

The State of Multi-Tenant Recycling in Oregon

January 2018



Materials Management

700 NE Multnomah St.
Suite 600
Portland, OR 97232
Phone: 503-229-5696
800-452-4011
Fax: 503-229-5850
Contact: Brian Staffki
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**

Updated: 4/16/18

This report prepared by:

Oregon Department of Environmental Quality
700 NE Multnomah Street, Suite 600
Portland, OR 97232
1-800-452-4011
www.oregon.gov/deq

Contact:
Brian R Stafki
503-229-5984

Documents can be provided upon request in an alternate format for individuals with disabilities or in a language other than English for people with limited English skills. To request a document in another format or language, call DEQ in Portland at 503-229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696; or email deqinfo@deq.state.or.us.

Acknowledgements

DEQ is grateful for numerous multi-tenant property owners, property managers and tenants who participated in multi-tenant recycling studies.

DEQ appreciates the following cities, counties, organizations and material collection companies for contributing to multi-tenant recycling studies including:

- Alameda County, Calif.
- Baker County
- Bend Garbage and Recycling
- Benton County
- Cascade Disposal/Waste Connections
- City of Albany
- City of Ann Arbor, Mich.
- City of Austin, Texas
- City of Beaverton
- City of Bellevue, Wash.
- City of Castro Valley, Calif.
- City of Corvallis
- City of Eugene
- City of Federal Way, Wash.
- City of Gresham
- City of Los Angeles, Calif.
- City of Miami, Fla.
- City of Oakland, Calif.
- City of Olympia, Wash.
- City of San Diego, Calif.
- City of San Jose, Calif.
- City of Seattle, Wash.
- City of Springfield
- City of Vancouver, Canada
- City Sanitary Service
- Clackamas County
- Columbia County
- Coos County
- Crook County
- Culver City, Calif.
- Curry County
- Deschutes County
- Douglas County
- Eureka recycling
- Hennepin County, Minn.
- Housing and Community Services Agency of Lane County
- Jackson County
- Jefferson County
- Jersey City, N.J.
- Josephine County
- King County, Wash.
- Kitsap County, Wash.
- Klamath County
- Lane Apex Disposal
- Lane County
- Lincoln County
- Linn County
- Loren's Sanitation & Recycling Service
- Malheur County
- Marion County
- Metro
- Mid-Valley Garbage and Recycling Haulers Association
- Morrow County
- New York City, N.Y.
- Oregon Refuse & Recycling Association
- Pacific Sanitation
- Pendleton Sanitary Service
- Pennsylvania Resources Council
- Philadelphia, Pa.
- Pitkin County, Colo.
- Polk County
- Portland State University Population Research Center
- Recology of Western Oregon
- Republic Services
- Rogue Disposal & Recycling
- Royal Refuse Service
- Sacramento County, Calif.
- Salt Lake City, Utah
- San Francisco, Calif.
- Sanipac/Waste Connections
- Snohomish County, Wash.
- State of Oregon Employment Department
- Suburban Garbage Service
- Thurston County, Wash.
- Tillamook County
- Union County
- University of Oregon
- Valley Recycling and Disposal
- Wasco County
- Washington County
- Yamhill County

DEQ is thankful for the help of staff who supported the project:

- Anya Dobrowolski
- Babe O'Sullivan
- Brian Fuller
- Brian Stafki
- Cahal Franks
- Caitlin Ahearn
- Cathy Rhoades
- Craig Filip
- Daniel Hough
- Jane Griffen
- Jamie Jones
- Julie Miller
- Loretta Pickerell
- Martin Brown
- Maya Buelow
- Minal Mistry
- Peter Canepa
- Peter Spendelow
- Rachel Mockler
- Shari Harris-Dunning
- Shannon Davis

Table of contents

Executive summary	1
1. Introduction.....	3
2. Research methods	3
2.1 Sampling methods	4
3. Findings	5
3.1 Multi-tenant properties defined	5
3.2 Improving multi-tenant recycling opportunities.....	5
3.2.1 DEQ’s authority.....	5
3.2.2 Oregon’s guiding policy for materials management	6
3.2.3 Providing the opportunity to recycle	6
3.3 Affected parties	7
3.3.1 The importance of tenants	7
3.3.2 Cities and counties.....	7
3.3.2.1 Multifamily properties.....	7
3.3.2.2 Businesses tenants	7
3.4 Recycling behavior	8
3.4.1 Tenant participation.....	8
3.4.2 Role of children	8
3.4.3 Safety and security	8
3.4.4 Convenience of using recycling	8
3.4.4.1 Collocation of garbage and recycling.....	9
3.4.4.2 Access to receptacles	9
3.4.4.3 Uncontained materials	9
3.4.5 Education and outreach	9
3.4.6 Getting information to tenants.....	11
3.4.6.1 Information at lease signing	11
3.4.7 Tailored messages for the audience.....	11
3.4.8 Using different media to deliver messages.....	11
3.4.9 Inclusive messaging.....	11
3.4.9.1 Printed materials.....	11
3.4.9.2 Face-to-face interactions.....	12
3.4.10 Signage and other visual cues.....	12
3.4.10.1 Directional signs	12
3.4.10.2 Differentiating material types with color.....	12
3.4.10.3 Collection area signs.....	12
3.4.10.4 Decals and labels	12
3.4.10.5 Images.....	13
3.4.10.6 Other languages	13
3.4.11 Reinforcing good recycling behaviors.....	13
3.4.11.1 Ongoing education.....	13
3.4.11.2 Incentives.....	13
3.4.11.3 Providing feedback.....	13
3.4.11.4 Contamination	13
3.4.12 Non-tenant use.....	14
3.4.12.1 Illegal dumping.....	14
3.5 Recycling collection systems.....	14
3.5.1 Recycling opportunities.....	14
3.5.1.1 Multifamily opportunities.....	15
3.5.1.2 Commercial opportunities	15

3.5.2	Single-stream compared to dual-stream	15
3.5.3	Collection service levels	15
3.5.4	Materials collected.....	16
3.5.5	On-site management	17
3.5.6	In-unit space	17
3.5.6.1	Recycling tote bags.....	17
3.5.6.2	Collection area design	17
3.5.6.3	Receptacle types	18
3.5.7	Utility rates and fees	18
3.5.8	Bulky waste	19
3.5.9	Technical assistance	19
3.5.10	Improving efficiency	19
3.6	Recycling policies	20
3.6.1	Goals and measures	20
3.6.2	Program staff time	20
3.6.3	Mandates.....	20
3.6.4	Administrative codes	20
3.6.5	Franchise and license requirements	20
3.6.6	Record keeping and reporting.....	21
3.6.7	Defining multi-tenant	21
3.6.8	Building guidelines.....	21
3.6.9	Landlord and tenant relationship	21
3.6.9.1	Recycling agreements.....	22
3.6.10	Compliance and enforcement	22
3.6.11	Penalties and fees	22
3.6.12	Alternative programs	22
3.6.12.1	Wasted food recovery.....	22
3.7	Other.....	22
3.7.1	Collaboration	22
4.	Discussion.....	23
4.1	Limitations.....	23
4.1.1	Multi-commercial properties and business tenants.....	23
4.1.2	Representative samples.....	23
4.2	Conclusion.....	23
4.3	Recommendations	23
	References	24
	Appendix A	25
	Appendix B.....	25
	Appendix C.....	28
	Appendix D	28

Executive summary

Changes to law

In response to changes in Oregon's recycling laws, the opportunity to recycle is being extended to all residential and commercial tenants of multi-tenant properties. The change will require cities and counties to ensure properties with tenants that share garbage collection service also receive recycling collection by July 2022. This requirement is for cities with 4,000 or more residents, cities within the Metro Service District and counties which manage programs within those cities' urban growth boundaries.

Multi-tenant research

In order to support implementation of this statutory change, Oregon Department of Environmental Quality staff conducted research to understand the conditions and stakeholder perspectives around offering recycling collection service to multi-tenant properties. Research included stakeholder interviews and surveys, property surveys and counts, and analysis of collection service levels.

Findings from each study are reported separately and summarized in this report for the benefit of a stakeholder workgroup that will work with DEQ to develop improvement options. Specific recommendations will be developed and shared with all stakeholders in late 2018 and for Oregon Legislative review in early 2019.

Research included both multifamily and multi-commercial stakeholder perspectives as much as possible, however the majority of findings represent multifamily perspectives due to both limited available research and resources. In many cases research findings are informative but may not necessarily represent all stakeholders or their particular circumstances.

Vision and plan for materials management

Oregon's guiding vision and plan for managing materials, including recycling, seeks to reduce the environmental impacts of materials and products as they move through their life cycle — starting with design and continuing through raw materials extraction, manufacture, transport, consumption, use, reuse, recycling and disposal. One of the desired outcomes is that materials are directed to their next highest and best use once they are discarded. The Vision also calls for communities to live high-quality lives with rich social and community relations that support low levels of acquiring new material goods. The Vision is only possible with a combination of a solid foundation and effective collaboration and partnerships.

Responsible cities and counties

Oregon law and policy require local governments to develop and implement systems that provide the opportunity to recycle for every person in Oregon. In 2022, DEQ projects there will be 89 cities and 29 counties that will need to provide multi-tenant recycling opportunities. Cities and counties do this through a combination of programs, often in cooperation with private and non-profit organizations including garbage and recycling collection service providers. The framework for providing the opportunity to recycle is defined by state law. Each local jurisdiction strives to achieve regional goals and support statewide goals including recovery of 52 percent of all materials generated, by weight, for recycling by 2022. Oregon recovered 43 percent of materials generated in 2016. In order to achieve these goals, increases in multi-tenant recycling are necessary. At the same time, these programs must also generate marketable materials that are free from garbage and other items that are not accepted as recycling. In general, multifamily recycling is more contaminated with items that don't belong than other sectors such as single-family residential.

Recycling behavior

There are many opportunities to improve the multi-tenant recycling system going forward including improving participation and reducing contamination. Recycling behavior is not wide-spread or consistent among multifamily properties. Concerns about safety and lack of information, along with inconsistent or incomplete messaging and visual cues combine to make the system seem scary or confusing for some users. In many cases shared recycling

The State of Multi-Tenant Recycling in Oregon

opportunities were less convenient than if they had individual collection service. Improper participation or inadequate service levels may have contributed to excess materials accumulating in or around collection receptacles, such as bulky waste that does not fit in receptacles, that compound the situation. In general, it appears that tenants are not getting the information or reinforcement they need to encourage them to participate or recycle. In addition, visual cues, such as signs in a few different languages that include images supportive of recycling behavior, are lacking. When new users are trying to find the collection area they often have trouble understanding which receptacle is for garbage and which is for recycling, and how to properly prepare materials. Non-tenant use of collection areas may also be a problem for some stakeholders.

Recycling collection system

There are also other opportunities to improve the recycling collection system. Only two-thirds of multifamily properties outside the Portland-Metro area had some sort of recycling collection service, though not what will be required by 2022. Only half of Oregon's cities had DEQ-approved multifamily recycling programs for 2015. Over three-quarters had some sort of commercial materials collection program.

There are mixed opinions whether collection services have adequate volume of receptacles, frequency of collection or both. Property managers felt service was adequate while multifamily tenants did not. In general, the collection service offered to multifamily properties is less than half of what is offered to single-family residents. This service is managed by the customer, which is currently either the property owner or manager. Service providers felt this needed to be managed by dedicated on-site staff that work regularly with the collectors. In cases of some larger properties and management firms with larger portfolios, property staff are managing multiple properties and potentially not providing individual properties and tenants what they need. Additionally, it is not always clear whose responsibility it is to dispose of items that don't fit in receptacles such as couches.

Collection area design and layout changes were called for by both collection service providers and property managers, including larger areas to accommodate more service, increased access and improved safety by both tenants and drivers. Similarly, changes to receptacles including size, color and lid type could affect tenants and collectors. Roll carts — typically used for single-family curbside collection — were the most common receptacle used for mixed recycling and glass recycling collection. This may be the most convenient for tenants — children often appear to be the ones taking materials out at multifamily complexes.

Recycling policies

To support good recycling behavior and collection systems, it is important to have good policies to address problems at various points in the recycling system. Not having adequate staff resources to support programs was reported at all levels. Local governments have the authority to establish rates that cover the opportunity to recycle. Additionally, they can adjust the cost of disposing garbage to cover recycling programs. Most local governments pass on many of their responsibilities to franchised collection service providers. City and county administrative codes can support programs. However, collection service providers rarely designate multi-tenant customers separate from other accounts. Less than half of local governments had education and outreach standards. A majority of local governments had some sort of convenience and collection service level standard.

In order to address tenants putting items in the recycling that don't belong, collection service providers report disposing of contaminated recycling, as directed by property managers, rather than cleaning them up. Collectors are not required to collect contaminated recycling. It is very difficult for property managers to identify which generators may have caused contamination, much less, get them to clean it up. There doesn't appear to be clear authority for the property manager to dispose of recycling they did not set out themselves. Similarly, there doesn't appear to be clear authority for the collection service provider to remove the opportunity to recycle from repeat offenders.

Cities can adopt building ordinances for new construction or major renovations to ensure there is adequate space and arrangement to support multi-tenant recycling systems. Nearly half of local jurisdictions interviewed did not have these codes. Ordinances could include minimum space requirements, convenience standards, safety and security requirements as well as specifications to support safe and efficient collection.

1. Introduction

This report is prepared for the benefit of stakeholders in order to determine solutions that could be helpful to cities and counties that need to implement multi-tenant recycling by 2022. Stakeholders could include but not limited to garbage and recycling collection companies and associations, developers and builders, local and regional governments, materials management programs, multi-tenant property owners, property managers, planners, recycling processors, tenant and tenant associations, and others.

The Recycling Opportunity Act was passed in 1983, with the intent that everybody in Oregon should be provided with an opportunity to recycle. In cities of 4,000 or more populations and within the Metro area, that opportunity meant regular on-route collection of recyclable materials from all collection service customers, or an equivalently-effective program. However, as the law was interpreted and implemented, many residential and commercial tenants ended up being denied an opportunity to recycle because it was the landlord, rather than the tenants, who were considered to be the collection service customers. If the landlord decided not to use a recycling service, then the tenant did not have an opportunity to recycle. In 2015, the legislature corrected this with the passage of Senate Bill 265. One provision of this law is that by July 1, 2022, tenants will also be considered to be collection service customers, and so must directly be provided with the opportunity to recycle by their landlords and collection service providers.

By July 1, 2022, cities with over 4,000 people — and counties responsible for managing waste within those cities’ urban growth boundaries — and cities within the Metro Service District will need to ensure that the opportunity to recycle is extended to occupants of multi-tenant properties (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents).

In order to help guide implementation of the updated recycling law, the Oregon Department of Environmental Quality conducted extensive research to understand the state of recycling at multi-tenant properties. Multiple studies were conducted by six DEQ staff between May and December 2017 to include property surveys, stakeholder interviews and a literature review.

The findings of each of these studies are presented in individual reports. Select findings from each report are shared in this executive report. Available resources limited the scope and depth of research to mostly residential multifamily information.

2. Research methods

DEQ conducted the following studies in Table 1 to get a baseline understanding of conditions around multi-tenant recycling opportunities.

Table 1: Research conducted by DEQ staff

Study	Methods
Commercial Multi-Tenant Property Managers Surveys	Electronic survey of commercial property managers for perceptions and experience about multi-tenant recycling
Garbage and Recycling Collection Service Provider Interviews	Phone and in-person interview of collection service providers for perceptions and experience with multi-tenant recycling
Local Government Interviews	Phone interview of city and county staff for perceptions and experience with multi-tenant recycling as well as review of reports and city administrative documents
Multifamily Program Interviews	Phone interview of multifamily programs in the United States and Canada for perceptions and experience with multifamily recycling

Study	Methods
Multifamily Property Collection Area Survey	In-person survey of multifamily properties for conditions in and around garbage and recycling collection areas
Multifamily Property Manager Interviews	Phone interview of multifamily property management staff for perceptions and experience with multifamily recycling
Multifamily Tenant Group Interviews	In-person, group interview of multifamily tenants for perceptions and experience with recycling
Multi-Tenant Recycling Literature Review	Review of articles, studies and literature about multi-tenant recycling
Oregon Business Tenant and Multifamily Property Profile	Review of property and employment records, online review of properties, phone interviews with businesses and calculations of projected growth for affected cities, counties, multifamily properties and businesses
Oregon Multi-Tenant Statutes, Rules and Guiding Documents	Review of online laws, rules and policy documents for relevant policy around multi-tenant recycling

Each study included information that falls under one or more elements identified for multi-tenant recycling programs including behavior, collection systems or policies.

Metro, the regional government in the Portland area and solid waste planning authority for Clackamas, Multnomah and Washington counties, also conducted a similar analysis of multifamily recycling between 2016 and 2017. The Metro study included:

- Materials collection service levels
- Collection service provider truck ride-alongs
- Materials characterization study
- Multifamily program interviews
- Multifamily tenant focus groups and interviews

Where possible, DEQ looked to incorporate but not duplicate efforts.

2.1 Sampling methods

In order to ensure representation from around the state, DEQ selected 15 city samples using census data from the 2011-2015 five-year American Community Survey and Portland State University’s Population Research Center’s 2016 estimates. The ACS estimates the number of units of multifamily housing for each city. PSU provides an annual list of cities and their projected populations. Cities over 4,000, but not within the MSD, were selected from the 2016 PSU list and combined with the ACS estimates and then ordered by the number of multifamily units. Unit-counts for less than five units, mobile homes, boats, recreational vehicles and vans were excluded as it is not guaranteed they share collection services. Cities in the Metro area were excluded from the sample due to the Metro regional governments having conducted similar research in 2016 and 2017. Due to their larger size, two cities were selected more than once — Eugene was selected three times and Salem twice. In order to more accurately reflect rural areas of the state, two additional rural cities were added — Pendleton and Tillamook. In the end, there were 14 individual cities selected for a total of 17 city samples — see Appendix A.

Results from city sampling were used as the basis of samples for several reports including:

- Garbage and Recycling Collection Service Provider Interviews
- Local Government Interviews
- Multifamily Property Collection Area Survey
- Multifamily Property Manager Interviews

3. Findings

The findings of each study are presented in individual reports. Select findings from each report are shared in this executive report. Where possible, select results from Metro’s report are incorporated or presented separately.

3.1 Multi-tenant properties defined

Multi-tenant recycling occurs where recycling collection services are arranged through one customer — usually an owner or manager of a property with multiple units — and services are passed onto the tenant. The tenant is not the direct customer of record from the collection service provider perspective, and so the tenants rarely have influence on the level of collection service and usually do not pay for services directly. Similarly, tenants rarely see direct benefits if they increase recycling and reduce garbage generation. Multi-tenant recycling includes both tenants of residential properties (multifamily), tenants of commercial properties (multi-commercial) and tenants of both types together on one property (mixed use). Where possible, findings will be presented as either multifamily (residential), multi-commercial or business tenants (commercial), or multi-tenant (both).

Multi-tenant recycling programs usually share collection receptacles placed in common collection areas. Some business tenants may be provided individual collection equipment due to size, layout of the property, and type and amounts of discard materials generated.

DEQ defines multifamily when part of an option program element cities elect as part of providing the opportunity to recycle, as properties that have five or more housing units (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). However, shared recycling collection services are sometimes also provided to individual units that are part of smaller complexes or larger communities, such as trailer parks. Some row houses and other properties with five or more dwellings can also have individual accounts and service similar to single-family dwellings. Some cities have different definitions for multifamily such as two or more units in Corvallis.

Multifamily households are typically fewer people per household than single-family households (U.S. EPA 2001). As a result, they generate less solid waste overall, and also less recycling than single-family households (U.S. EPA 2001).

Multi-commercial recycling has not been previously defined. There is very little research or information that is specific to multi-tenant commercial properties and business tenants (Oregon DEQ 2018, Multi-Tenant Literature Review). This is an area that is as complex as multifamily recycling and produces more solid waste than multifamily (Metro 2008). Different types of businesses might require different levels of service and information specific to the solid waste streams they produce in high volumes. While restaurants will produce large quantities of compostable waste, a copy shop might generate predominantly high-grade office paper.

Commercial recycling programs affect most businesses with the exception of manufacturers and home-based businesses (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents).

3.2 Improving multi-tenant recycling opportunities

3.2.1 DEQ’s authority

With the passage of Senate Bill 263, the Oregon Legislature called for DEQ to report in 2019 on efforts to support and implement multi-tenant recycling programs, the cost of implementing the programs and efforts to reduce contamination in multi-tenant recycling programs (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents).

To support state policy, DEQ and the EQC can conduct research and demonstration projects, assist with planning and promote partnerships where necessary (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents).

Where necessary, in conjunction with the EQC and following an established administrative procedure, DEQ can propose reasonable administrative rules that support statutes and policy (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). If rules are needed, DEQ will work with stakeholders to develop them.

3.2.2 Oregon’s guiding policy for materials management

Oregon’s guiding plan for managing solid waste (garbage) and recycling and preventing waste is called “Materials Management in Oregon — 2050 Vision and Framework for Action.” The Vision was adopted by Oregon’s Environmental Quality Commission in accordance with state law (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). The plan defined a vision that in 2050 all Oregonians are producing and using materials responsibly, while conserving resources, protecting the environment and living well. The Vision defines a new focus for DEQ to take into account the full impacts of materials throughout their life cycle — from raw material extraction to recycling and disposal — and try to reduce them. The Vision is possible with a combination of a solid foundation with goals and outcomes, useful policies and regulations, effective collaboration and partnerships, and supporting education and information.

One of the desired outcomes of the Vision is that producers and consumers of materials discard materials in a way that directs them to their next highest and best use (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). A large majority of products, materials, wasted food and yard trimmings should be captured for reuse, recycling or reprocessing with few materials being disposed of in landfills or being incinerated.

The Vision also calls for communities of individuals living high-quality lives with rich social and community relations that support low levels of acquiring new materials goods (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Community membership is very important in this area. Activities that are highlighted include collaboration, sharing, repair and reuse. These activities become the new norm.

3.2.3 Providing the opportunity to recycle

The Oregon Legislature creates statutes (laws) that guide state materials management policy (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Since 1983, the state has directed DEQ to ensure that every person in Oregon has the opportunity to recycle, either through collection systems, drop-off opportunities or both. To support state policy, DEQ and the Environmental Quality Commission prioritize materials management methods, provide local governments the authority to establish collection programs, conduct research or demonstration projects, and more.

The opportunity to recycle is defined in statute and rule. Recycling collection service must be provided to all “customers” who receive garbage collection service (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Cities and counties affected must ensure that at least monthly recycling collection service is provided. Education must also be conducted to notify everyone of this opportunity and encourage participation.

With the passage of the 2015 Senate Bill 263, the definition of “customer” changed to include both the direct customer — property management in the case of multi-tenant properties — and the residential and commercial tenants of multi-tenant properties (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Prior to this legislation, tenants did not have direct control over their collection service and did not necessarily have access to recycling collection service unless their property management decided to provide it.

As part of the opportunity to recycle requirements, local governments must choose from among 13 program elements (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). The number of elements varies by the size of the city and distance from the Portland area. These elements include a multifamily recycling program. Cities that have elected to offer multifamily recycling and are approved by DEQ have already put in place a structure where residential tenants of multi-tenant properties should be receiving the opportunity to recycle. There are also several commercial recycling program elements to include voluntary recycling collection service and wasted food collection. Soon, all affected cities will be required to provide multifamily recycling programs. Additionally, cities will at least need to have a partial commercial recycling program to cover commercial tenants. Another program element referred to as “expanded education and promotion” increases the

requirements under the other program elements. Cities and counties submit a report to DEQ on the status of their recycling programs each year to DEQ for review and approval.

Local jurisdictions have the option to implement an alternative program as described in section 3.6.12 Alternative programs.

3.3 Affected parties

3.3.1 The importance of tenants

Multi-tenant properties in Oregon and around the United States, both in the residential and commercial sector, have seen a rapid growth in numbers (Strabic 2016) (Metro 2010).

The multi-tenant sector is being prioritized because it has not received the same services and opportunities to recycle as single-family dwellings or businesses with individual collection service. Forty-three percent of households in the United States live in complexes of five or more dwellings (National Multifamily Housing Council 2017). Four percent live in mobile homes. Twelve percent of Oregon’s population in 2016 lived in multifamily housing of five or more units (United States Census Bureau 2016). Twenty-six percent lived in housing that had more than one unit, mobile homes, boats, recreational vehicles, vans, etc. If recycling was made available to all of these housing units, at least 847,000 additional tons of materials could be diverted each year (United States Environmental Protection Agency 2001).

A 2005 solid waste composition study conducted in the Portland-Metro area found that 10 percent of the solid waste generated was generated by the multifamily sector, and 62 percent was generated by the commercial sector (Metro 2008). From the solid waste composition data, it was also found that an additional 739,449 tons of material — 59 percent of the solid waste disposed that year — could have been recycled in the region annually by all existing programs or facilities. Providing more robust multi-tenant recycling services is both an opportunity to significantly increase recycling rates in the state of Oregon in order to help achieve the Vision and — since multifamily dwellings house a higher percentage of lower-income residents and minority groups — a chance to make the opportunity to recycle more equitable in an underserved portion of the population (National Multifamily Housing Council 2017).

3.3.2 Cities and counties

In Oregon, cities and counties are primarily responsible for planning and implementing state policy including providing the opportunity to recycle (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). They set up and administer local garbage and recycling collection programs through a system of franchised or licensed garbage and recycling collection service providers and other entities. DEQ organizes and manages the state recycling opportunities by “wasteshed” which is usually by county boundary. Cities and counties may delegate many aspects of providing the opportunity to recycle to collection service providers or other designees. Local governments can then also enforce violations of that system. Cities take care of areas within the city limits and counties take care of all areas outside those limits including urban growth boundaries. Requirements for within city limits are extended into the UGBs. What is required in the city is also required within the UGB.

DEQ found there will be 89 cities and 29 counties affected by the new multi-tenant provisions in 2022 (Oregon DEQ 2018, Oregon Multi-Tenant Business and Multifamily Property Profile) — see Appendix B. DEQ projects there will be 94 cities by 2030.

3.3.2.1 Multifamily properties

DEQ projects there will be approximately 16,089 multifamily properties with five or more units in 2022 and 17,565 properties in 2030, compared to 14,896 estimated for 2016 (Oregon DEQ 2018, Oregon Business Tenant and Multifamily Property Profile). DEQ did not estimate the number of properties with fewer than five tenants that share collection service.

3.3.2.2 Businesses tenants

DEQ estimates there will be 30,442 business tenants by 2022 and 33,286 in 2030, compared to 28,145 estimated business tenants in 2016 (Oregon DEQ 2018, Oregon Business Tenant and Multifamily Property Profile).

3.4 Recycling behavior

Research identified several strategies that might improve recycling behavior at multi-tenant properties including providing periodic information to tenants using tailored messages, increasing the convenience of recycling and providing feedback to property managers and tenants (Oregon DEQ 2018, Multi-Tenant Literature Review).

3.4.1 Tenant participation

Good recycling behavior was not widespread or consistent, according to the interviewed tenants, due to a variety of factors (Oregon DEQ 2018, Multifamily Tenant Group Interviews). The overall tone of all responses from tenants interviewed about recycling or garbage at respective properties was negative. Tenants had health and safety concerns, noted improper disposal by other tenants, and commented on issues with the maintenance and capacity of the collection area.

3.4.2 Role of children

Children are often the individuals who go to the collection areas to dispose of garbage and recycling (Oregon DEQ 2018, Multifamily Tenant Group Interviews) (Metro 2017). This creates unique challenges for using the system, including potentially not being able to reach receptacles, read signs or understand how to properly recycle, as well as possible risks in the collection areas from bulky waste and hazardous materials.

3.4.3 Safety and security

Safety concerns were common among interviewed tenants (Oregon DEQ 2018, Multifamily Tenant Group Interviews) (Metro 2017). Interviewed tenants felt unable to easily and safely use garbage and recycling services at their respective property. Tenants expressed that changes to the collection area could improve safety and security including locking the collection area and adding lights.

DEQ only observed a fraction of multifamily collection areas with security cameras (Oregon DEQ 2018, Multifamily Property Collection Area Survey). Three-quarters of properties had some lighting in or around the collection areas. Only a quarter had direct lighting.

3.4.4 Convenience of using recycling

Multifamily recycling programs are almost always less convenient than single-family recycling programs, and it follows that multi-tenant recycling programs also have lower recycling rates than single-family recycling programs (Oregon DEQ 2018, Multi-Tenant Literature Review). It is possible, as recycling programs become more widespread and even commonplace, the degree of personal environmental consciousness is not as important as convenience. Even people with very low concern for the environment will recycle if it is convenient enough. The more convenient recycling is, the more likely people are to participate. A majority of local jurisdictions

“Maybe make the garbage a little shorter so kids can get the garbage in there, because a lot of people send little ones out there. I don't know if it's possible, a step stool or something. A lot of little kids can barely reach it and it ends up on them.”

— Multifamily tenant

“...it's black as pitch out there. There's no light whatsoever and the trees block what streetlights we have. So I'm literally feeling along with my foot.” —

Multifamily tenant

interviewed in Oregon had some sort of convenience requirement as part of their administrative codes (Oregon DEQ 2018, Local Government Interviews).

The time it takes to perform a task is one of the functions of convenience. It takes 38 seconds, on average, to walk to the closest collection area from a multifamily dwelling (Oregon DEQ 2018, Multifamily Property Collection Area Survey). The average walking speed is 4.6 feet per second, so the average distance traveled is approximately 173 feet. Compared to what could be a typical two-car single-family driveway, that is over three times as long. In most cases, this also included a change in floors. Elevators were only available at a small percent of properties. Taking out garbage and recycling in a multifamily setting is less convenient than single-family.

3.4.4.1 Collocation of garbage and recycling

If a tenant has to walk further to take out the recycling than the garbage, it is inherently less convenient. Over three-quarters of surveyed multifamily properties locate the garbage and recycling receptacles together in the same collection area (Oregon DEQ 2018, Multifamily Property Collection Area Survey). When they were not collocated, it took an additional 17 seconds to walk to the recycling collection area.

3.4.4.2 Access to receptacles

Receptacles cannot be used if they cannot be reached due to arrangement or blocking materials. On average, most of the multifamily garbage, mixed recycling, cardboard and glass receptacles' openings were not blocked (Oregon DEQ 2018, Multifamily Property Collection Area Survey). The least accessible was glass recycling at an average of 27 inches available.

3.4.4.3 Uncontained materials

A majority of multifamily collection areas surveyed had some uncontained materials in and around the collection area (Oregon DEQ 2018, Multifamily Property Collection Area Survey). Uncontained materials were reported as an important obstacle to residents using collection areas (Metro 2017). The most common material was garbage. Uncontained glass was found at five percent of multifamily properties. Bulky waste was another type of material that could potentially block access — see section 3.5.8 Bulky waste.

3.4.5 Education and outreach

Educating property owners, property managers, and commercial and residential tenants about how and where to recycle, and what the benefits are, is part of most multi-tenant recycling programs (Oregon DEQ 2018, Multi-Tenant Literature Review). A majority of local jurisdictions interviewed felt education and outreach could be improved (Oregon DEQ 2018, Local Government Interviews). Multifamily tenants expressed that they would like additional training or information on recycling (Oregon DEQ 2018, Multifamily Tenant Group Interviews) (Metro 2017). Most garbage and recycling collection service providers interviewed said they provided education materials to the property manager to be passed on to tenants (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews).

“...teach the community... dumb it down to kindergarten, pictures and colors. This goes here and that goes there...” — Multifamily tenant

Nearly all cities required to provide the opportunity to recycle, were approved as offering the expanded education and promotion program element in 2015 — see Appendix C. For 2022, cities conducting expanded education and promotion will be expected to educate all customers, including tenants, of their opportunity each year to include what to recycle, how to prepare it, why it is important and how to reduce contamination (Oregon DEQ 2018, Local Government Interviews). Additionally, customers will need to receive information at least four times a year with what materials are collected.

Nearly three-quarters of cities and counties interviewed pass on education requirements on to their collection service providers (Oregon DEQ 2018, Local Government Interviews). However, less than half of the cities or counties had education and outreach standards in their franchise or administrative codes.

3.4.6 Getting information to tenants

Interviewed garbage and recycling collection service providers said an important challenge to providing recycling service was getting hauler-provided communication passed on to tenants (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). It was difficult for collectors to not have a direct line of communication to tenants. They also said it is challenging with both turnover of property managers and turnover of residents. Metro reported they found over half of residents may be new from year to year (Metro 2017).

3.4.6.1 Information at lease signing

Many multifamily recycling “best practices” reports recommend providing new tenants with recycling packets containing all the necessary information (Oregon DEQ 2018, Multi-Tenant Literature Review). Tenants who were interviewed by DEQ and recycled said they received some training on recycling from somewhere other than their property manager such as from family members or other informal sources (Oregon DEQ 2018, Multifamily Tenant Group Interviews). Most tenants interviewed were interested in receiving more information including improved signage, posted guidelines or other types of information. Most property management staff interviewed said they passed information to tenants at the time the lease was signed, either in person or with printed materials (Oregon DEQ 2018, Multifamily Property Manager Interviews) (Oregon DEQ 2018, Commercial Multi-Tenant Property Manager Survey).

3.4.7 Tailored messages for the audience

Outreach efforts to residents should consider that different populations have different structural or psychological barriers to recycling (Oregon DEQ 2018, Multi-Tenant Literature Review). There are also cultural and socioeconomic factors that influence recycling behavior. Messages that are tailored to either residential or commercial tenants, rather than using general outreach messages, have been shown to be significantly more effective. The issues and conditions each of these groups face are different than those of other residents or businesses. They are likely sufficiently different from each other to warrant some focused attention. Language barriers may prevent would-be recyclers from understanding outreach materials and fully participating in the recycling program — see section 3.4.10.6 Other languages.

3.4.8 Using different media to deliver messages

It is best to combine several types of media communication and outreach efforts (Oregon DEQ 2018, Multi-Tenant Literature Review). Those cities conducting expanded education and promotion are required to use a variety of formats to educate customers about what is collected as well as using community and media events to promote recycling and reduce contamination (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents).

3.4.9 Inclusive messaging

It is important to support a positive attitude around recycling (Oregon DEQ 2018, Multi-Tenant Literature Review). Using inclusive messaging, such as “our building recycles” to create a social norm and a spirit of community, could help create a positive attitude toward recycling. Those cities who are conducting expanded education and promotion as part of providing the opportunity to recycle are required to tailor messages to various types of businesses and to consider their unique needs when crafting messages (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents).

3.4.9.1 Printed materials

Printed materials are the most common outreach tools used to promote recycling (Oregon DEQ 2018, Multi-Tenant Literature Review). About a third of multifamily property managers who provided information at the beginning of the lease, shared printed information (Oregon DEQ 2018, Multifamily Property Manager Interviews). Of the property managers that share information with their tenants on an ongoing basis, most used printed materials.

3.4.9.2 Face-to-face interactions

If there are resources available for door-to-door canvassing, they are likely more effective than just sharing printed materials (Oregon DEQ 2018, Multi-Tenant Literature Review). The best approach seems to be to combine face-to-face outreach with other methods. Door-to-door canvassing is difficult without the property owners' permission.

3.4.10 Signage and other visual cues

The majority of multi-tenant recycling programs agree that clear signage for receptacles and collection areas are important (Oregon DEQ 2018, Multi-Tenant Literature Review). Basic signage includes directional signage, receptacle decals, color-coding of receptacles, instructional signage and illegal dumping warnings. All of the garbage and recycling collection service providers interviewed said they provided decals for recycling collection receptacles, though only about a half provided them for garbage receptacles. Less than a quarter said they provided collection area signs (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews).

3.4.10.1 Directional signs

Directional signage throughout the property indicating where collection areas are located is part of the basic signage that can be provided to help encourage participation in recycling (Oregon DEQ 2018, Multi-Tenant Literature Review). Turnover of residents was identified as an issue among collection service providers and by Metro (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews) (Metro 2017). Directional signage serves to help orient new users and reinforce behaviors. Virtually none of the multifamily properties surveyed had directional signage (Oregon DEQ 2018, Multifamily Property Collection Area Survey).

3.4.10.2 Differentiating material types with color

Using visual prompts, like color, can increase recycling rates (Oregon DEQ 2018, Multi-Tenant Literature Review). Images and distinctive color coding in the design of the outreach materials are key features that allow residents to quickly distinguish between correct and incorrect recycling practices. The vast majority of collection service providers reported they use receptacle colors to differentiate material types (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). They identified blue or red as the most common color for recycling receptacles and a different color for garbage. Just over half of multifamily properties outside the Portland-Metro area had mixed recycling and garbage receptacles that were different colors (Oregon DEQ 2018, Multifamily Property Collection Area Survey). DEQ researchers found the majority of multifamily properties had blue mixed recycling receptacles. Blue was also the most predominate color for garbage receptacles and cardboard receptacles. Within the Portland-Metro area, colors were not reported to be used consistently and were said to be counterproductive to identifying which receptacles were for which materials type (Metro 2017).

Receptacle lids were often different colors than the receptacles (Oregon DEQ 2018, Multifamily Property Collection Area Survey). It is assumed to be less expensive to change the lid than change the whole receptacle. Nearly three-quarters of garbage and mixed recycling receptacle lids were different colors. Black was the most common color of garbage receptacle lids, while blue was the most common for recycling receptacle lids.

3.4.10.3 Collection area signs

Basic signage that could encourage participation in recycling includes signs in the collection area that help reinforce which receptacles are used for which type of material (Oregon DEQ 2018, Multi-Tenant Literature Review). Signs are generally a larger format and are posted near, above or behind a group of receptacles. They might also reinforce what is accepted or not accepted with images and other languages. In general, collection area signs are rarely used at multifamily properties surveyed (Oregon DEQ 2018, Multifamily Property Collection Area Survey).

3.4.10.4 Decals and labels

To identify which receptacles were to be used for what materials, garbage and recycling collection service providers provided recycling decals for most receptacles and garbage decals in a majority of cases (Oregon DEQ

2018, Garbage and Recycling Collection Service Provider Interviews). Nearly all the multifamily mixed recycling receptacles and a majority of glass recycling receptacles surveyed had decals or labels indicating what the receptacle was for (Oregon DEQ 2018, Multifamily Property Collection Area Survey). In the Portland-Metro area, there was an overabundance of decals, sometimes from over a 30-year period, that may actually cause confusion (Metro 2017). Garbage receptacles surveyed by DEQ rarely had any decals or labels indicating what they were for. Metro also found that garbage receptacles rarely had decals or labels.

3.4.10.5 Images

According to collection service providers, half of provided decals and signs contained images (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). However, of the multifamily properties surveyed by DEQ, only a third had signage or decals with images (Oregon DEQ 2018, Multifamily Property Collection Area Survey).

3.4.10.6 Other languages

Half of decal and signs were only in English, according to garbage and recycling collection service providers interviewed (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). This was supported by the multifamily property surveys (Oregon DEQ 2018, Multifamily Property Collection Area Survey). Less than a quarter of signs were in two languages. Nearly 13 percent of Oregon's population identifies as Hispanic (United States Census Bureau 2016).

3.4.11 Reinforcing good recycling behaviors

3.4.11.1 Ongoing education

Reinforcing good recycling behaviors can include receiving general recycling information on an ongoing basis. About half of property managers interviewed said they provided information periodically (Oregon DEQ 2018, Multifamily Property Manager Interviews).

3.4.11.2 Incentives

Incentive or reward programs use monetary gains to improve participation in multi-tenant recycling programs — including cash, coupons or other prizes (Oregon DEQ 2018, Multi-Tenant Literature Review). The promise of rewards has been shown to increase recycling rates, however, the effects of incentives are often short-lived. Furthermore, the cost of the program may ultimately outweigh the economic benefits of recycling. Despite these challenges, some communities have used incentives to increase recycling rates and become high-recovery multi-tenant recycling programs.

3.4.11.3 Providing feedback

Providing feedback to property managers and tenants of multifamily recycling programs has been shown to be both effective and more cost-efficient than other incentive programs (Oregon DEQ 2018, Multi-Tenant Literature Review). Feedback can take the form of individual feedback or group feedback including positive feedback and constructive feedback. An example could be messaging around reducing items that do not belong in the recycling (contamination).

3.4.11.4 Contamination

Contamination was cited as a problem by most garbage and recycling collection providers (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). It was also identified by multifamily property managers as their greatest challenge to offering recycling collection service (Oregon DEQ 2018, Multifamily Property Manager Interviews). Multifamily property managers said contamination of recycling by tenants was a weekly occurrence. Metro also found multifamily properties in the Portland-Metro area to have high levels of contamination in the mixed recycling (Metro 2017). From a thorough study of the composition of multifamily properties in 2016 and 2017, they found nearly a quarter of materials in recycling did not belong. Contamination was cited as the most challenging part of offering recycling collection to commercial tenants as well (Oregon DEQ 2018, Commercial Multi-Tenant Property Manager Survey).

Managing contamination

Collection service providers are not required to collect recycling that has not been prepared properly or contains hazardous material (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Collectors can leave the materials to be cleaned up by the generator — in the case of multi-tenant recycling, the generator is the tenant. In practical terms, it is difficult to identify specific generators that caused contamination. The collector must also leave instructions on how to properly prepare the materials.

To address contamination, garbage and recycling collection service providers said they notify the customer if the contamination is found and leave contaminated recycling to be cleaned up (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). Property managers usually directed the collector to dispose of contaminated recycling as garbage. Most collectors said they provide education or assistance to the customer to reduce contamination.

Otherwise, mixing recycling with garbage is not allowed (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). There do not appear to be any provisions about disposing of contaminated recycling that the generator will not clean up. There also does not appear to be an option of removing recycling opportunities for repeat offenders.

According to multifamily property managers and as observed by DEQ staff who surveyed properties, a little over half of property managers provided information to tenants about materials that do not belong in the recycling including posters or other signage, newsletters or other printed materials (Oregon DEQ 2018, Multifamily Property Manager Interviews) (Oregon DEQ 2018, Multifamily Property Collection Area Survey). Messages were posted on doors, walls, fences and receptacles. Most multi-tenant commercial property managers provide information and special messages to tenants such as flyers, posters, email reminders and more (Oregon DEQ 2018, Commercial Multi-Tenant Property Manager Survey). Multifamily programs interviewed around the United States and Canada used a relatively even mix of methods for dealing with contamination including leaving a tag or note on the receptacle, collecting the contaminated recycling as garbage, or providing follow-up education with residents, property managers or both (Oregon DEQ 2018, Multifamily Program Interviews).

3.4.12 Non-tenant use

Over half of multifamily property managers said that other non-tenants such as transients and scavengers caused problems with collection including contamination of recycling (Oregon DEQ 2018, Multifamily Property Manager Interviews). Problems occurred most often either several times a year or weekly. Over a third of collection service providers also identified non-tenant use as a problem (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). Several service providers put locks on receptacles to later find them cut off.

No one is allowed to remove any recyclable material set out for recycling in the recycling receptacle without the permission of the owner of the receptacle (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Retrieving containers with redemption value appears to be a motivation for non-tenant use of collection areas.

3.4.12.1 Illegal dumping

A small portion of multifamily properties surveyed had signs posted to discourage non-tenants for using the property's collection service (Oregon DEQ 2018, Multifamily Property Collection Area Survey). Signs were posted on doors, walls and fences. Lack of direct lighting might be an issue that contributes to illegal activity — see section 3.4.3 Safety and security.

Nearly three-quarters of collection areas were visible from the adjacent streets.

3.5 Recycling collection systems

3.5.1 Recycling opportunities

There seemed to be difference between multifamily and multi-commercial recycling opportunities.

3.5.1.1 Multifamily opportunities

Overall, two-thirds of multifamily properties surveyed outside the Portland-Metro area had some sort of recycling collection service (Oregon DEQ 2018, Multifamily Property Collection Area Survey) (Oregon DEQ 2018, Local Government Interviews). Only a small percent of multifamily properties in the Portland-Metro area do not have mixed recycling collection service, though over a quarter do not have glass recycling service (Metro 2017). Half of Oregon's 89 cities who are obligated to provide opportunities to recycle have DEQ-approved multifamily programs for 2015 — see Appendix C.

3.5.1.2 Commercial opportunities

All but one of the commercial multi-tenant property managers interviewed offered recycling service to their tenants (Oregon DEQ 2018, Commercial Multi-Tenant Property Manager Survey). Most cities also have approved voluntary commercial recycling programs — see Appendix C. About a quarter have mandatory commercial recycling — all in the Portland-Metro area.

3.5.2 Single-stream compared to dual-stream

There are several ways to organize materials collection programs. In a single-stream system, all recyclables are collected together in a single-compartment truck (Oregon DEQ 2018, Multi-Tenant Literature Review). This system has been described as more efficient for the collection service providers because each collection vehicle can remain on route until the truck is completely full. Over the past fifteen years, an increasing number of communities have shifted to single-stream collection systems. The majority of multifamily programs interviewed in the United States and Canada had single-stream recycling collection that included glass (Oregon DEQ 2018, Multifamily Program Interviews).

Some argue that this widespread adoption of single-stream systems has largely been due to the cost savings it affords collection service providers, and not because of improvements in recycling rates or benefits to the recycled material market. For example, in a 2004 report on paper mills, it was found that, with the growth of single-stream collection, paper manufacturers saw their costs climb due to contaminated recycled paper sources. Furthermore, findings showed a strong correlation between using recycled-paper content and increased production costs, which presented an economic disincentive for the use of recycled content.

A dual-stream system is also called a source-separated system. It generally describes a recycling collection system where the fiber grades and recyclable containers are collected separately. Depending on the region, it might also signify that only glass is collected separately from the remaining recyclables. Source separation usually produces a higher quality and more valuable stream of recovered materials. It does take more effort for the collection service provider to collect separated sources, but it also costs less to process dual-stream collected recyclables — less contamination usually occurs in this type of collection system.

It has been shown that the more materials are collected separately (not single-stream), the higher the recycling rate and possibly the lower the contamination rate (Oregon DEQ 2018, Multi-Tenant Literature Review).

Local governments work with their collection providers to determine how recycling is collected, whether single-stream, dual or other (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Just over a third of multifamily properties surveyed had mixed recycling and separate glass recycling collection service (Oregon DEQ 2018, Multifamily Property Collection Area Survey). Cardboard was collected separately as well, though less frequently. Single-stream recycling including glass was only found at eight percent of multifamily properties.

3.5.3 Collection service levels

Providing sufficient capacity for the garbage and recycling generated by a property is an important collection system attribute (Oregon DEQ 2018, Multi-Tenant Literature Review). Adequate collection service is provided with a combination of receptacle volume and frequency of collection. If the volume of receptacles, frequency of collection or both are inadequate, tenants would experience full or overflowing receptacles on a regular basis. If

garbage collection service is inadequate, additional space available in recycling receptacles can sometimes be used for additional storage of garbage as well — causing recycling contamination issues.

Over half of local jurisdictions have some sort of specification for collection service levels in administrative code (Oregon DEQ 2018, Local Government Interviews).

Interviewed tenants felt that their collection area had issues due to inadequate capacity or collection frequency (Oregon DEQ 2018, Multifamily Tenant Group Interviews). Participants in the Metro study perceived enclosures as unsafe, that non-tenant use was an issue, that there were capacity issues of receptacles and other similar issues (Metro 2017).

In contrast, most multi-tenant property managers felt both their garbage and recycling collection service was adequate. For both groups, however, satisfaction in recycling service was less than garbage, especially for multi-tenant commercial property managers (Oregon DEQ 2018, Multifamily Property Manager Interviews) (Oregon DEQ 2018, Commercial Multi-Tenant Property Manager Surveys).

The median garbage collection service level provided to multifamily properties in Oregon — including the Portland-Metro area — is 36 gallons for each unit per week (Oregon DEQ 2018, Multifamily Property Collection Area Survey) (Metro 2017). The median mixed recycling service level is 16 gallons. The statewide median service level for glass recycling is three gallons per unit per week. There is only 44 percent as much mixed recycling service provided as there is garbage. In comparison, single-family households in the Portland-Metro area receive more service than multifamily households — between 35 and 90 gallons of mixed recycling service each week — see Table 2. Metro determined there was inadequate access to mixed recycling and glass recycling collection service at multifamily properties in the Portland-Metro area as part of their study (Metro 2017).

Table 2: Service volumes and ratios comparing multifamily statewide and single-family households in the Portland area

Type	Multifamily	Single-family
Garbage	36 gal.	17.5-60 gal.
Mixed recycling	16 gal.	35-90 gal.
Glass recycling	3 gal.	3.4-14 gal.
Ratio mixed recycling to garbage	0.44	0.75-3.4

It appeared at the time multifamily properties were surveyed, that the majority of garbage and recycling receptacles provided had space available for more materials (Oregon DEQ 2018, Multifamily Property Collection Area Survey). Twelve percent of garbage receptacles and nine percent of recycling receptacles were full.

If there were additional services needed, the average collection area was found to have 40 unused square feet, not including walkways (Oregon DEQ 2018, Multifamily Property Collection Area Survey).

3.5.4 Materials collected

Oregon defines what should be considered a recyclable material (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). The statutory definition says that it is recyclable if it doesn't cost more to collect and dispose of as garbage. The state also lists a number of materials referred to as “principal recyclable materials” that wastesheds should be recovering as part of their programs within the wasteshed either collected on-route, at a depot or both. The number of PRMs vary by wasteshed. What may be recyclable in one part of the state, may not be in another, due to processing facilities being too far away and therefore too expensive to transport.

What is collected beyond PRMs is determined by local governments (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Most local jurisdictions interviewed reported collecting old newspaper, tin cans, old cardboard and kraft paper, aluminum containers, plastic bottles and tubs, and container glass for both multifamily and commercial recycling programs (Oregon DEQ 2018, Local Government Interviews).

The current optional multifamily recycling program element requires local governments to collect at least four PRMs or what is collected with single-family collection, whichever is less (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents).

Including more materials to be collected can increase a property’s recycling rate (Oregon DEQ 2018, Multi-Tenant Literature Review).

3.5.5 On-site management

Dedicated on-site property management and providing recycling education were identified as keys to supporting successful recycling programs by garbage and recycling collection providers interviewed (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). For some property management companies with larger portfolios of properties, one staff could manage multiple properties. DEQ staff found that in some cases, ownership was also out of state and either non-responsive to inquiries or difficult to reach.

3.5.6 In-unit space

Lack of appropriate storage space and receptacles have been cited as significant barriers to recycling by tenants (Oregon DEQ 2018, Multi-Tenant Literature Review) (Oregon DEQ 2018, Multifamily Tenant Group Interviews). Households with adequate interior space for collection were more likely to recycle.

3.5.6.1 Recycling tote bags

Some local governments in the United States and Canada have distributed in-unit recycling receptacles as part of their multifamily programs, though there is little evidence about how helpful they are (Oregon DEQ 2018, Multi-Tenant Literature Review). Nearly a quarter of interviewed garbage and recycling collection service providers offered tote bags to carry recycling from the unit to the collection area (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews).

3.5.6.2 Collection area design

No one specific material collection area arrangement has produced higher recovery rates over another, however convenience and sufficient volume of collection has been shown to have a significant impact on recycling behavior (Oregon DEQ 2018, Multi-Tenant Literature Review).

Collection areas were identified as needing improvement in order to increase efficiency of collection by service providers (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). More than half of the collectors would like to see changes to the size, location and design as a way to help remove barriers to collection.

Perceptions about collection areas by multifamily property managers was mixed. The collection system including collection areas was most often cited as what was working best, including the quantity and distribution of areas, receptacles used, security and signage (Oregon DEQ 2018, Multifamily Property Manager Interviews). At the same time, nearly half of multifamily property managers said they would like to see changes to their collection area including larger receptacles, increased accessibility, including more types of materials collected, and improved security.

The average collection area is 167 square feet (Oregon DEQ 2018, Multifamily Property Collection Area Survey). On average, there were three collection areas for each multifamily property surveyed. The median was one collection area per property. Collection areas served up to 29 units on average and 21 as a median.

Nearly all of the multifamily collection areas surveyed were outside the buildings (Oregon DEQ 2018, Multifamily Property Collection Area Survey). It was equally likely that receptacles were kept outside in the open

“I live in a two-bedroom. It's also very small. And it's difficult to recycle because there's nothing to put it in. We put it in the shopping bags, and that's about it. But sometimes, since I don't have something to put it in, I throw it away.” — Multifamily tenant

with no walls as outside but with walls around them. A small percent of collection areas had receptacles inside a few walls and outside them at the same time.

Driver safety

To improve safety for drivers of collection trucks, collection service providers also identified clean and well-maintained areas as being important, as well as good visibility in and around the areas, and a clear, unobstructed path for the truck to drive up and lift receptacles (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). Parked cars in front of or adjacent to the collection areas were also concerns. Steps to reduce the use of the areas by transients and scavengers were also suggested as ways to improve collector efficiency and safety.

Metro identified driver safety as one of the top priorities identified by collection service providers (Metro 2017). After riding along with drivers, Metro staff observed that maneuvering receptacles was very physically demanding and required a high degree of ingenuity to safely navigate stairs, curbs, parked cars, mud and gravel, slopes, long hallways, locked gates and receptacles, and other obstacles.

3.5.6.3 Receptacle types

High-recovery programs are more likely to use 90-gallon roll carts — similar to those used for individual households — and serve fewer households per set of recycling receptacles (Oregon DEQ 2018, Multi-Tenant Literature Review). A majority of Oregon cities and counties interviewed had some sort of specification for collection equipment in their administrative codes (Oregon DEQ 2018, Local Government Interviews). For multifamily properties surveyed, containers — also known as dumpsters — were used most often for collecting garbage and cardboard (Oregon DEQ 2018, Multifamily Property Collection Area Survey). Roll carts were most commonly used for mixed recycling and glass collection.

Metro determined collection equipment used for multifamily properties in the Portland-Metro area was inconsistent and confusing for users (Metro 2017). Some of this was attributable to the inconsistent use of colors as described in section 3.4.10.2 Differentiating material types with color.

3.5.7 Utility rates and fees

Businesses and individuals alike are driven by economic incentives (Oregon DEQ 2018, Multi-Tenant Literature Review). If cost structures incentivize reducing the total waste generated by a customer and reward increases in recycling rates, the recycling behaviors of customers should begin to respond to these economic drivers.

While there are many different available cost models associated with waste collection services and recycling programs, it must be underscored that customers of multi-tenant recycling programs do not pay for waste disposal directly.

Most modern fee systems are modeled on the pay-as-you-throw or variable-rate approach. A successful variable-rate charges customers in a fair manner in accordance with the amount of waste they actually generate. Communities with variable-rate structures have been associated with significantly higher recovery rates. Variable-rate programs should ideally be based on a two or multi-component waste charge system. A fixed fee charged to each household and a variable fee component is then additionally chargeable for each individual unit of waste set out for collection. Fee differentiation clearly demonstrates to customers that an efficient waste management system comes at a price and it lends a certain amount of transparency into the complexity of waste handling and its staggered-costs system.

An essential element in calculating rates is the cost of disposing a unit of material at a landfill or transfer station. Increasing garbage disposal fees improves the relative economics of recycling compared to disposal. This provides an incentive to reduce the amount of garbage disposed through improving recycling programs or encouraging source reduction.

Local governments work with service providers to establish rates for collection programs (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Cities and counties can include all the net costs for providing the opportunity to recycle and including, but not limited to, collection, handling, processing,

transporting and delivering materials to markets. These rates are then passed on to customers. The cost of offering recycling collection service must not exceed the cost of the same volume of collection service without recycling.

3.5.8 Bulky waste

It is not clear to all parties who is responsible for taking care of waste too large to fit in receptacles such as a couch or bed (Oregon DEQ 2018, Multifamily Tenant Group Interviews). When asking residential tenants, an equal number indicated it was the tenants' responsibility versus the property managers. According to responses captured in the Metro community interviews, bulky waste is largely the responsibility of the tenant (Metro 2017). Many of these respondents expressed that they did not have the means to dispose of these items themselves. Metro determined that bulky waste service for Portland-Metro multifamily properties was inadequately managed (Metro 2017).

Bulky waste was not one of the problems identified by collection service providers interviewed (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). If drivers spotted bulky waste, the vast majority of drivers contacted property managers. A third of collectors use standing agreements with the property managers and take bulky waste automatically for an extra charge. One collector will even remove bulky waste from the unit level.

From the multifamily property-manager-point-of-view, most felt the tenant should arrange for disposing of bulky waste, which usually meant taking it for disposal themselves (Oregon DEQ 2018, Multifamily Property Manager Interviews). Of the nearly quarter of multifamily property managers that took care of bulky waste on behalf of tenants, most would take it for disposal themselves compared to having their collection service provider take it. A majority of multi-tenant commercial property managers said it was the tenants' responsibility to take care of bulky waste (Oregon DEQ 2018, Commercial Multi-Tenant Property Manager Surveys). Most multi-commercial property managers didn't identify bulky waste as a problem.

A majority of multifamily properties had uncontained materials and DEQ found over a quarter of that was bulky waste (Oregon DEQ 2018, Multifamily Property Collection Area Survey). Bulky waste is the second largest category of uncontained materials after garbage.

3.5.9 Technical assistance

In order to help property managers, a third of collection service providers offered additional services, such as waste and recycling composition audits and walk-through assessments of recycling areas (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews).

3.5.10 Improving efficiency

It is preferable to combine multi-tenant collection routes with other types of collection, based on the type of equipment, as this will most often increase route efficiency and reduce carbon emissions (Oregon DEQ 2018, Multi-Tenant Literature Review). It is also more efficient to have a single collection service provider serving an entire mixed-use building. However, tracking multi-tenant recycling tonnage separately from single-family or commercial collection is also a logistical challenge that must be carefully considered — see section 3.6.6 Record keeping and tracking.

“[My mattress] is hanging out at my place. Can't take it outside. I've asked the manager, but she says no, you can't... She says, 'cut it up.' So I had to cut up a perfectly good mattress... a little piece every day!” — Multifamily tenant

3.6 Recycling policies

3.6.1 Goals and measures

Oregon has recovery goals for 2022 through 2024 and 2025 that call for an increase in recovery of discarded materials — at least a 52 percent recovery rate in 2022 and 55 percent in 2025 (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Oregonians recovered 43 percent of materials generated in 2016 — a decrease from the previous year (Oregon DEQ 2017). Increasing recycling in multi-tenant properties will likely be needed to achieve these goals.

Oregon is also developing alternative recovery goals that reduce the overall impact of materials on the environment rather than overall tons of materials recovered (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents).

Results of recycling programs and recovery are required to be reported by cities and counties each year (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Additionally, all collection service providers are required to report recovery including from commercial and multifamily customers.

3.6.2 Program staff time

The amount of staff time that city, county or non-profit programs dedicate to multifamily recycling varies according to those interviewed in the United States and Canada (Oregon DEQ 2018, Multifamily Program Interviews). The majority of programs have at least some staff dedicated to multifamily recycling. The most common response was less than one. Usually, staff have other responsibilities as well. Increase staffing was also the top area identified by those programs as an area for improvement. One of the top weaknesses identified by Oregon cities and counties interviewed, was limited resources including staff time (Oregon DEQ 2018, Local Government Interviews). The average amount of staff working on multifamily recycling or commercial recycling among Oregon cities and counties was nearly zero.

3.6.3 Mandates

The most direct example of inducing increases in recycling participation using formal law is through mandatory provision of multi-tenant programs (Oregon DEQ 2018, Multi-Tenant Literature Review). There are many ways to enact mandates including the existing Senate Bill 263 legislation which focuses on cities and counties. Mandates can include a focus on the generator, the property manager, collection service provider, local materials management planning agency or a combination of these. Of multifamily programs interviewed in the United States and Canada, almost three-quarters required multifamily properties to separate and collect recycling by state law, local law or both (Oregon DEQ 2018, Multifamily Program Interviews).

3.6.4 Administrative codes

The current multifamily program element, which cities can choose as part of providing the opportunity to recycle, includes a requirement that cities must issue some sort of declaration that the city is conducting multifamily recycling (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). This declaration can be included in administrative code, franchise agreement or some other administrative procedure. Half of Oregon's cities have approved multifamily programs and so should have some sort of administrative mechanism to declare multifamily properties should receive recycling collection service — see Appendix C. A majority of local jurisdictions interviewed had some sort of reference to multifamily recycling, though not all had enough to be considered adequate for the multifamily program requirements — see Appendix D.

3.6.5 Franchise and license requirements

A majority of collection service providers interviewed were under a franchise agreement with the local government (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews) (Oregon DEQ 2018, Local Government Interviews). In addition to collection requirements, nearly all conducted planning, education and outreach, and technical assistance on behalf of the city or county. Of the multifamily programs

interviewed in the United States and Canada, about a third relied on the collection service provider to conduct education and outreach and technical assistance (Oregon DEQ 2018, Multifamily Program Interviews).

Some communities have a variety of environmental non-profits or other businesses that are working with or alongside property managers or collection service providers to manage various aspects of education or collection including door-side valet service and maintaining the collection area (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). For those multifamily programs interviewed outside Oregon, about a third worked with consultants or non-profits to provide education and outreach and technical assistance to properties (Oregon DEQ 2018, Multifamily Program Interviews).

3.6.6 Record keeping and reporting

It has clearly been shown that higher recovery rates are associated with multifamily programs that have better recordkeeping practices (Oregon DEQ 2018, Multi-Tenant Literature Review). As with most activities, measuring outcomes is a key element to making progress. Tracking the performance of a program is clearly correlated with achieving a high recovery rate.

DEQ found that collection service providers rarely track multi-tenant accounts separately from other residential or commercial customers (Oregon DEQ 2018, Garbage and Recycling Collection Service Provider Interviews). Multifamily data was only tracked separately by 30 percent of collectors. Multi-commercial collection data was only tracked separately by 10 percent of collectors. Less than half of interviewed local jurisdictions had some sort of reporting requirement in their administrative codes (Oregon DEQ 2018, Local Government Interviews).

A majority of interviewed multifamily programs relied on collection service providers to report data on volume or tonnage of recycling collected (Oregon DEQ 2018, Multifamily Program Interviews). About a third of the programs also conducted material composition studies to assess performance.

3.6.7 Defining multi-tenant

Oregon DEQ defines multifamily as complexes with five or more units (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Multifamily programs interviewed in the United States and Canada defined multifamily differently. All definitions are based on the number of units. The most common definitions were five or more units and more than one unit (Oregon DEQ 2018, Multifamily Program Interviews). Not all cities and counties define multifamily the same as the state.

DEQ staff did not encounter a similar definition of multi-tenant commercial properties as part of this research.

3.6.8 Building guidelines

Cities have increasingly adopted building guidelines or ordinances for new construction or major renovations which include requirements for in-unit storage of recyclables and for communal material collection areas (Oregon DEQ 2018, Multi-Tenant Literature Review). Minimum space requirement ordinances and building design guidelines are tools that can be used by communities to ensure properties are providing adequate material collection areas for their tenants. This type of ordinance typically encourages or requires developers to provide a minimum square footage for storage of recyclables. Some ordinances also reference collection efficiency or safety issues. Over half of local jurisdictions interviewed had some sort of reference to collection enclosures in their building codes (Oregon DEQ 2018, Local Government Interviews).

3.6.9 Landlord and tenant relationship

The Residential Landlord and Tenant Act is another law that influences residential multi-tenant recycling programs (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Currently, if a jurisdiction elects to have a multifamily program, it requires property managers to offer their tenants recycling collection service as well as periodic information on how to use the collection service. There are some multifamily residences that are exempt from the law such as rehabilitation institutions and fraternal or social housing. The act also defines the terms of conditions, fees and service charges, roles and responsibilities of landlords and tenants, and failure to comply with these terms and conditions. Landlords must keep buildings and

grounds free of garbage and provide an adequate number of garbage receptacles. Tenants must dispose of garbage and hazardous waste properly. Both parties have a recourse available to them to terminate the agreement if terms and conditions are not met.

3.6.9.1 Recycling agreements

Requiring recycling as part of the lease was one of the strategies mentioned in the literature (Oregon DEQ 2018, Multi-Tenant Literature Review). Most multifamily property managers interviewed are not using recycling agreements to encourage recycling participation or proper use (Oregon DEQ 2018, Multifamily Property Manager Interviews). None of the multi-tenant commercial property managers surveyed use recycling agreements with their tenants (Oregon DEQ 2018, Commercial Multi-Tenant Property Manager Surveys).

3.6.10 Compliance and enforcement

Compliance with recycling law is monitored most often by conducting inspections according to interviewed multifamily programs in the United States and Canada (Oregon DEQ 2018, Multifamily Program Interviews).

Enforcement can take place at the city or county level, such as enforcing the specifications in a contract or franchise agreement (Oregon DEQ 2018, Multi-Tenant Literature Review). For multifamily programs around the United States and Canada, enforcement consisted of a combination of letters or notices, fines (usually after several notices) or working directly with properties to fix the problem (Oregon DEQ 2018, Multifamily Program Interviews).

3.6.11 Penalties and fees

Enforcement can also take place at the community level (Oregon DEQ 2018, Multi-Tenant Literature Review). Communities in the high-recovery category report more frequent use of notices, fines or sanctions against complexes which violate the regulations. Over half of multifamily property managers used some sort of penalty for improper disposal of garbage or recycling including warnings, fines or evictions (Oregon DEQ 2018, Multifamily Property Manager Interviews). Only one of the multi-tenant commercial property managers surveyed uses a penalty (Oregon DEQ 2018, Commercial Multi-Tenant Property Manager Surveys).

3.6.12 Alternative programs

Local jurisdictions wishing to have an alternative program may opt to have one, as long as it meets the recovery goals that are required for that watershed (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents).

3.6.12.1 Wasted food recovery

Wasted food recovery is identified as a priority in the Vision and in statute (Oregon DEQ 2018, Oregon Multi-Tenant Statutes, Rules and Guiding Documents). Oregon is supposed to recover 25 percent of wasted food by 2022. This was an area identified by some interviewed local jurisdictions that they wanted to explore (Oregon DEQ 2018, Local Government Interviews). Almost half of United States and Canadian multifamily programs interviewed collect organics (Oregon DEQ 2018, Multifamily Program Interviews). This can include wasted food, yard debris or both. About a quarter of programs identified recovering organics as their next area of expansion.

Two of the multifamily properties surveyed by DEQ in Oregon collected organics (Oregon DEQ 2018, Multifamily Property Collection Area Survey). Eight cities had approved commercial wasted food collection programs in 2015 — see Appendix C.

3.7 Other

3.7.1 Collaboration

Collaboration was a theme that was repeated in several areas. Section 3.5.5 On-site management, highlighted the need for good communication with property management and collectors. The majority of collection service providers interviewed said they regularly work with the city, county or both (Oregon DEQ 2018, Garbage and

Recycling Collection Service Provider Interviews). Multifamily programs in the United States and Canada cited the work they do with partners as the top strength of their programs (Oregon DEQ 2018, Multifamily Program Interviews). Similarly, they also identified the importance of being flexible and creative and utilizing existing resources.

4. Discussion

4.1 Limitations

Available resources limited the scope and depth of research including available staff and DEQ needing to address urgent changes to international recycling markets.

4.1.1 Multi-commercial properties and business tenants

Business tenants and multi-commercial property findings are very limited. It was decided early on by DEQ staff to prioritize multifamily property surveys over multi-commercial properties and conduct property manager interviews. Similarly, there was a good opportunity to conduct multifamily group interviews with tenants, but no comparable opportunity with commercial tenants. Study of the multifamily sector versus the multi-commercial sector is more prevalent in the literature as well. Findings presented here are much more representative of residential tenants and associated stakeholders than business tenants and their stakeholders.

4.1.2 Representative samples

In general, sample sizes were relatively small and therefore not as representative of the whole population. Efforts were made to collect data that could represent the whole population where possible. The multifamily property collection area survey and property manager interviews did not include information from the Portland-Metro area for most of the data points. Conversely, there is not specific multifamily materials composition data outside the Metro area — though presence and absence was observed for the rest of the state. Additionally, some data would be more representative if there were multiple samples over a period of time.

4.2 Conclusion

About a half of Oregon's cities with population over 4,000 and cities in the Metro area and most of Oregon's counties will need to make improvements to recycling collection programs to ensure tenants of multi-tenant properties have access to recycling. Before July 1, 2022, DEQ will work with interested parties to develop and implement improvement options that increase participation in recycling at multi-tenant properties and encourage proper use of recycling. Options should address key elements including recycling behavior, recycling collection systems and recycling policy.

4.3 Recommendations

DEQ recognizes there might not be one specific package of practices that will work to support all multi-tenant recycling opportunities. Due to the nature of the varying demographics of stakeholders, the different character of residential and commercial groups and the diverse layout of multi-tenant properties, each property could be successful with a slightly different set of improvement options. It appears though, that investing resources to address good recycling behavior, recycling systems and policy would benefit most stakeholders to some degree.

Specific recommendations will be developed in conjunction with a stakeholder workgroup in 2018. The workgroup will brainstorm and prioritize improvement options after review of the findings and experience. The findings from this workgroup will be presented to all stakeholders for review in late 2018 and to the Oregon Legislature in early 2019.

References

- Metro. 2017. *Multifamily Recycling 2017 Report*. Accessed Dec. 22, 2017. <https://www.oregonmetro.gov/multifamily-recycling-research>.
- . 2010. *Urban Growth Report 2009-2030 Employment and Residential*. Jan.
- . 2008. *Regional Solid Waste Management Plan 2008-2018 Update*. Accessed Jan. 2018. https://www.oregonmetro.gov/sites/default/files/2017/04/19/Regional_Solid_Waste_Management_Plan_2008-2018.pdf.
- National Multifamily Housing Council. 2017. *Quick Facts: Resident Demographics*. Accessed Jan. 2018. Quick Facts: Resident Demographics.
- Oregon DEQ. 2012. *Materials Management in Oregon — 2050 Vision and Framework for Action*. Accessed Dec. 13, 2017. <http://www.oregon.gov/deq/FilterDocs/MManagementOR.pdf>.
- . 2018. *Multifamily Property Manager Interviews*.
- . 2018. *Multifamily Program Interviews*.
- . 2018. *Commercial Multi-Tenant Property Manager Surveys*.
- . 2018. *Multifamily Property Collection Area Survey*.
- . 2018. *Garbage and Recycling Collection Service Provider Interviews*.
- . 2018. *Multifamily Tenant Group Interviews*.
- . 2018. *Multi-Tenant Literature Review*.
- . 2018. *Oregon Multi-Tenant Statutes, Rules and Guiding Documents*.
- . 2018. *Local Government Interviews*.
- . 2017. *2016 Oregon Material Recovery and Waste Generation Rates Report*. Accessed Jan. 2018. <http://www.oregon.gov/deq/FilterDocs/mmmgwgRep2016.pdf>.
- . 2018. *Oregon Business Tenant and Multifamily Property Profile*.
- Oregon Legislature. 2015. "459A.020 Statewide integrated solid waste management plan; review; revision." *Oregon Revised Statute Chapter 459A — Reuse and Recycling*. https://www.oregonlegislature.gov/bills_laws/ors/ors459A.html.
- Proehl, Risa. 2016. "Population Estimates for Oregon Counties." Portland State University, Population Research Center. Accessed Dec. 15, 2017. <https://www.pdx.edu/prc/population-reports-estimates>.
- Strabic, Marc. 2016. "Multifamily Market Analysis." *Center for Real Estate Quarterly Report*. Vol. 10. no. 1. Winter. Accessed Jan. 2018. <https://www.pdx.edu/sba/sites/www.pdx.edu.sba/files/05%20Strabic%20-%20Multifamily.pdf>.
- United States Census Bureau. 2016. "Race and Hispanic Origin." *QuickFacts*. Accessed Jan. 2018. <https://www.census.gov/quickfacts/fact/table/OR/RHI725216#viewtop>.
- United States Environmental Protection Agency. 2001. *Multifamily Recycling; A National Study*.

Appendix A

Table 3: Sample cities with populations, multifamily units and opportunity to recycle program elements

City	2016 Pop.	2015 Units	2016 Multifamily program status	2016 Commercial program status
Albany	52,540	2,943	Partial	Vol. recycling/Vol. food
Bend	83,500	4,428	Yes	Voluntary recycling/Vol. food
Corvallis	58,240	7,768	Partial	Vol. recycling/Vol. food
Eugene (sample 3 x)	165,885	17,770	Partial	Vol. recycling/Vol. food
Keizer	37,505	2,579	Partial	Vol. recycling/Vol. food
Lebanon	16,435	1,109	Partial	Vol. recycling/Vol. food
Medford	78,500	4,882	Yes	Vol. recycling
Pendleton	16,880	982	None	Vol. recycling
Redmond	27,595	964	Yes	Vol. recycling
Salem (sample 2 x)	162,060	12,757	Partial	Vol. recycling/Vol. food
Sheridan	6,115	351	Partial	Vol. recycling
Springfield	60,140	4,542	Yes	Vol. recycling/Vol. food
Tillamook	4,920	693	None	Vol. recycling
Woodburn	24,795	1,459	Partial	Vol. recycling

Appendix B

Table 4: Cities selected for counting multi-tenant properties and business

City	County
Albany	Linn
Ashland	Jackson
Astoria	Clatsop
Aumsville*	Marion
Baker City	Baker
Beaverton	Washington
Bend	Deschutes
Boardman*	Morrow
Brookings	Curry
Canby	Clackamas

The State of Multi-Tenant Recycling in Oregon

City	County
Central Point	Jackson
Coos Bay	Coos
Coquille*	Coos
Cornelius	Washington
Corvallis	Benton
Cottage Grove	Lane
Creswell	Lane
Dallas	Polk
Damascus	Clackamas
Durham	Washington
Eagle Point	Jackson
Estacada*	Clackamas
Eugene	Lane
Fairview	Multnomah
Florence	Lane
Forest Grove	Washington
Gladstone	Clackamas
Grants Pass	Josephine
Gresham	Multnomah
Happy Valley	Clackamas
Harrisburg*	Linn
Hermiston	Umatilla
Hillsboro	Washington
Hood River	Hood River
Independence	Polk
Johnson City	Clackamas
Junction City	Lane
Keizer	Marion
King City	Washington
Klamath Falls	Klamath
La Grande	Union
Lafayette*	Yamhill
Lake Oswego	Clackamas/Multnomah
Lebanon	Linn
Lincoln City	Lincoln
Madras	Jefferson
Maywood Park	Multnomah
McMinnville	Yamhill
Medford	Jackson
Milton-Freewater	Umatilla
Milwaukie	Clackamas
Molalla	Clackamas
Monmouth	Polk

The State of Multi-Tenant Recycling in Oregon

City	County
Newberg	Yamhill
Newport	Lincoln
North Bend	Coos
Ontario	Malheur
Oregon City	Clackamas
Pendleton	Umatilla
Philomath	Benton
Phoenix	Jackson
Portland	Clackamas/Multnomah/Washington
Prineville	Crook
Redmond	Deschutes
Reedsport	Douglas
Rivergrove	Clackamas
Roseburg	Douglas
Salem	Marion
Salem	Marion/Polk
Sandy	Clackamas
Scappoose	Columbia
Seaside	Clatsop
Sheridan	Yamhill
Sherwood	Washington
Silverton	Marion
Springfield	Lane
St. Helens	Columbia
Stayton	Marion
Sutherlin	Douglas
Sweet Home	Linn/Benton
Talent	Jackson
The Dalles	Wasco
Tigard	Washington
Tillamook	Tillamook
Troutdale	Multnomah
Tualatin	Clackamas/Washington
Umatilla	Umatilla
Veneta	Lane
Warrenton	Clatsop
West Linn	Clackamas
Wilsonville	Washington
Winston	Douglas
Wood Village	Multnomah
Woodburn	Marion/Polk

* Cities projected to achieve 4,000 residents after 2016

Appendix C

Table 5: Cities approved for select opportunity to recycle program elements in 2015

Recycling program elements	Percent	Number	Total
Multifamily	50%	44	88
Voluntary commercial recycling	88%	77	88
Mandatory commercial recycling	24%	21	88
Voluntary commercial food	9%	8	88
Expanded education and outreach	91%	80	88

Appendix D

Table 6: Cities and counties referencing multifamily or commercial recycling in administrative codes

Reference in code	Percent	Number
Multifamily	69%	9
Commercial	54%	7
Total sample	100%	13