpability of this format, we believe access will quickly grow.

[4] RRS, MRF Material Flow Study (2015)
[5] Email from FPI 3-21-2022
[6] AF&PA On Padded Paper Mailers (2022)
[7] Ibid

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Collection, Sortation and/or Anticipated Yield Data

Although, to the best of our knowledge, no yield study has been undertaken on paper-based mailers per se, interpreting from the AF&PA Mill study, we assume mailers can flow through the system and be directed accordingly to OCC or mixed paper bales, and therefore yield rates for these materials are likely to be high.

Ongoing Activity to Support Recycling of these Materials by Industry

AF&PA performs regular studies with mills and communities to access the recyclability of their paper-based products. Most commonly what they have found is that recyclability relies more on the technical equipment and skills of the specific mills rather than as a material specific issue. As the industry continues to support research and best practices, we expect access and recyclability to continue to advance.

Pizza Boxes and Other Food Contaminated Paperboard Packaging

Curbside and Drop-off Recycling Access

Data from the American Forest and Paper Association (AF&PA) indicate the following access rates for pizza boxes within the state. [8]

Package Type	Access Rate
Pizza Boxes	29% (curbside) 66% (drop off)

Responsible End Markets

Pizza boxes can be sold in either OCC or mixed paper bales.

A 2020 study by WestRock found neither cheese or grease negatively impacted repulpability, performance on the paper machine or finished product quality at their mills.[9] In 2013 and 2014, FPI conducted studies to determine whether food service packaging (e.g., pizza boxes, coffee cups, paper clamshells) and food contact packaging (e.g., cereal boxes, noodle boxes, ice cream packages) set out for recycling was more contaminated with food residue than food contact packaging that has traditionally been accepted at single stream MRFs.[10] The studies identified that: *"there is no appreciable difference in the amount of contamination between foodservice packaging and broader types of food packaging typically accepted in residential curbside programs….an initial indication that food contamination is a perceived rather than real barrier to residential recycling of foodservice packaging."*

[8] AF&PA 2021 AF&PA Access to Recycling Study (2022)
[9] WestRock, Incorporation of Post-Consumer Pizza Boxes in the Recovered Fiber Stream (2020)
[10] Per email from AF&PA 03-18-22

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Phone: +1 651-288-3431

Collection, Sortation and/or Anticipated Yield Data

To the best of our knowledge, no yield study has been undertaken on pizza boxes per se, but if we interpret the WestRock and FPI studies to indicate no appreciable challenge in recycling this material, we assume that food contaminated boxes can flow through the recycling system and be directed accordingly to OCC or mixed paper bales, the yield rates for these materials must be relatively high.

Ongoing Activity to Support Recycling of these Materials by Industry

Both AF&PA and FPI perform regular studies with mills and communities to access the recyclability of their paper-based products. Most commonly what they have found is that recyclability relies more on the technical equipment and skills of the specific mills rather than as a material specific issue. As the industry continues to support research and best practices, we expect access and recyclability to continue to advance.

Aerosol Containers – Aluminum and Steel

Curbside and Drop-off Recycling Access

Data from the 2020-21 SPC Centralized Study on Availability of Recycling, indicate the following access rates for the aerosol containers. [11] Aerosol containers meet the FTC Green Guides threshold for recyclable claims.

Package Type	Access Rate
Aerosol Containers	61% (Steel); 62% (Aluminum)

Responsible End Markets

i. Aerosol Containers--Aluminum

Demand exceeds supply for mixed aluminum. Research for the aerosol container industry by RRS indicates "most secondary end-markets are eager for material and willing to work with potential suppliers to unlock new sources."[12]

Although there is not an ISRI bale specification, mixed aluminum is often collected in open-top containers and then sold to either directly to one of two end markets: 1) Deox – a critical additive to steel making which helps to replace virgin material) or 2) RSI – melted into an ingot and then mixed with other materials to make a new product. Both end markets are stable and well-established.

[11] Ibid
[12] Resource Recycling Systems. Surveying State of MRFs and End Market Barriers to Recycling Steel and Aluminum Aerosols and Pet Food Cans and Identification of Solutions. 2021

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ii. Aerosol Containers – Steel

Steel aerosol containers also have stable and established end-markets. They can be readily added to steel bales at MRFs without any sortation concerns. Steel end-markets have national reach since 40 of 50 states (including Oregon) have electric arc furnaces capable of melting down steel cans, including aerosols. RRS research states, *"There is ample capacity for steel mills to absorb higher volumes of steel from scrap managers across the country."*[13]

Collection, Sortation and/or Anticipated Yield Data

Aerosol containers are widely collected and sorted within the majority of U.S. based MRF's based upon widely adopted and long-established technology. Eddy stream currents and magnets, in addition to their solid 3-dimensional shape result in an estimated 95% effective sortation rate for both aluminum and steel aerosol containers.

Ongoing Activity to Support Recycling of these Materials by Industry

In response to some concern that unemptied aerosol containers may pose safety concerns, the industry studied the potential risks that aerosol containers may pose in the recycling stream.[14] The study found that the likelihood of an accident was very low. This study led to development of additional guidelines and educational resources to capitalize on the opportunity to recycle these containers safely.

The aerosol industry has invested heavily in developing and promoting resources to educate the public that they can recycle empty aerosol containers and to increase overall recycling rates.

Polyethylene Terephthalate (PET) Cups and Thermoforms

Curbside and Drop-off Recycling Access

Data from the 2020-21 SPC Centralized Study on Availability of Recycling, indicate polyethylene terephthalate (PET) cups and thermoforms (clamshells, trays etc.) have a national access rate around 54% – just slightly below the 60% FTC threshold rate. [15]

Package Type	Access Rate
PET Clamshells, Tubs, Trays, and Cups	54%

[13] Resource Recycling Systems. Surveying State of MRFs and End Market Barriers to Recycling Steel and Aluminum Aerosols and Pet Food Cans and Identification of Solutions. (2021).
[14] Kumar R. Bhimavarapu and Dimitrios M. Karydas. Recycling Aerosol Cans: A Risk Assessment. Factory Mutual Research Corporation. (April 1996).
[15] Sustainable Packaging Coalition. 2020-21 Centralized Study on Availability of Recycling (2022)

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Responsible End Markets

As demand for post-consumer PET grows[16], there is increased interest in capturing thermoforms and cups to help supplement volume. Currently PET thermoforms and cups can be sold as part of mixed PET bottle and thermoform bale or as a thermoform only bale. Over 14 different reprocessors across Canada and the U.S. will accept PET thermoforms in one or both formats. Additionally, Republic Service's recent announcement of a new plastics recycling facility in Las Vegas will further increase demand for this material as they offer the capacity of 65 million lbs. per year of PET.[17]

Chemical recycling is also an emerging market, with Eastman's facility in Kingsport, Tennessee expressing interest in taking all formats and colors of PET for their 2023 launch.

PET has one of the more diverse end markets of the plastics resins, with demand for this material existing in the textiles, packaging and building material sectors.

Collection, Sortation and/or Anticipated Yield Data

According to a 2015 MRF study commissioned by FPI, 61% of PET clamshells and 77% of PET cups made it to a target PET bale. Losses tend to occur when these three-dimensional shapes are flattened during the collection and sortation process and then redirected to paper lines. As an increasing number of MRFs have upgraded equipment since 2015 and additional; funding for increase optical or robotic sortation becomes available, this yield is expected to increase.

Ongoing Activity to Support Recycling of these Materials by Industry

FPI's Community Partnership Program and industry specific research works directly with residential recycling programs to evaluate and increase access to recycling for many foodservice items.

Additionally, The Recycling Partnership (TRP) launches a PET recovery working group in March 2022 to help identify best practices to increase PET recovery of all formats.

Polypropylene (PP) Tubs and Other Containers

Curbside and Drop-off Recycling Access

Data from the 2020-21 SPC Centralized Study on Availability of Recycling indicate the following access rates for polypropylene (PP) tubs, cups and containers.

Package Type	Access Rate
Polypropylene Tubs and other containers	59%

[16] Both from voluntary goals but also increasing state recycled content mandates
[17] Resource Recycling Republic Services Move to Vertically Integrate in Plastics (March 2022)

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We note that national access is just slightly below the FTC 60% threshold and given the increase demand for this material by end markets, it is likely to exceed 60% in the very near future.

Responsible End Markets

With the rise of voluntary goals, state recycled content mandates and growing chemical recycling capacity, demand for recycled polypropylene markets is poised to grow. PP tends to be sold in one of two different bales type – either as a polypropylene only bale or as a mixed plastics bale. There is no distinction within these markets between tubs or cups and containers. At the current time there are 17 different re-processors who will put polypropylene in either bale format.
While the majority of these PP reprocessors are based in the East Coast, it should be noted that there are two emerging reprocessors in Oregon looking to source PP Bales: Denton Plastics and Green Rhino.

Polypropylene is also an emerging feedstock for chemical recycling and agreements between companies like Berry Plastics, Wendy's and Lyondell Basel who are establishing upfront commitments to use and process specific volumes of post-consumer polypropylene plastics.

Collection, Sortation and/or Anticipated Yield Data

FPI's 2015 MRF Flow study indicates that PP cups and containers have a high rate of capture. PP products appear to hold their 3-dimensional shape rather well, increasing their direction to the correct container lines. Depending on technology, MRFs were losing between 3-10% of PP containers to paper lines. As noted with PET, any investments in improving paper lines to better captured crushed plastics that are misdirected will further increase yield.

Ongoing Activity to Support Recycling of these Materials by Industry

FPI's Community Partnership Program and industry specific research works directly with residential recycling programs to evaluate and increase access to recycling for many foodservice items, including polypropylene.

Additionally, the Recycling Partnership has launched an established PP recovery working group to help identify best practices to increase PP recovery of all formats.

Additional Materials to be Considered for Producer-Collected Materials lists

Oregon defines materials to be considered for the producer-collected materials list as materials that are largely incompatible with commingled processing systems, thereby requiring separate collection and handling in *"which a producer responsibility organization must provide for the collection through recycling depot or mobile collection events as provided in section 15 of the Act."*

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We believe the following should be considered for the producer collected materials list

- Polystyrene

Curbside and Drop-off Recycling Access

Data from the 2020-21 SPC Centralized Study on Availability of Recycling[18]indicates rigid polystyrene materials (EPS) are generally collected 45% rate curbside.

Package Type	Access Rate
Rigid Polystyrene[19]	45%

The EPS Industry Alliance (EPSIA) notes that 55 communities in the U.S. offer curbside recycling access for expanded polystyrene (EPS), with an additional 214 drop off locations. In Oregon alone there are five drop off locations in Tigard, Salem, and Eugene.

Given the high demand for EPS in commercial sales, measuring recycling based on consumer curbside access may be misleading in this case.

Responsible End Markets

Tigard, Oregon is home to Agilyx, the first U.S. chemical recycling facility for EPS. As of July 2021, Agylix has converted more than 4,400 tons of mixed waste plastic and polystyrene waste and plans to continue growth. Demand is there if we can gather EPS.

Collection, Sortation and/or Anticipated Yield Data

The low weight, high bulk of EPS tends to discourage many residential communities from collecting this materials. But where drop off programs exist, or commercial collection is possible, the use of densifiers has significantly improved the economics and interest in collecting and recycling this material.

By collecting via drop-off or through commercial partners, EPS does not face challenges other materials have in running through a MRF sortation line.

We are not aware of any data on yield.

Industry Support for Recycling of these Materials

There are several industry-supported efforts to increase EPS recycling. There are six MRFs in the U.S. that have recently adopted a turnkey EPS recycling system that minimizes sortation problems and

[18] Ibid
[19] Please note that Carton Council data on aseptic cartons access is specific to Oregon access. Federal access is slightly higher.

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significantly reduces storage space. The system consistent of a refurbished freight container that houses a low volume densifier and handling materials.

To help maintain feedstock, Agylix has developed the Cyclyx consortium to build off their insights from drop off and collection programs to help gather increased feedstock for both their facilities as well as other emerging chemical recyclers. They also host several collection programs with communities and corporations

EPSIA as well as DART Container also offer grant programs to help place densifiers within community spaces, or corporations.

End markets and access to EPS recycling continues to grow. We believe Oregon DEQ should recognize this material as a promising market with a state-based recycler within.

Conclusion

AMERIPEN appreciates the opportunity to submit this letter. In trying to address all the various materials our members produce, we refer you as well to our peer trade associations who we understand have also submitted information and are able provide much greater detail the recyclability parameters associated with their specific material.

AMERIPEN welcomes any inquiries regarding this submission, and we would be happy to help facilitate further dialogues with our material specific peers.

With appreciation,

Dan Felton
Executive Director

Background

In 2019, recycling market shifts led to the decision by City of Eugene to exclude specific materials from its recycling program due to the economics of recycling certain materials at that time. Materials removed from the program included plastic tubs, plastic jugs, and shredded paper. The items that remain on Eugene's list of accepted materials include paper, cardboard, tin and aluminum cans, transparent soda bottles, water bottles, milk jugs, and juice bottles.

Resident response to the removal of plastic tubs and jugs from curbside commingled collection has been robust. Program staff receive calls once monthly or more from residents that are frustrated with the lack of local recycling options for these items and/or who are storing them in anticipation of an opportunity to recycle them in the future. In many cases, these conversations also reveal that other items (plastic clamshell and takeout containers and other rigid plastic items like flowerpots) that have never been accepted into the City's commingled recycling program are still commonly thought to be recyclable among residents.

Eugene Residents and Recycling

To improve awareness and understanding of Eugene's existing recycling program within the community, a public education campaign is currently underway to determine the most effective way to reduce confusion around Eugene's recycling program while simultaneously anticipating how best to communicate future changes to recycling programs related to Oregon's Plastic Pollution and Recycling Modernization Act (Senate Bill 582).

Focus Groups

The City has contracted recent qualitative research designed to explore the knowledge and motivations of Eugene residents related to recycling locally. Three focus groups were conducted in February of 2022 including single-family homeowners, renters of both multifamily and single-family residences, and Spanish speaking residents.

Residents in all groups expressed a high level of awareness about recycling in general and an understanding of the importance of recycling correctly, and also understood that there were impacts associated with putting the wrong items in their recycling.

Focus group members reported being motivated to recycle by environmental concerns, the safety of workers processing recycled material, and the idea that recycling service could potentially be limited or made less accessible by service providers due to contamination issues, leading many to report that they would throw an item away if they were unsure it could be recycled.

Participants reported they were most confused when recycling different kinds of plastics, and nearly all participants were unclear which items made from plastics could be recycled. In some cases, focus group members were aware of the resin identification numbers on plastic

containers and routinely looked for them when recycling despite Eugene's recycling program accepting plastics based on shape and visual characteristics and not resin type.

Residents reported not being aware that guidelines vary from locality to locality and that they rely on recycling information that they acquired a while ago, sometimes even in different cities or states. Many interviewees also expressed frustration about how rules may vary from place to place and indicated that they would not spend significant amounts of time researching information when unsure about what to do with a specific item.

Public Outreach

While performing public education and outreach around recycling at community events, City of Eugene Waste Prevention staff routinely encounter a lack of clarity about what can be recycled even among residents that describe themselves as environmentally minded and up to date on recycling information.

One of the methods of educational outreach employed by the Waste Prevention team is a recycling 'game' where participants use trash pickers to select materials from a mixed pile of common household trash and recycling materials and then place them into staged trash, recycling, and yard + food waste 'bins'. In addition to being educational and very popular with families, the staff delivering the game have reported the most common items that residents consistently misidentify as recycling as:

- Plastic clamshell containers
- Plastic to-go containers
- Plastic tubs and jugs not accepted into the current recycling program
- Rigid plastic items such as flowerpots
- Frozen food boxes

Resident Communications

When responding to resident inquiries related to recycling, the majority of resident calls (6 out of an average of 7 calls weekly) are requests for information about where to recycle items that are too large to fit in their curbside commingled bin (large volumes of carboard), or that are not accepted into the recycling program (tubs and jugs).

Contamination

Data on the level of contamination in Eugene's commingled recycling stream isn't readily available but during observation by Waste prevention staff of local commercial and residential recycling route loads being aggregated at a local materials recovery facility, contamination is obvious and significant. Plastic film, rigid plastics including clamshell and takeout containers, and single use items such as coffee/hot cups are prevalent.

Recycling Contamination Measured at Public City Facilities

The City's Internal Zero Waste Program staff works with assigned recycling coordinators at City operated facilities to ensure that recycling signage is posted and up to date in both public and

restricted areas, monitors internal and external trash and recycling for volume and recycling contamination, and works with an external third-party contractor to perform waste assessments at these facilities.

In 2017, a waste assessment performed on a City operated pool/community center with publicly accessible trash and recycling collection points reported a 40% contamination rate in the exterior recycling container. After the 2019 changes to Eugene's recycling program, contamination observed during a waste assessment at a different but similarly sized pool/community center was 37% of the total material in the exterior recycling containers. In both assessments, the contamination was comprised of rigid plastic, compostable food, and items suitable for donation.

Recommendation

Although the removal of several items from Eugene's recycling program simplified the program's list of accepted materials, no direct evidence that the exclusion of shredded paper and several categories of plastics has significantly reduced commingled contamination of the local recycling stream overall has been observed.

Eugene made alterations to the list of accepted materials in the City's recycling program due to market forces that may no longer be as relevant as we anticipate the contribution of resources from producers potentially increasing the feasibility of recycling a broader range of materials. A final list of commonly recycled items that included more categories of material (clamshell containers, tubs, jugs, flower pots and other rigid plastic products) than are currently included in Eugene's commingled curbside recycling program would align better with existing resident recycling habits while possibly allowing for more targeted public outreach and education focusing on eliminating the most problematic items (plastic film, etc.) from commingled recycling streams.

DIRECT PACK

1025 W. 8th St.
Azusa, CA. 91702
O: (626) 380-2360
F: (626) 969-5555

DATE: February 16, 2022

TO: State of Oregon Department of Environmental Quality

SUBJECT: Recyclability of PET Clamshells

Dear DEQ,

Direct Pack, Inc. (DPI) supports your efforts to identify and list only fully recyclable plastic packaging like that made from recycled #1 PET. DPI brand BOTTLEBOX was first to make PET clamshells from recycled PET bottles and we now use 90% PET bottles and 10% PET clamshells as feedstock for new clamshells. DPI has created a network of MRFs in California, Washington, Nevada, Arizona, New Mexico and Texas to supply us with recycled PET loads that we wash and flake ourselves before putting back into new clamshells for California brands like Driscoll's Berries, NatureSweet, The Cheesecake Factory, Organic Girl and many others.

DPI buys and reprocesses 50-100 loads per month of recycled PET loads from MRFs, making us the largest regional buyer. Attached is our MRF map showing our network of 24 MRFs that we buy from every day. We trade not only with the 3 largest waste companies in the country but also the largest independent MRFs in California like Athens in Los Angeles, GreenWaste in San Jose and Recology in San Francisco. DPI created this network of MRF partners in only 2 years to supply our growing demand from brands for closed loop recycling who have reviewed LCA and selected recycled PET as the most sustainable food package.

Demand has doubled in the past 2 years leading us to build another wash line in the region to close the loop on more recycled PET bottles and clamshells into new clamshells. Our second wash line is designed specifically to process PET clamshell feedstock allowing us to increase the content of recycled clamshells in new clamshells from 10% to higher levels. What makes this whole network work is the high price being paid for recycled PET clamshells. Over the past 2 years the value of recycled PET clamshells rose twenty times from one cent per lb. to twenty cents per lb. MRFs and cities we buy from now can profit either keeping PET clamshells in their bottle bales or separating and baling 100% PET clamshells, we can reprocess efficiently either way. Attached are letters from Athens and GreenWaste describing their success with PET clamshell recycling.

DIRECT PACK

1025 W. 8th St.
Azusa, CA. 91702
O: (626) 380-2360
F: (626) 969-5555

The truth is that although recycled content mandates like Driscoll's 10% recycled PET clamshell content are working as more and more MRFs each year recover PET clamshells for a profit, this is not a new thing. Nationally PET bottle bales have contained 10% PET clamshells for many years, as most states do not yet have bottle bills. This 90-10 blend of PET bottles and clamshells has worked for most PET wash lines. More recently, DPI helped the States of Arizona and Texas add PET clamshells to their bottle bales that were previously being landfilled. In our video you can view here, you can see what happens to MRF bales after we buy. Our own trucks haul to wash line where it is transformed back into food grade post-consumer recycled flake we use to make our new clamshells.

I hope you take this fragile network of MRFs we created into account when you make your list. At 2 years old it is very young and as the State of Oregon Department of Environmental Quality has found, we need to nurture it and not throw it out with the bathwater of non-recyclable plastic. We appreciate your consideration of putting PET clamshells on your list of recyclable material, as soon most PET clamshells with be recovered in all states supplying a robust market that includes not only closed loop PET clamshells, but even larger industries like carpet fiber.

Direct Pack and The State of Oregon share a common vision of a zero-carbon, sustainable economy. Although the recycling rate for all types of plastic may still be in the single digits nationally, 100% of MRFs accept PET bottles, 87% of Americans have access to PET recycling, over 80% of PET bottles are recycled in California and Oregon, and most MRFs in Washington, California and the Southwest now either sort and bale PET thermoforms separately or include PET thermoforms in their bottle bales.

We know this because we reprocess into new thermoforms a majority of the PET recovered at MRFs in Washington, California and the Southwest. Direct Pack has used almost 10B bottles in the past 10 years, which has reduced greenhouse gas by about 300M lbs. In the past 2 years we have also reprocessed over 5M lbs. of recycled PET thermoforms helping to create a robust market for MRFs and new retail collection models like reverse vending by Driscolls and collection at grocery stores with Replenysh.

Thank you,

Andrew Jolin
Director of Sustainability
1055 W. 8th Street | Azusa, CA 91702
☎ 626 - 380 - 2360 (Office), 707 - 407 - 6787 (Mobile)


DIRECT PACK
MANUFACTURING
DIRECT PACK FACILITY
PARTNER MRF
WOODINVILLE, WA
SEATTLE, WA
TACOMA, WA
SPOKANE, WA
VANCOUVER, WA
YUBA CITY, CA
SACRAMENTO, CA
VALLEJO, CA
SAN FRANCISCO, CA
SAN JOSE, CA
SALINAS, CA
MONTEREY, CA
PASO ROBLES, CA
LAS VEGAS, NV
SUN VALLEY, CA
IRWINDALE, CA
AZUSA, CA
WILMINGTON, CA
ORANGE COUNTY, CA
PHOENIX, AZ
TUCSON, AZ
FORT WORTH, TX
DALLAS, TX
HOUSTON, TX
SAN ANTONIO, TX
CORPUS CHRISTI, TX
REPUBLIC SERVICES
WM
Recology
Athens Services
Potential Industries Inc
greenwaste
GP Georgia-Pacific
MSW
Mid State Waste

Direct Pack also submitted a link to a video showing loads arriving and being washed and flaked:

https://www.youtube.com/watch?v=LsQlne4zSUc

Martin Vogt
President & CEO
EFS-plastics Inc.
5788 Line 84, Listowel, ON, Canada N4W 3G9
519-418-3377 ext. 3101
Martin.vogt@efs-plastics.ca

March 18, 2022

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

Re: Request for Information on Oregon Statewide Recycling Collection List

Dear DEQ Technical Workgroup and Rules Advisory Committee,

EFS-plastics Inc. would like to register support for the inclusion of certain foodservice packaging items on the "Uniform Statewide Collection List". EFS-plastics Inc. has three facilities in North America, including a new facility in Lethbridge, Alberta, and we are an end market for post-consumer materials sourced from Material Recovery Facilities (MRFs). We have been purchasing #3-7 mixed plastic from Oregon MRFs since 2019 to process at our facility in Listowel, Ontario, as our throughput capacity has grown rapidly in recent years. At our new Lethbridge facility, we are sourcing post-consumer olefins (mostly in the form of #3-7 or #1-7 commodity bales) to produce various grades of 100% PCR PP and PE pellets. We currently have a total capacity to process 55,000 metric tonnes post-consumer material annually.

We would like to take this opportunity to highlight how important it is to us to grow the supply of polyolefins (in particular PP) collected from households. As a recycler, we are seeing demand grow for PCR PP and PE over the next few years, and we are looking far and wide to get access to more material. We know there is a large volume of PP and PE that is not being appropriately collected or sorted in the Pacific Northwest and is unfortunately ending up in landfill. EFS-plastics is very eager to continue working with communities and MRFs in Oregon to incentivize them to keep these materials in circulation.

We procure the following MRF grades:
- 25,000 tonnes of #3-7 or #1-7 mixed rigid plastic
- 20,000 tones of Grade A-C and MRF-grade film
- 5,000 tonnes of PP/Tubs & Lids
- 5,000 tonnes of HDPE

The following foodservice packaging items are desirable in these incoming bales:
- Polyethylene Terephthalate (PET) Cups and Containers, including drink cups, clamshells, bowls, trays and other thermoformed containers
- Polypropylene (PP) cups and containers, including drink cups, deli tubs, clamshells, takeout dishes and lids and other PP thermoformed or injection molded containers

The following foodservice packaging items are acceptable in these incoming bales (i.e., we are happy to accept them because we can easily sort them from other materials, and it makes it easier for MRFs to recover more material that we do want.)

- Rigid Polystyrene (PS) cups and containers, including drink cups, clamshells, sandwich boxes and other thermoformed containers
- Expanded Polystyrene (EPS or Styrofoam) cups and containers, including drink cups and clamshells

As an end market for these materials with expanding demand from our customers, EFS-plastics wants to encourage the inclusion of these items in the statewide list to ensure an adequate supply to feed our growing operation.

Thanks very much for your consideration. We are happy to provide follow-up information upon request.

Best Regards,

Martin Vogt
President & CEO

EFS-plastics Inc.
5788 Line 84
Listowel, ON N4W 3G9, CA

519-418-3377
www.efs-plastics.ca

EFS-plastics US Inc.
504 White Birch Rd
Hazleton, PA 18202, USA

March 18, 2022

Oregon Department of Environmental Quality

PET thermoform recycling. The National Association for PET Container Resources (NAPCOR) appreciates the opportunity to provide data that may assist the Oregon Department of Environmental Quality (DEQ) evaluate materials for inclusion in statewide recycling lists, which are being developed in accordance with Section 22 of Oregon's Plastic Pollution and Recycling Modernization Act (Senate Bill 582). We can share proprietary data that may assist the Department's implementation of the new regulations, particularly regarding PET thermoforms. PET thermoform recovery continues to grow as demonstrated by our annual PET Recycling Report (Figure A below). This annual report utilizes survey data directly reported by all PET reclaimers operating in the US and Canada. Our work to increase recovery of thermoforms dates back over a decade, yielding in recent years a substantial increase in PET thermoform recovery with reclamation of these packages doubling since 2016.

Oregon's contribution. Although we do not collect state-specific data (we survey all reclaimers in the US and Canada but do not ask feedstock origin in our questionnaire), we have been able to estimate PET thermoform recovery in California (a bottle deposit state collecting PET thermoforms in curbside programs) using CalRecycle sort analysis of their Grade B PET bale (curbside mixed collection). Incorporating CalRecycle sort data applied to total PET shipped to reclaimers from Grade B bales we estimated 9.5 million pounds of PET thermoforms were recycled, or about 10% of all PET thermoforms recycled nationally in 2019. Although population differences would impact the quantity of PET thermoforms recovered in Oregon, we can anticipate an Oregon program similar to California (bottle deposits plus curbside collection of PET thermoforms) would yield a notable stream of PET thermoforms for reclaimers searching for additional supplies.

Recycled PET short supply. Recycled PET supply to final markets is short throughout North America illustrated by sharply elevated PET bale prices. Although Oregon does an excellent job collecting PET bottles through its deposit program, it is the exception and not the rule in post-consumer bottle recovery. Only ten states have deposit laws, resulting in a US bottle collection rate of only 27% (2020 data). End-markets for recycled PET are diverse with applications in carpet, textile, strapping and packaging applications. Weak post-consumer bottle collection coupled with sharply growing recycled PET end-markets amplifies the need to collect all PET packaging formats.

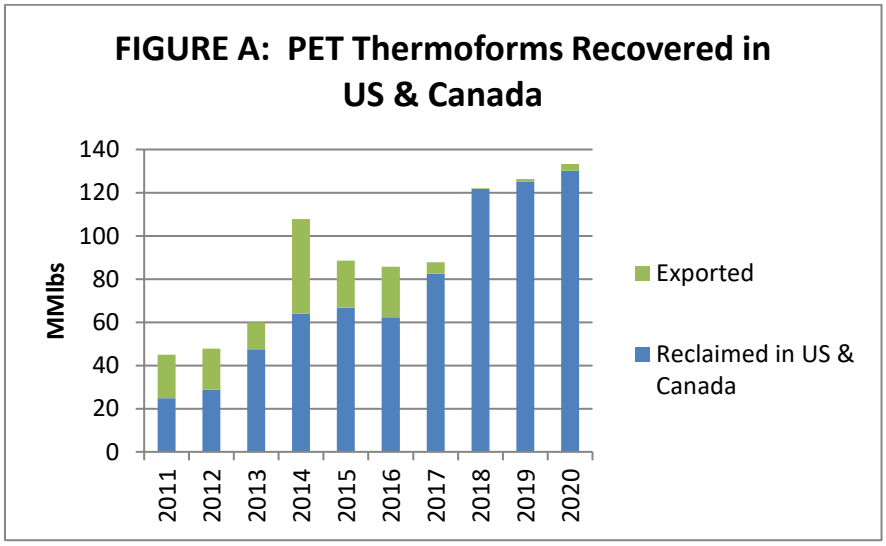
Advances in thermoform recycling. Although PET thermoforms are more difficult to recycle than bottles, particularly for reclaimers focusing on "bottle-to-bottle" markets, short supply plus process improvements and technical advances in reclamation equipment have stimulated recyclers to make significant increases in thermoform recycling in recent years. On average, PET reclaimers in the US accept thermoforms at levels up to 10-15% with baled bottles for processing into a variety of end-use markets. More recently, markets for postconsumer PET thermoform-only material have emerged, with multiple buyers on the west coast seeking PET thermoform-only bales, including supplies from Ridwell in Portland. With more consumer education around PET thermoform recyclability and a deliberate push to include in curbside bins, the potential recovery increase is even greater. Total annual generation of PET thermoforms available for recycling in the US is estimated at 1.8 billion pounds.

Thermoform to thermoform recycling. We are also encouraged that several producers of PET thermoform packages have introduced new specifications requiring postconsumer PET thermoform content in their packages. Data from our recent 2020 PET Thermoform Market Analysis yielded a total of

14.5 million pounds of post-consumer thermoform recycled PET used by the sheet and thermoform community in 2020.

NAPCOR is a non-profit trade association representing the polyethylene terephthalate (PET) plastic packaging industry. PET is the most recycled plastic and identified by the number 1 resin identification code. Common applications using PET material include beverage bottles, thermoforms, cups and trays. Our membership encompasses the PET supply chain, including raw material suppliers, container producers, PET reclaimers and equipment suppliers.

Thank you for the opportunity to provide input on this important decision and please feel free to ask additional questions.



Best regards,

Darrel Collier
Executive Director NAPCOR
Phone: (704) 241-1631 | Email: dcollier@napcor.com

March 21, 2022

Mr. Dan Allaway
Project Manager
Department of Environmental Quality for Oregon

VIA EMAIL: rethinkrecycling@deq.oregon.gov

RE: Oregon Plastic Pollution and Recycling Modernization Act (Senate Bill 582)
Polypropylene – Material Technical Information Submission

Dear Mr. Allaway,

Thank you for the opportunity to provide input to the Oregon Department of Environmental Quality's (DEQ)'s request for technical information to be considered as part of the DEQ's responsibility for developing recommendations for inclusion (or exclusion) of materials from statewide recycling lists to be developed under Section 22 of Oregon's Plastic Pollution and Recycling Modernization Act (Senate Bill 582) ("SB 582"). We appreciate DEQ's interest in receiving input on an issue that will have significant impact on Oregon's efforts to develop a sustainable, meaningful recycling program designed to incentivize innovation, demands accountability, and will address plastic pollution. PureCycle Technologies is a pre-commercial operations company bringing innovative, disruptive polypropylene ("PP") recycling technology that will enable manufacturers to fabricate products using 100% recycled material.

PureCycle 's patented solvent-based plastic purification process removes additives, colors, and odors from waste plastic resulting in an ultra-pure recycled (UPR) resin with nearly all the same applications as virgin plastic. Our UPR resin has a significantly broader application than mechanically recycled PP and does not require a chemical reaction to repurpose the waste plastic (as does pyrolysis and other chemical recycling processes). No one else is currently bringing a technology like ours to the market and we believe it will enable companies to design PP products that can be part of a circular economy.

We believe PP should be among the materials the DEQ recommends to the Environmental Quality Commission because market demand is solid and growing and our PP recycling technology will result in a substantially lower impact on the environment, including less greenhouse gas generation, than virgin production. PureCycle's commissioned independent, third party life cycle analysis ("LCA") of our UPR resin production process shows definite savings in both GHG emissions and fossil fuel consumption in comparison to prime PP. Currently we believe approximately 17 billion pounds of PP are produced today and based on our estimates we believe approximately 2.3 billion a year can be recycled and hope to create a market for half that. For example, PureCycle: has an anchor customer with Procter & Gamble ("P&G"), who invented this technology; has preprocessing that sorts and captures the other resins for resale, as opposed to ground and sorted in a wash process deeming them unrecoverable; has technology that can make a food grade recycled pellet; is interested in all forms of PP, not just packaging, including items like pill vials, hangers, super sacks and automotive residue – bringing new value opportunity to these post-use items.

purecycle.com | 5950 Hazeltine National Drive, Suite 650, Orlando, FL 32822

After licensing the PP purification technology from P&G 2012, PureCycle continued its development and has spent the last four years proving the technology out through a pilot plant we built in 2019. After a series of raising capital, we are now developing a billion pounds of domestic capacity in the U.S. over the next three years, starting with our first commercial-scale operation in Ironton, Ohio. This plant is slated to be operational by the fourth quarter this year with over 100 million pounds of capacity. A second plant with two purification lines is breaking ground March 22, 2022, in Augusta, Georgia with an estimated 260 million pounds per year capacity. We have plans to keep building lines and plants as committed to our customers and investors through 2025 until we reach our billion pounds recycling capacity. Locations for these facilities, including locations in the western U.S., will be dependent on availability of supply. Our business model is extremely dependent on a growing PP recycling infrastructure, not a declining one.

Any efforts to decrease PP waste collection could undermine key domestic recycling technology innovation investments, like ours, in the U.S. and actually result in lower recycling rates. Polypropylene is the most versatile resin produced – with applications in almost every format of packaging, durable goods and fibers and fabrics. The fact it has not had a large stream of natural or clear consistent monotype packaging like PET has with beverage bottles as well HDPE with milk, water and juice bottles, has inhibited the growth of PP recycling until now. PureCycle's technology takes the colorants and additives out without breaking the molecular chain of the polymer. In other words, our technology allows the packaging industry to use our 100% recycled UPR resin nearly all the same products as virgin PP – regardless of whether the waste PP was from carpet, a car or a package.

PureCycle is committed to being a significant resource for recycled PP resin, but we need post-use, waste PP to produce UPR resin. To reach our billion pound per year goal, we need to procure approximately 2.5 times more waste PP from across the U.S. than what is currently being collected in Mrf's (multi recovery facility) today. We need your help, to it. We would welcome the opportunity to discuss with the Oregon DEQ staff and the Environmental Quality Commission how PureCycle can be a part of, and support, Oregon's efforts to ensure an efficient and effective PP and other plastic recycling program. If you have any questions regarding our technology or expansions, I will be happy to facilitate a call through The Recycling Partnership and ourselves.

Sincerely,

Tamsin Ettefagh
Chief Sustainability Officer

purecycle.com | 5950 Hazeltine National Drive, Suite 650, Orlando, FL 32822

The Recycling Partnership
SOLVING FOR CIRCULARITY

125 Rowell Court
Falls Church, VA 22046

RECYCLINGPARTNERSHIP.ORG

Response to Request for Information: Oregon Statewide Material Recycling Collection List

The Recycling Partnership
3/18/2022

The Recycling Partnership is pleased to submit this response to Oregon DEQ's Request for Information (https://www.oregon.gov/deq/recycling/Documents/MaterialList-RfI.pdf) regarding a statewide material recycling collection list. This response provides detailed information on polypropylene packaging and additional general input on three other materials: PET thermoform packaging, pizza boxes, and paper cups.

Thank you for the opportunity to submit this information. Any questions or needed clarifications regarding The Recycling Partnership's input can be addressed to Scott Mouw at smouw@recyclingpartnership.org or Liz Bedard at ebedard@recyclingpartnership.org

Material Focus: Polypropylene

Based on the technical criteria submitted below, The Recycling Partnership urges Oregon DEQ to include polypropylene container packaging on its statewide recycling collection list. Polypropylene (PP) is an established and growing packaging material used in a variety of formats. PP containers are generated at levels comparable to other common recyclables and are proven to be sortable at MRFs. PP also has proven domestic markets, which will be further strengthened by the market dynamics of brand company content goals and state-level content requirements. Our technical input for Section 22 criteria is presented below:

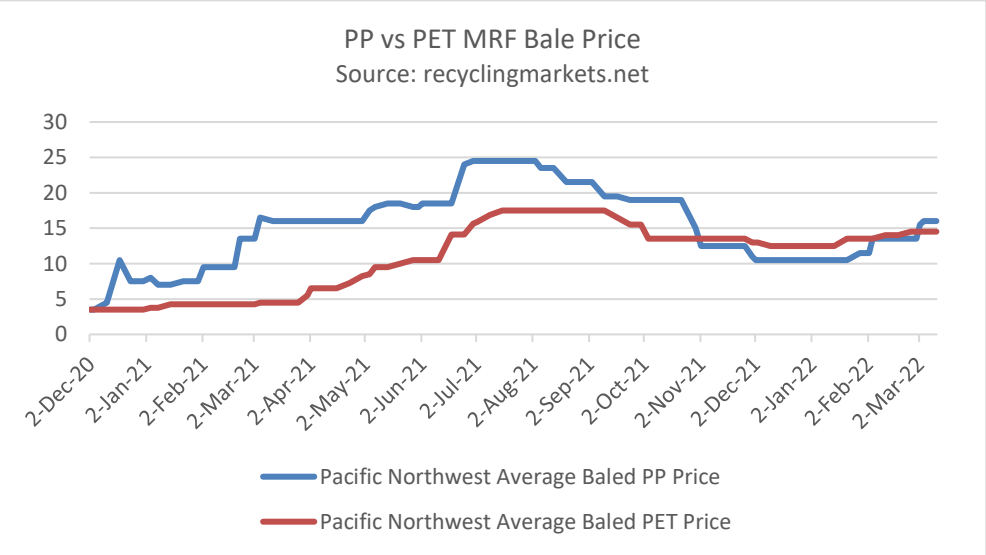
(a) The stability, maturity, accessibility, and viability of responsible end markets

Market price data is an important indicator of a material's recyclability status. Price data from recyclingmarkets.net displays a notable and sustained rise in pricing for sorted and baled PP since December 2020. Although West Coast pricing lags stronger pricing for other regions, Pacific Northwest regional pricing provides solid evidence of market demand.

Figure 1 below compares PP pricing with PET for the Pacific Northwest. We recognize that much of PET is collected through deposit in Oregon, but for the PET that does go through MRF processing, PP prices track positively with this established commodity, in most months exceeding PET pricing. It is important to bear in mind that recyclingmarkets.net reports prices as "picked up" (freight-on-board at MRFs) so it encompasses the price effects of freight. PP has enjoyed an average market price $300/ton over the last 14 months, well exceeding typical MRF processing costs of around $90/ton and providing a robust return-on-investment case for the sortation of this material.

As with all recyclable commodities, PP could see price swings over the coming years. However, long-term market fundamentals, in particular regarding brand commitment to recycled content in PP packaging (discussed further below), provide a foundation of market value for PP.

Figure 1: Pacific Northwest PP vs PET MRF Bale Price



Oregon does not have in-state PP reclamation capacity and in general West Coast domestic recycling capacity for PP is not currently as well developed as it is in other parts of the U.S. However, that could change as PP becomes a mainstream acceptable plastic on par with PET and HDPE and as supply grows that in turn spurs and justifies PP reclamation investment. Some West Coast reclaimers for PP are indicating plans to add equipment to accommodate more PP feedstock and other recent developments demonstrate additions of reclamation capacity in Western states.[1] If PP feedstock is not available because of exclusion from Oregon or other West Coast collection lists, it could undermine potential reclamation development.

It is important to also note that PP is a commodity with established national market specifications. The Institute of Scrap Recycling Industries (ISRI) includes a marketable commodity standard for PP that incorporates quality considerations in its Scrap Specifications Circular: http://www.scrap2.org/specs/40/

(b) Environmental health and safety considerations

The Recycling Partnership has no technical input on this criteria.

(c) The anticipated yield loss for the material during the recycling process

As with any other material, PP can be lost in MRF processing when it is not targeted as a sortable commodity. However, applicant submittals to The Recycling Partnership's Polypropylene Recycling Coalition grant program show that PP yield loss to residue or to lower value mixed plastics can be effectively addressed.[2] Figure 2 displays data on four of the first PP Recycling Coalition grant recipients that provides strong evidence of success in establishing PP as a specific sorted material.

Figure 2: Creation of Sorted PP Tonnage by Polypropylene Recycling Coalition Grant Recipients

MRF	PP Loss Pre-Grant Project	Technology/Approach Deployed to Address PP Loss	Annualized tonnage of new PP capture
MRF 1	PP not formally accepted; 40% of incidental PP sorted to low value mixed plastic and 60% lost to disposal	PP now formally accepted; Robotics applied on new plastic conveyor line	564 tons per year of sorted PP
MRF 2	PP sorted to low value mixed plastic	Optical sorter dedicated to PP sortation	563 tons per year of sorted PP
MRF 3	PP not formally accepted; incidental PP lost to disposal	PP formally accepted; Robotics applied on retrofitted conveyor	447 tons per year of sorted PP
MRF 5	PP treated as a contaminant and discarded in residue	Optical sorter dedicated to PP sortation	260 tons per year of sorted PP

[1] An indication of positive momentum in olefin reclamation investment in the West is found in the announcement of a Polymer Center by Republic Services, which also operates the MRF in Bend, OR: https://resource-recycling.com/plastics/2022/03/01/republic-services-moves-to-vertically-integrate-in-plastics/

[2] The Polypropylene Recycling Coalition is an industry collaboration bringing together stakeholders across the polypropylene (PP) value chain – resin suppliers, manufacturers, consumer packaged goods, and recycling processors – to improve polypropylene recovery and recycling in the United States and further develop the end-market of high-quality recycled polypropylene. The Coalition has released $5.33 million in total funding committed to date in 17 grants covering 18 MRFs, with a projected increase in national PP recycling access rate of 6.4%.

The PP Recycling Coalition continues to offer grants to facilitate MRF PP sortation. To date, 18 facilities have received funding and projects are underway. We anticipate grantee reports will continue to demonstrate that investment in PP sortation equipment can effectively address MRF yield loss and deliver solid economic returns.

Little data is available on reclaimer yield loss. As with PET, reclaimers received commodity bales that contain materials that will not be converted to a final "pure" flake or pellet. Private estimates indicate reclamation bale yield loss for PP to be around 33%, which is comparable to PET. It must be noted that maximizing yield is in the business interest of reclaimers and even with this yield loss, the recycling of PP is economically proven.

(d) The material's compatibility with existing (Oregon) recycling infrastructure

A review of Web-posted information by Oregon-based MRFs reveals mixed results for PP acceptability currently. One Portland area MRF accepts "plastic containers" that includes "#5 – Plastics – Dairy tubs." Indirectly, community acceptance lists indicate MRF acceptance of PP in the Bend/Deschutes County area. Although most other Oregon-based MRFs focus acceptance on "bottles only" or "bottles and jugs," acceptance by two MRFs indicates strong potential for broader PP acceptance, which is reinforced by PP acceptance at the MRF in West Vancouver, WA (significantly, 80% of Washington state MRFs show PP acceptance).

These data points demonstrate a baseline level of compatibility for PP with existing recycling infrastructure in Oregon and the Pacific Northwest. As The Recycling Partnership has found with its PP Recycling Coalition grant program, compatibility is dynamic and can be built through capital interventions in MRFs that did not previously have PP sortation capability. PP was largely incompatible with the State of Ohio's recycling infrastructure until Coalition granting created a change in MRF sorting capacity that now makes PP accepted across the majority of households in the state.

The Recycling Partnership has created a Web-search platform that tracks and characterizes material acceptance in recycling programs across the U.S. A review of the information in this database indicates that PP is already accepted in geographic areas covering 60 percent of single family Oregon households. While there is little reference to PP or #5 plastics specifically, formats described in text and imagery demonstrate that main PP formats are accepted. This is another indicator of baseline compatibility for PP with Oregon's recycling infrastructure. A review of the database for the State of Washington reveals 72 percent PP acceptance for single family homes, a clear sign of regional compatibility. With this level of baseline acceptance, failure to add PP to the state list will confuse consumers who are already enjoying access, potentially undermining public trust in the recycling system.

(e) The amount of the material available

The Recycling Partnership conducts capture studies examining parallel samples of waste and recycling streams that allow us to project commodity-specific household material generation. PP is a common consumer packaging material that is present in household generation at levels comparable to or exceeding other plastic materials commonly accepted for recycling.

Figure 3 provides the overall averages from capture study data ranking plastic containers in single family households on a per household basis. The Figure further uses this data to extrapolate tonnage for Oregon based on the state's single family household numbers. It shows that PP packaging ranks second among common plastic recyclables in pounds/household and in projected tonnage for the State of Oregon. It ranks highest of materials

not typically covered by deposit and is generated at rates 69% higher than HDPE natural bottle and 26% higher than colored HDPE bottles.

Figure 3: National Average Single Family Household PP Generation Rates Compared to PET and HDPE

Material	Average Pounds/Household/Year	Extrapolated Tonnage for Oregon Single Family Households
PET Bottles	54.8	33,839
Polypropylene Packaging	19.8	12,226
HDPE Colored Bottles & Jars	15.7	9,695
Non-bottle PET packaging	11.7	7,225
HDPE Natural Bottles & Jars	11.7	7,225

If half of the estimated PP were captured and marketed as bales from Oregon MRFs, using 15 cents/pound a base price, it would equate to $1.83 million in MRF commodity revenue per year.

In 2019, The Recycling Partnership supported a capture study for the Portland Metro area that included detailed sortation of PP packaging types. Figure 4 presents this data, showing a per household number smaller than indicated above but still within range, comparing favorably to HDPE bottle plastics and in line with PP and HDPE ratios in Figure 3.

Figure 4: PP Household Generation in Portland Metro Region

	Pounds/Household/Year	Extrapolated Tonnage for Oregon Single Family Households
PP (#5) Bottles & Jars (> 6 oz < 2 gals)	0.61	378
PP (#5) Bottles & Jars (<6 oz)	0.62	381
PP Tubs (> 6 oz < 2 gals)	3.20	1,977
PP Tubs (< 6 oz)	1.05	648
PP Other Rigid containers and packaging (< 2gals, >2")	8.93	5,516
PP rigid non-packaging (< 2gals, >2")	0.85	526
TOTAL – ALL PP	**15.26**	**9,425**
HDPE Natural Bottles	6.38	3,940
HDPE Colored Bottles	9.42	5,817

As the data shows, PP is available in quantities almost equal to natural and colored HDPE bottles combined in the Portland Metro region. Attachment A to this document show product examples of PP packaging use, indicating the materials widespread use across a variety of products. These images underscore the established presence of PP packaging in household consumption.

PP use in packaging appears to be growing and will likely benefit from resin replacement for other packaging, especially those that have been deemed problematic and unnecessary by the U.S. Plastics Pact.[3] Moreover, PP has qualities that are not replicable by PET and HDPE, and so can be expected to continue filling key packaging categories for many common consumer products that those resins cannot.

(f) The practicalities of sorting and storing the material

As discussed in the example of PP Recycling Coalition grantees above and as can be found true for many other MRFs across the country, standard MRF optical and robotic equipment available on the market today successfully sorts PP. As a specified material, PP can be sorted into regular truckload quantities and moved quickly to market like any other established commodity at scale. For PP Recycling Coalition grantees to date, dedicated pre-baling storage capacity has been established to manage PP and all are moving baled material into outbound trucks in a manner similar to PET and HDPE.

(g) Contamination

There is no indication that PP packaged products are less cleanable for recycling preparation by households than other plastics packaging. PP packaging also tends not to have extraneous materials or any kind of composite makeup that is substantially different than many common PET and HDPE recyclable formats.

PP can certainly be perceived as an inbound contaminant from the perspective of a MRF with no capacity for PP sortation, but that capacity can be created. MRFs can expect market demand for spec PP bales will be consistent and further supported by the dynamic of brand and statutory content targets.

(h) The ability for waste generators to easily identify and properly prepare the material

In a section above and in Appendix A, we demonstrated the established nature of PP as packaging across a wide array of products and as present in household generation at levels facilitating collection and processing. As a recyclable material specified to households as a tub, cup or container, households and others waste generators can easily comprehend the material is recyclable (especially, as needed, if reference to the #5 Resin Identification Code is included in outreach information).

Basic recycling outreach can convey through words and imagery that PP is recyclable. Appendix B provides examples of outreach materials that describe clearly to households that PP is accepted in its main packaging formats. The examples include one community in the U.S. that recently added PP collection under a PP Coalition Grant, one from the Seattle area, and three from Oregon. The latter are further indication that PP is already a successfully accepted and sorted material in Oregon, which also further shows that MRF acceptance has an established baseline in the state. As we have discussed above, grant and technical interventions can also create sorting and acceptance capacity in MRFs where it is not already in place.

(i) Economic factors

Recycled content commitments by brand companies that package in PP, bolstered by recycled content mandate activity by states, can be expected to spur recycled domestic PP demand (a factor not previously in play when PP

[3] https://usplasticspact.org/problematic-materials/

was typically sorted into mixed plastic bales often reliant on export markets). Commitments to recycled content in packaging is especially important when recognizing that most recycled PP is currently used in established non-packaging products such as automotive and construction products. Although market uses may shift, it is likely that recycled PP packaging demand will be *additive* on top of these current uses.

Activities within U.S. Plastics Pact provides insight into the potential market demand from recycled content commitments.[4] Comparing current baseline content to the Pact's 30% content target by 2025, it is clear that a substantial supply gap needs be closed. Pact Activators with PP bottle and rigid container formats will need an estimated additional 200 million pounds per year of recycled PP to meet the recycled content target, which is equivalent to a 45 percent increase in the current national PP bottle and rigid container recycling rate.

It is important to remember two factors in this analysis: 1) not all brands packaging in PP are members of the Pact and additional r-PP demand will come from non-Pact members, and 2) assuming a 33% yield loss through MRF and reclaimer processing, the actual amount of PP needing to be collected to close the Pact Activator content gap would be 266 million pounds. At typical capture rates, this would be equivalent to the curbside collection of PP from 35 million single family homes, or about 35 percent of all U.S. single family households.

The Ocean Conservancy's recent Recommendations for Recycled Content report shows the interplay of recycled content scenarios and supply.[5] From a baseline estimate of 0% for 2019/2020 in PP packaging recycled content, the report finds that 10% PCR by 2030 is only possible under significant growth in recycling collection and modest technological innovation. A content rate of 15% is feasible only when supply is boosted by national supply-side policy (EPR and Bottle Bill), technical intervention, and design-for-recycling improvements.

Brands are already subject to recycled content targets through publicly stated commitments (in part through the U.S. Plastics Pact) and to incipient State-level requirements. The Ocean Conservancy's report shows that supply side interventions are necessary to make those content levels achievable. This underscores the importance for PP to be included in universal collection. As noted in the report, "…one of the barriers to increased use of recycled plastics is the lack of available supply – there is not enough postconsumer plastic being collected in the recycling system to meet voluntary corporate commitments and industry demand."

(j) Environmental factors from a life cycle perspective

The Recycling Partnership has no technical input on this criteria.

(k) The policy expressed in Oregon Revised Statutes 459.015 (2)(a) to (c), as amended by Section 46 of the Recycling Modernization Act.

The Recycling Partnership has no technical input on this criteria.

Conclusion

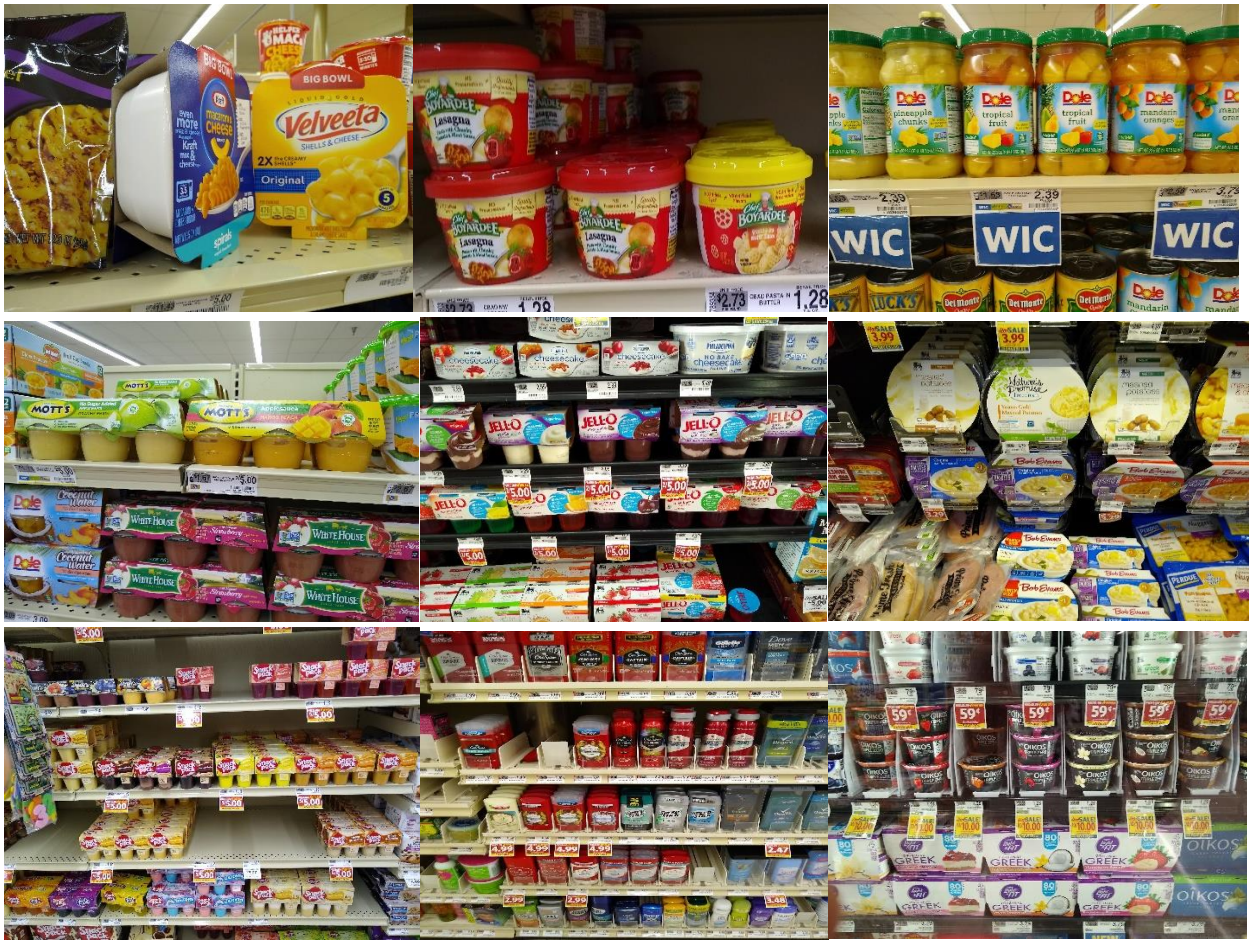
Thank you for the opportunity to submit this technical information. In summary, we believe it presents a compelling case for PP to be included in Oregon's statewide recycling collection list.

[4] The U.S. Plastics Pact Baseline Report displays current levels of PP and other resin recycling content as reported by brand Pact Activators: https://usplasticspact.org/baseline-reader/

[5] https://oceanconservancy.org/blog/2022/02/16/recycled-content-standards/

Appendix A: Imagery of PP Packaging on Store Shelves

PP is used in a wide variety of refrigerated, shelf-stable, microwavable and personal care products consumed in scaled quantities in U.S. households.



Appendix B: Imagery of Outreach Materials Conveying PP Recyclability

In response to the technical criteria regarding the ability for waste generators to easily identify and properly prepare the material, examples below show simple, effective imagery and communications that facilitate understanding of PP recyclability.

Example 1: Generic TRP mailer used in regions served by MRF recipients of PP Coalition Grants where PP was not originally accepted in collection programs

Example 2: WM imagery accessible on-line for areas served by the company's MRFs (including State of Washington). Imagery accompanied by text directions to "Recycle plastics by shape: bottles, jars, jugs and tubs."

Example 3: Imagery on Portland Metro material collection list, accompanied by text directions to recycle: "**Round plastic containers** that can hold 6 ounces or more, with a wider rim than base, and typically contain products such as salsa, margarine, cottage cheese, hummus, etc. (no drink cups)"

Example 4: Imagery on City of Gresham OR material collection list

Example 5: Imagery and wording from Republic Services City of Bend Recycling Guide

Material Focus: PET Thermoforms

In lieu of providing detailed information in step with DEQ's technical criteria, The Recycling Partnership offers general input on PET thermoforms below.

Our National Database indicates a strong base level of acceptance in Oregon for "plastic clamshells," a common surrogate for PET thermoforms, with community collection lists covering 492,671 single family households (nationally, the number is 43.8 million). Many community programs and MRFs are ambiguous regarding their acceptance of thermoforms. In part, this reflects ambiguity in the PET reclamation sector toward thermoforms, with its much higher focus on bottles and a set of yield issues regarding thermoform processing.

However, recent thermoform-specific reclamation investments in the U.S. and Mexico demonstrate that the material has a growing market pathway that is separate from PET bottles (and alongside bottles, as well, in some instances). Secondary processors (often referred to as "PRFs") in some parts of the U.S. are also having success in extracting and marketing thermoforms from mixed MRF plastics. In addition, one entrepreneurial collector in Oregon is producing and marketing thermoform bales. We would further note that ISRI does have a PET thermoform bale specification in its Scrap Specifications Circular: http://www.scrap2.org/specs/40/ . These are signs that thermoforms are emerging as a distinct recyclable commodity and that there is baseline return-on-investment in thermoform reclamation.

The broader context for these developments is the overall shortfall of recycled PET to meet brand and statutory content targets. Greater collection and processing acceptance of thermoforms is seen as one key strategy to address that shortfall.[6]

Relatedly, there is indication that thermoforms are growing faster than bottles in terms of generation. Current Recycling Partnership data indicates a 5:1 ratio of PET bottle to non-bottle PET generation in single family household but industry growth statistics and some key trends could push that ratio to 4:1 by 2030. A number of factors could encourage greater PET thermoform usage and generation, including resin substitution in products like cups, egg packaging, and other packaging that currently uses PS and PVC, which are identified as problematic and unnecessary by the U.S. Plastics Pact. Capture study data indicates non-bottle PET is already generated at levels equal to Natural HDPE (11.7 pounds per household per year) – under universal collection acceptance and strong capture rates, PET thermoforms could produce a quantity of MRF bales similar to HDPE.

In short, PET thermoforms are an established packaging format with recycling market demand that has grown and is expected to grow more. Many industry stakeholders are working to address technical and other issues that pose recycling challenges (e.g., detrimental labels). A pathway for PET thermoform acceptance could help catalyze conversion of non-PET clamshell packaging away other resins and thereby reduce contamination in the recycling system from look-alike materials. With these factors in mind, if PET thermoforms are not included in an initial material acceptance list, we encourage Oregon DEQ to be open to their inclusion in the future.

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[6] From NAPCOR 2020 PET Recycling Report, p.23, emphasis added by The Recycling Partnership: "As noted in a December 2020 report by Foodservice Packaging Institute (prepared by Resource Recycling Systems), some PET reclaimers will accept PET thermoforms as part of a curbside PET bale, but acceptance is capped at approximately 10 percent of bale weight. NAPCOR has found that this upper limit varies; *given the tight supply of RPET in the market, tolerance for thermoforms in bottle bales has increased by necessity in 2021*."

Material Focus: Pizza Boxes

In lieu of providing detailed information in step with DEQ's technical criteria, The Recycling Partnership offers general input on Pizza Boxes.

Data from The Recycling Partnership's National Database of community program material acceptance indicates that pizza boxes are already included in program collection lists covering 76 percent of Oregon single family households. Pizza boxes are a readily identifiable discard for generators, who can be successfully instructed on how to prepare the boxes for recycling by excluding food or other extraneous materials. The Recycling Partnership provides resources to help communities communicate effectively about pizza boxes: https://recyclingpartnership.org/pizzaboxes/

Pizza boxes sort effectively in MRFs into corrugated cardboard or mixed paper commodity bales. Paper industry acceptance of pizza boxes is well documented by industry sources (for example, see https://www.afandpa.org/news/2020/afpa-and-industry-partners-aim-set-record-straight-pizza-boxes-are-recyclable-grease-and)

In sum, with no market or sortation barriers, and with the ability of recycling programs and haulers to effectively communicate about pizza box acceptance and how to avoid contamination, we urge Oregon DEQ to include the material on its statewide collection list.

Material Focus: Paper Cups

In lieu of providing detailed information in step with DEQ's technical criteria, The Recycling Partnership offers general input on Paper Cups.

Our review of publicly available MRF information and data from our National Database of community program material acceptance does not indicate a clear picture for paper cup acceptance in Oregon. However, industry sources show growing mill acceptance of paper cups and work continues to expand overall MRF and community program acceptance: https://www.recyclefsp.org/paper-cup-alliance. As documented in a recent white paper, paper cups are allowed in four different paper grades, all associated with substantial mill capacity and demand in the U.S.: https://static1.squarespace.com/static/5e8221dbc8b11929c3f7eef7/t/61fd9d504264206ae6406d4e/1644010833194/The+State+of+Paper+Cup+Recycling+-+Moore+and+Associates+2022.pdf

As a sign of general regional acceptance and a demonstration of how generators can easily be instructed that paper cups are recyclable, see the City of Seattle's information: http://www.seattle.gov/utilities/your-services/collection-and-disposal/where-does-it-go#/item/paper-cup In similar regional vein and again, indicative of the status of regional market and mill acceptance, British Columbia's program also accepts paper cups and communicates clearly how generators should prepare the materials: https://www.crd.bc.ca/service/waste-recycling/recycle/myrecyclopedia/products/paper-cups#:~:text=Residential%20paper%20cups%20are%20accepted,accepted%20in%20the%20blue%20bag

In short, paper cups are showing signs of steady progress in mill, MRF, and community acceptance, with the backing of industry stakeholders helping to improve cup recyclability. This progress provides compelling evidence that paper cups are beyond just "technical recyclability" and are now experiencing practical success as communities, MRFs, and mills find alignment and as perceived barriers to cup recycling are overcome. If paper cups are not included in an initial statewide acceptance list, we encourage Oregon DEQ to be open to their inclusion in the future. Paper cups contain valuable fiber which should ideally not be lost to landfill disposal.