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Waste Prevention
and Recycling

Waste Prevention and Recycling

Policies

- WPR-1 Achieve Zero Waste of Resources – to eliminate the disposal of materials with economic value – by 2030 through a combination of efforts in the following order of priority:
 - a. Waste prevention and reuse
 - b. Product stewardship, recycling, and composting
 - c. Beneficial use
- WPR-2 Set achievable goals for reducing waste generation and disposal, and increasing recycling and reuse.
- WPR-3 Enhance, develop, and implement waste prevention and recycling programs that will increase waste diversion from disposal using a combination of tools:
 - a. Infrastructure
 - b. Education and promotion
 - c. Incentives
 - d. Mandates
- WPR-4 Advocate for stewardship in the design and management of manufactured products and greater responsibility for manufacturers and retailers to divert these products from the waste stream.
- WPR-5 Work with regional partners to find the highest value end uses for recycled materials and support market development.
- WPR-6 Strive to ensure that materials diverted from the King County waste stream for recycling or reuse are handled and processed using methods that are protective of human health and the environment.

Waste Prevention and Recycling

Summary of Recommendations

Responsibility		Action	Detailed Discussion
<i>Waste Prevention, Product Stewardship, and Recycling</i>			
1	Cities, county	Lead by example by improving waste prevention and recycling in public-sector operations, facilities, and at sponsored events, as well as through the purchase of environmentally preferable products.	Page 3-5
2	County	Provide regional education and incentive programs to help consumers improve their waste prevention efforts.	Page 3-5
3	County	Provide waste prevention and recycling education programs in schools throughout the county, and help schools and school districts establish, maintain, and improve the programs.	Page 3-5
4	County, in partnership with the Northwest Product Stewardship Council, local businesses, and other stakeholders	Pursue product stewardship strategies through a combination of voluntary and mandatory programs for materials that contain toxic materials or are difficult and expensive to manage, including, but not limited to, paint, carpet, fluorescent bulbs and tubes, mercury thermostats, rechargeable batteries, pharmaceuticals, mattresses, junk mail, and telephone books.	Page 3-8
5	County, in partnership with the Northwest Product Stewardship Council, and other stakeholders	Draft model legislation that sets up a framework for addressing producer responsibility through efforts such as take-back programs.	Page 3-9
6	Cities, county	Monitor the ability to transition away from recycling collection events as enhanced recycling services are provided at renovated transfer stations, as improved bulky item collection becomes available curbside, and as product stewardship programs emerge.	Page 3-13
7	County, in cooperation with cities	Work with food producers, grocers, restaurants, and schools to donate surplus meals and staple food items to local food banks.	Page 3-19

Responsibility	Action	Detailed Discussion	
<i>Waste Prevention, Product Stewardship, and Recycling</i>			
8	County	Provide technical assistance and promote proper deconstruction, building reuse, and reuse of building materials.	Page 3-10, 3-23
9	County	Implement a pilot program to link retailers, warehouses, and other generators of large amounts of plastic wrap with material processors.	Page 3-30
10	County, in cooperation with cities	Promote consumer use of reusable bags at grocery and other retail stores.	Page 3-30
11	County, in cooperation with cities	Partner with area retailers to establish a wide-scale take-back network for used plastic bags, and encourage reuse and recycling of plastic bags.	Page 3-30
12	County, in cooperation with cities	Provide regional and local education and promotion to increase recycling of food scraps and food-soiled paper.	Page 3-31
<i>Green Building</i>			
13	Cities, county	Adopt green building policies that support the design of buildings and structures that have less impact on the environment, are energy efficient, and use recycled materials.	Page 3-10
14	County	Assist cities in developing green building policies and practices; provide financial incentives to encourage green building through Leadership in Energy and Environmental Design (LEED) and Built Green™; provide technical assistance for projects seeking green certification, such as LEED; and promote residential green building programs, such as Built Green™.	Page 3-10
<i>Use of Grant Resources</i>			
15	County	Continue to support the cities' implementation of the plan through the county waste reduction and recycling grant program and allocation of Coordinated Prevention Grant funds from the Washington State Department of Ecology.	Page 3-13
16	County	Work collaboratively with cities and other stakeholders to consider a new competitive grant program that would be available to cities and collection companies to support innovative programs that help meet plan goals.	Page 3-13

Responsibility		Action	Detailed Discussion
<i>Recycling at Transfer Facilities</i>			
17	County	Maximize recycling services at the transfer facilities as new stations are constructed and as space allows at existing facilities. Focus on priority materials: organics, clean wood, scrap metal, and cardboard.	Page 3-21
18	County	Provide financial and other incentives to encourage recycling instead of disposal.	Page 3-22
<i>Management of Construction and Demolition Debris (C&D)</i>			
19	Cities, county	Consider implementing city and county permitting requirements to increase the diversion from disposal of C&D generated at job sites.	Page 3-24
20	County	Clarify the definitions of recycling and beneficial use. Endeavor to establish consistent definitions with the Washington State Department of Ecology, the City of Seattle, and other regional governments.	Page 3-23
<i>Market Development</i>			
21	County	Support the development of markets for recyclable materials through incentives and programs such as LinkUp.	Page 3-28
<i>Data Reporting and Tracking</i>			
22	Cities, county, collection companies	Standardize the sampling methodology and frequency in tonnage reports submitted to the division and the cities by the collection companies.	Page 3-33
23	County	Perform solid waste characterization studies on a periodic basis to support goal development and tracking.	Page 3-35
24	County	Develop a strategy to report waste disposal information by business type.	Page 3-35
25	County	Conduct organics characterization studies on a periodic basis to support goal development and tracking.	Page 3-36
26	County	Conduct C&D waste characterization studies on a periodic basis to support goal development and tracking.	Page 3-36

WASTE PREVENTION AND RECYCLING

In the late 1980s, state law and county code (RCW 70.95 and KCC Title10, respectively) established waste prevention and recycling (WPR) as the preferred method of managing solid waste. In 1989, the state adopted the Waste Not Washington Act, making it a priority to provide curbside recycling services to all residents living in urban areas.

Working together over the last 20 years, both the public and private sectors have taken the region well beyond curbside recycling by creating myriad programs and services that foster the recycling and reuse of materials that might otherwise be thrown away – and more importantly, that prevent waste from being created in the first place.

In the 1980s, residents of King County were throwing away on average nearly 35 pounds of garbage per person per week. Projections indicated that with the growing population and economy in the region, this number would continue to climb steeply.

Rather than responding to this trend by building more solid waste facilities to handle increasing amounts of garbage, the division and its many stakeholders embraced a strategy to reduce disposal through progressively rigorous WPR. Through the efforts of the county and area cities, businesses, and individual citizens, the amount of garbage disposed per resident per week dropped from 35 pounds in the 1980s to 16.7 pounds in 2007 – a reduction of more than half.

This reduction in disposal has extended the life of the Cedar Hills Regional Landfill by more than 10 years – a result that can be attributed solely to the region’s WPR efforts.

Division Helps Consumers Lose Weight in Their Garbage Cans

In June 2008, six Renton families took the Recycle More Neighborhood Challenge to see who could make the biggest reduction in the weight of their garbage. In the first week, each family was visited by the division’s resident Garbologist, Program Manager Tom Watson. First, he weighed each household’s garbage to establish their starting point. Watson then examined the contents of the garbage and gave each family tips on what was present that could have been recycled.

Most of the errant waste was food scraps and food-soiled paper, which could be recycled with the yard waste.

For four consecutive weeks Watson visited each family to conduct a garbage weigh-in and monitor each family’s progress. The average weekly weight loss ranged from 42 to 82 percent. In total, the six families reduced their garbage weight by 290 pounds over the course of the challenge.

As can be seen with this small-scale project, a little bit of effort on the part of a lot of people could make a big difference. The participants reported simple changes that led to their successes – such as setting up several convenient recycling locations in the home and involving the entire family in making recycling a household priority.



Yet even with the increased recycling and waste prevention we've seen over the years, recent waste characterization studies conducted by the division indicate that about 60 percent of all materials disposed in the landfill are resources that could have been recycled or reused. As discussed in this chapter, identifying what these materials are and who generates them can help us determine where future efforts should be focused to achieve ongoing improvements.

Concentrating efforts on a particular class of waste generator (e.g., residential or business) or commodity type can yield measurable results. Four categories of information, discussed in detail herein, can be used to evaluate the current status of our WPR efforts and help us develop strategies that will lead to future improvements:



The division advertises its Recycle More. It's Easy to Do. campaign to reinvigorate recycling in the region.

1. Waste prevention programs achieving results in the region
2. Recycling and disposal rates, as well as waste prevention efforts, by type of waste generator, including:
 - Single-family (up to 4 units) and multi-family residents
 - Non-residential generators, such as businesses, institutions, and government entities
 - Self-haulers, both residents and businesses, who bring materials to division transfer facilities
 - Generators of construction and demolition (C&D) debris
3. Types and quantities of recyclable or reusable commodities that remain in the waste stream, such as food scraps, clean wood, metals, and paper
4. The status of markets for recyclable materials, availability of take-back options for used products, and opportunities to partner with private-sector businesses, national coalitions, and other jurisdictions to effect change

Information from these four categories was used to shape the goals and recommendations presented in this chapter. To set the stage for the chapter, we begin with a description of our regional goals for the future. This discussion is followed by a detailed account of the progress and current status of our WPR efforts. From there we focus on ways to sustain the momentum by looking at additional resource conservation, recycling, and product stewardship opportunities. And finally, we detail the methods used to track our progress, along with ways to improve the data and reporting requirements from various sources.

GOALS FOR THE FUTURE

The goals for WPR set forth in this section were established through extensive discussions with the division's advisory committees – the Solid Waste Advisory Committee (SWAC) and the Metropolitan Solid Waste Management Advisory Committee (MSWMAC). They are countywide goals, intended to improve the

effectiveness of the region's WPR efforts as a whole. The recommendations for implementation presented at the beginning of this chapter were developed to provide general strategies for meeting the goals and to identify the agency(ies) that would lead those efforts. The recommendations are intended to serve as a guideline for the county and the cities. They do not preclude other innovative approaches that may be implemented to achieve our regional goals.

As we consider the goals, it is important to keep in mind that there are factors other than WPR programs and services that can cause increases or decreases in the overall amount of waste generated. For example, the recent economic downturn has resulted in significant, unanticipated reductions in garbage collected, stemming primarily from the drop in consumer spending and business activity in the region. When establishing goals and measuring our success in meeting them, it is important to consider the economy, policy changes, and other factors that may be in play and to adjust the goals as necessary.

Waste Prevention and Recycling Goals

Waste Prevention Goal

By looking at overall waste generation (*tons of material disposed + tons recycled*), we can identify trends in waste prevention activity in the region. A decline in waste generation typically means that the overall amount of materials disposed or recycled, or both, has been reduced.

Waste generation rates to be achieved by 2020

Per Capita – 20.4 pounds/week

This goal addresses residential waste from single- and multi-family homes. The goal of 20.4 pounds/week represents a 15 percent reduction from the rate in 2007 of 24 pounds/week.

Per Employee – 58 pounds/week

This goal addresses waste from the non-residential sector. The goal of 58 pounds/week is the same as the average amount of waste generated in 2007; however, while we expect overall waste generation to remain about the same, we expect the recycling portion to increase and disposal to decrease.

Waste Disposal Goal

Reductions in disposal over time indicate an increase in waste prevention and/or recycling.

Waste disposal rates to be achieved by 2020

Per Capita – 14.2 pounds/week

This goal addresses residential waste from both single- and multi-family homes. The goal of 14.2 pounds/week represents a 15 percent reduction from the disposal rate in 2007 of 16.7 pounds/week. A target of 18.5 pounds/week was set in the 2001 comprehensive solid waste management plan.

Per Employee – 22.9 pounds/week

This goal addresses waste from the non-residential sector. The goal of 22.9 pounds/week is a 15 percent reduction from the disposal rate in 2007 of 26.9 pounds/week. A target of 23.5 pounds/week was set in the 2001 comprehensive solid waste management plan.

Recycling Goal

Recycling will continue to be an important strategy to reduce the disposal of solid waste. The recycling goal combines single-family, multi-family, non-residential, and self-haul recycling activity. It addresses the amount of waste being diverted from disposal at the Cedar Hills Regional Landfill to recycling. It does not include C&D or other wastes, such as car bodies, which are not typically handled through the county system. In 2007, the overall recycling rate for the county was 47 percent.

The goal for this planning period reflects the estimated recycling rate achievable if the recommended strategies in this plan are fully implemented –

Overall recycling rate by 2015: 55 percent

Achieving the 55 percent goal during this planning period would pave the way for implementing additional WPR strategies and setting a higher goal for recycling in the next comprehensive solid waste management plan –

Overall recycling rate by 2020: 70 percent

The role of individual cities will be critical in reaching our countywide WPR goals. The way in which each city contributes to those goals, however, may vary depending on the city's demographic make-up and other factors. For example, a city with a large concentration of apartments and condominiums might focus more efforts on programs for multi-family residents. Communities with primarily single-family homes might focus education and promotion on food scrap recycling for their residents.

Another factor cities may consider is the make-up of their business (or non-residential) sectors. Cities with many restaurants, grocers, or other food-related businesses might look at ways to promote the recycling of food scraps or to partner these businesses with local food banks to donate surplus food to those in need. Similarly, cities with booming construction activity may want to take advantage of markets for the recycling and reuse of

What is Your Recycling Rate? It Depends on What You Count.

Currently, there are no state or national standards for what should be counted in the "recycling rate" for a city or county. As a result, recycling rates reported by various jurisdictions may include different materials. For example, the recycling rate reported by some jurisdictions includes C&D, which can raise a recycling rate based on tons considerably by adding heavy materials such as concrete and asphalt. And some jurisdictions add percentage points to their recycling rate to account for the projected success of their waste prevention efforts.

The division has chosen to calculate King County's recycling rate based on the known amount of materials diverted from disposal at the Cedar Hills Regional Landfill. As such, it does not include materials such as C&D or car bodies that are handled largely by the private sector. Neither does the division include any estimate of waste prevention, primarily because of the lack of measurable data.

The county's recycling rate in 2007, based on the definition above, was 47 percent. If C&D were counted, the rate would be about 60 percent. Adding landclearing debris, car bodies, and other materials would raise the rate to approximately 63 percent.

Given the various methods for calculating the recycling rate, it is important to understand what materials are being included before comparing rates across jurisdictions.

C&D materials. Likewise, the county will consider the make-up of unincorporated areas to focus WPR efforts in those areas.

The county and the cities lead by example to improve WPR in their respective operations, at their facilities, and at sponsored events, for instance:

- Some cities have held their own zero waste events and picnics
- The county and many cities have begun to collect food scraps and food-soiled paper at their offices and associated sites
- The county provides recycling containers at various musical and sporting events held at county-owned venues such as Marymoor Park

The county will continue to play an active role in supporting regional WPR programs. Through programs such as Waste Free Holidays, EcoConsumer, and the Master Recycler Composter, the division continues to provide education and incentives for consumers across the county. The division’s work with area schools is furthering recycling education and supports new and ongoing programs that encourage waste prevention and resource conservation. The division is also working to expand markets for recyclable and reusable materials through programs such as LinkUp, which draws together area businesses, public agencies, and other organizations through seminars, roundtable discussions, demonstrations, online forums, and other events and activities. Ongoing collaboration with the cities and the private-sector collection and processing companies in the region will also continue, with efforts to increase the recycling of food scraps and other materials with market value.

Tools Used to Meet the Recommended Goals

The division and the cities have various tools at their disposal to promote waste prevention and increase recycling. The chart below identifies these tools and cites some of the successes achieved through their use.

Tool	Application	Successes
<p>Infrastructure</p>	<p>Establishing the collection and processing infrastructure is always the first step. It can be accomplished through enhanced curbside collection services, additional recycling options at transfer facilities, and partnerships with private-sector processing facilities and manufacturers/retailers, e.g., to develop take-back programs.</p>	<p>As the division upgrades the transfer system, facilities are being designed with dedicated areas for recyclable materials such as yard waste, clean wood, and scrap metal</p> <p>Nearly all single-family curbside collection customers in the county now have access to collection service for food scraps and food-soiled paper, along with the yard waste</p> <p>Through Washington’s electronics recycling program, electronics manufacturers have developed a statewide network of more than 220 collection locations for recycling televisions, computers, and monitors</p>

Tool	Application	Successes
Education and promotion	Educational programs and targeted advertising play a key role in the initiation of new programs and in sustaining the momentum of existing programs. These efforts can be tailored to specific waste generators or materials.	<p>The division’s GreenTools team provides education, resources, and technical assistance to contractors, project managers, and property owners on how to recycle and manage C&D as a resource rather than a waste</p> <p>Many cities provide assistance to businesses to establish and maintain recycling programs</p>
Incentives	Incentives have proven highly successful in encouraging the use of recycling services and other programs. For example, if a customer generates less garbage by recycling and reducing their wastes, they may need a smaller garbage container, which means a lower charge on their garbage bill. Incentives can also take the form of a new, larger recycling container, or some other give-away item that makes WPR easier.	<p>To encourage WPR, curbside garbage collection fees increase with the size of garbage can that customers subscribe to – creating a “pay as you throw” system</p> <p>Some cities provide kitchen containers and sample compostable bags to encourage residents to recycle their food scraps</p>
Mandates	Mandates that restrict the disposal of specific materials have proven effective in increasing recycling. Mandates can be legislated at the local, state, or federal level, or implemented through city contracts.	<p>To discourage disposal of yard waste, since 1993 its disposal in the curbside garbage container has been prohibited</p> <p>In 1992, the U.S. Environmental Protection Agency banned the disposal of appliances that contain chlorofluorocarbons</p>

The successful diversion of residential yard waste from disposal exemplifies the effective use of all four tools. First, an **infrastructure** was created to make it easy to separate yard waste from garbage. Curbside collection programs were implemented in phases across the county, easy-to-use wheeled collection containers were provided to residents, and private-sector businesses began turning the collected yard waste into compost for building healthy soils. **Promotions** were used to inform residents of the availability of curbside collection as implementation was phased in. **Educational** campaigns were launched to teach citizens how to compost yard waste from their own yards for use as a soil amendment. Because the cost

of collecting yard waste for composting was less than the cost of disposal in the garbage, residents had an *incentive* to subscribe to yard waste collection service. Many cities provided an additional incentive by including yard waste collection as part of their basic package of collection services at the curb. Finally, *mandates* were passed by the cities and the county to prohibit residents from disposing of yard waste in the garbage wherever separate curbside yard waste collection was available.



Yard waste is easily collected alongside the garbage and recyclables at the curb.

STATUS OF REGIONAL WASTE PREVENTION AND RECYCLING EFFORTS

Measuring the results of our WPR efforts is a complex process. Discussions and data often focus on recycling and recycling rates, when in fact waste prevention is the number one priority. While programmatic successes for waste prevention can be assessed qualitatively, it is difficult, if not impossible, to measure directly how much waste is “not created” in terms of tons or percentages. What we can measure more accurately is recycling and disposal activities. Data for these activities are available through division tonnage and transaction records, reports from the curbside collection companies and the Washington State Department of Ecology (Ecology), and the division’s waste characterization studies. Using data on the types and amounts of materials recycled, combined with measures of waste disposed, we can evaluate our success in reaching the goals established with each successive comprehensive solid waste management plan.

The following discussions take a look at the status of our past and current WPR programs and activities, from a qualitative and/or quantitative perspective. This review gives us a clearer picture of how far we have come, what challenges we face, and what can be done to build upon our successes.

Past and Current Regional Waste Prevention and Recycling Efforts

Waste prevention is simple in concept – if you create less waste, you avoid using the resources needed to recycle or dispose of it. The county, the cities, and a host of manufacturers, businesses, and environmental coalitions are implementing promotions and practices to prevent waste through a number of avenues.

Decisions to reduce waste can be made at several critical stages in a product’s life cycle:

- When manufacturers decide what goods to produce, how to produce them, and how to package them
- When consumers decide if and what to purchase
- When consumers adopt ways to use and reuse products more efficiently

While we cannot measure the amount of waste prevented at each stage, we can assess the types and numbers of programs being implemented and determine which efforts appear to be effective. What

follows are brief descriptions of successful regional waste prevention efforts that are currently in progress and are likely to continue:

- The county's EcoConsumer program offers resources and incentives to help citizens balance consuming and conserving.
- The cities and the county promote grasscycling and backyard composting to manage yard waste on site.
- Some cities have distributed reusable shopping bags to residents or issued coupons for free bags that can be redeemed at local retail stores.
- School programs teach waste prevention techniques, such as how to pack a waste free lunch.
- The county's Waste Free Holidays program encourages organizations to offer discounts and incentives to consumers to "give experiences instead of stuff."
- The county is working with architects and other design professionals to incorporate the concept of design for disassembly – a forward-thinking design principle that allows for the easy recovery of products, parts, and materials once a building is disassembled or renovated.
- The county provides technical assistance and resources to those seeking certification through the nationally recognized Leadership in Energy and Environmental Design (LEED) process for construction. LEED offers incentives and points for the reuse of buildings and building materials.
- The cities and the county hold special collection events for reusable household goods, and the county collects reusable household goods, clothing, and building materials at some transfer stations.
- The county and the cities are working with food producers, schools, and restaurants to capture edible foods, which might otherwise be scrapped, for donation to local food banks and other social service agencies.
- The county and other local governments are working with the telephone book industry to reduce the number of books printed and distributed, offering customers the option of online directories in their place.



Product reuse is another way of preventing waste and is accomplished primarily through the private sector. There are numerous charitable organizations that pick up or provide drop-off sites for household items and clothing. Reusable building materials are also collected and resold at several locations in King County.

There has also been major growth in the resale market for items through online classified services, auctions, and exchange programs. The division's Web site features an online materials exchange program for posting household items and reusable building materials for sale or exchange, as well as yard sale events.

Product stewardship is a movement gaining momentum at the state, national, and international levels. It is a management strategy used to encourage the environmentally friendly design of products and to shift the responsibility for managing a product at its end of life from government to product manufacturers.

In 2006, the Washington state legislature led the nation by passing the Electronic Product Recycling Law – E-Cycle Washington (WAC 173-900) – which requires manufacturers of televisions, computers, and monitors to provide recycling services for these products at no cost to residents, small businesses, charities, school districts, and small governments. The program launched on January 1, 2009 with about 35 collection locations across King County. By February 2009, nearly 3.3 million pounds of e-waste was received at take-back locations across the state of Washington. Similar legislation has been drafted by the Northwest Product Stewardship Council (NWPSC) for fluorescent bulbs and tubes and leftover or expired pharmaceutical products.

The division is on the steering committee of the NWPSC and has been participating in the development of product stewardship strategies for additional commodities that contain toxic materials or are difficult and expensive to manage, such as paint, carpet, mercury thermostats, rechargeable batteries, mattresses, junk mail, and telephone books.

In an effort to reduce the number of product-specific bills that would be introduced to the legislature, the NWPSC is drafting model legislation that would set up a framework to 1) establish the process and criteria for selecting products that can be managed under producer-funded take-back programs, 2) establish the process for manufacturers to follow when setting up their product stewardship programs, and 3) identify the role of state government in providing oversight and enforcement of these programs. Establishing a framework to address these issues reduces the need to introduce product-specific legislation each time a new product is identified as a candidate to be managed under a product stewardship program.



A nationwide effort is underway to encourage the telephone book industry to reduce the distribution of unwanted books.

Curbside collection services in the region have flourished over the last two decades, expanding to include a wide array of materials. Curbside recycling began in the early 1990s in King County through the cooperative efforts of the cities, the county, private recycling firms, and the solid waste collection companies. Initial materials collected curbside included plastic bottles and jugs, glass bottles and jars, aluminum cans, tin cans, mixed paper, newspaper, and cardboard. As of 2008, curbside recycling was available to more than 99 percent of residents in the county, and the list of materials collected continues to grow.

Another trend that has increased recycling is the transition to commingled (or single-stream) collection, whereby all the recyclable materials are placed in one large cart for pickup at the curb. Prior to 2001, most residents were required to separate recyclable materials into multiple bins for collection. Over time, however, the material recovery facilities, which sort and process the recyclables for market, have expanded their ability to sort materials on site, allowing the collection companies to transition to commingled recycling. Commingled collection not only makes recycling easier and more convenient for the customer, it is more efficient for the companies that provide the service. (A more detailed discussion is provided in Chapter 4, *Collection and Processing*.)

Collection of organic materials has also been successful in diverting more materials from disposal. In the 1990s, single-family yard waste collection was phased in across the county. Today, curbside yard waste collection is available to all county residents except those on Vashon Island and in the Skykomish and Snoqualmie Pass areas.

In 2001, the division began working with the cities and collection companies to phase in curbside collection of food scraps and food-soiled paper in the yard waste container. Currently, nearly all single-family curbside collection customers have access to food scrap collection, and the number of households using the service is increasing.

C&D – debris from the construction, remodeling, repair, or demolition of buildings, other structures, and roads – was banned from disposal at county facilities in 1993. Since then, the division has contracted with Waste Management, Inc. and Allied Waste to dispose of and recycle these materials. Current contracts with the companies provide monetary incentives to increase their C&D recycling. Materials that can be diverted for recycling or other uses include concrete, asphalt roofing, clean wood, steel and other metals, and gypsum wallboard. With the increase of private-sector recycling facilities in the region, both contractors and homeowners have more options for recycling C&D materials. In 2008, the division published the most recent *King County/Seattle Construction Recycling Directory*, which provides listings for the many companies that handle a variety of C&D materials. The list is kept up to date online.

Waste prevention is also playing a greater role in the diversion of C&D from disposal. The salvage of building materials during deconstruction is becoming increasingly common, markets for the salvaged materials are growing, and the reuse of entire houses by moving them to new sites is gaining popularity and acceptance by permitting agencies. Another growing practice is design for disassembly – a building design process that allows for the easy recovery of products, parts, and materials when a building is disassembled or renovated. The division has teamed with the City of Seattle and the building community to provide resources and technical assistance to help businesses and residents manage C&D from building design to disassembly. The division has also begun holding events to collect reusable building materials at the Shoreline Recycling and Transfer Station; this program will be expanded to other facilities where space allows and there is demand.

Green building programs have been instrumental in promoting C&D recycling and reuse. The division is actively engaging builders, residents, businesses, and governments, including other county agencies, to create and sustain green buildings and developments in the region. The division's GreenTools program supports county agencies, cities, the building community, and the public in designing buildings and structures that have less impact on the environment, are energy efficient, and use recycled materials.



There are more than 20 recycling companies in the region that will pay for source-separated metals.

The services and resources available include:

- Information and technical assistance on managing C&D as a resource rather than a waste for disposal
- Residential green building support through the King County Master Builders Association and the Built Green™ program
- CD-ROM toolkits to help cities in King County create successful green building programs in their jurisdictions
- Assistance on county building projects to achieve the maximum possible green building standards
- Grants to eligible homeowners, builders, and public- and private-sector developers meeting a high level of green building certification

The division also coordinates the countywide Green Building Team, tasked with ensuring that all county construction projects achieve the maximum possible standards of green building, including the application of LEED concepts into all projects. In the U.S. and other countries around the world, LEED certification is the recognized standard for measuring building sustainability. The rating system evaluates buildings in six areas: sustainable site development, water savings, energy efficiency, materials and resources selection, indoor environmental quality, and innovation and design.

County ordinance requires that all county projects seeking LEED certification strive to achieve at least a Gold rating. In cases where LEED certification may not be economically feasible or applicable for a project, such as open-air bus passenger shelters, restroom facilities, pump stations, and conveyance lines, the ordinance requires the completion of a sustainable development scorecard, which indicates what green building strategies are being applied on the project. In accordance with the ordinance, the county has also developed guidelines for the operation and maintenance of existing buildings to incorporate green strategies for water conservation, WPR, green cleaning, and overall improvements in facility operations.

King County is the first local government in the nation to add evaluation of greenhouse gas emissions to the environmental review that construction projects undergo. In addition to incorporating this evaluation into its own projects, the county is providing assistance to developers on the application of this new standard.

The long-term goals of the county's green building program align with the 30-year goals of the state's Green Building Initiative, whereby:

- Green building practices and the demand for green buildings become the norm
- Reuse of buildings and recycling of construction materials are normal business practices
- Buildings and materials are designed for human, economic, and environmental health

Cities are also joining in the adoption of green building strategies, for example:

- Issaquah is developing a multi-family housing project, called zHome, designed to use no more energy than it generates during the course of a year, resulting in a carbon-neutral development.
- Kirkland's Green Building pilot program is offering an incentive for expedited permit processing to encourage sustainable building in the construction of new single-family developments. The

program also offers educational resources, an informative Web site, and seminars on green building topics to help educate builders and the public about the benefits of sustainable building.

- Redmond's Green Building and Green Infrastructure Incentive Program was adopted by their City Council in March 2009. The program encourages developers and homebuilders to incorporate green building techniques into residential developments.
- Shoreline is in the strategic planning process of developing their green building program.



Greenbridge

Collection of recyclables at

division transfer facilities began in the 1980s. It started with the addition of collection containers for the standard curbside recyclables at those facilities that had adequate space. At some facilities, textile and appliance collection was also added. Due to space constraints at most facilities,



The division provides recycling opportunities at the transfer stations, where possible.

Green Building and Equity

The goal of the county's Equity and Social Justice Initiative is for all King County residents to live in communities of opportunity. To reach this goal, all communities must be equipped with the means to provide residents with access to a livable wage, affordable housing, quality education, quality

health care, and safe and vibrant neighborhoods. Green building can play an important role in providing safe, healthy, affordable housing, which has historically not been built to the highest standards.

Greenbridge, a mixed-income community in White Center, is an example of how green building practices can be applied to affordable

homes. Greenbridge is being built on land that until recently held rundown public housing from the World War II era. The old, inefficient barracks-style duplexes are being replaced with sustainably designed and constructed homes that are affordable, energy-efficient, comfortable, and well built. Greenbridge includes a plaza, a community center, social services, public art, trails and parks, and access to public transportation. The community will ultimately consist of 1,000 homes for approximately 3,500 people.

In addition to the Greenbridge project, the King County GreenTools program has provided technical assistance and education for affordable housing projects of all types. This technical assistance includes working directly with affordable housing developers, with nonprofits such as Habitat for Humanity, and with trade associations. Educational efforts include collaborating with the American Institute of Architects, Community Trade and Economic Development, Master Builders Association of King and Snohomish counties, and the U.S. Environmental Protection Agency to deliver training to the building trades on universal design and green building, as well as developing educational materials on green remodeling tips for senior citizens.

however, few other recyclables have been added for collection. With the transfer system renovations in progress (see Chapter 5, *The Solid Waste Transfer System*), facilities are now being designed with ample space for collecting more recyclables and the flexibility to add and change materials as community needs change or markets fluctuate. The newly rebuilt Shoreline Recycling and Transfer Station (formerly the First Northeast Transfer Station) sets the standard for the other planned station renovations, with added space for collecting yard waste, clean wood, scrap metal, and many other materials.

Numerous private-sector facilities have also emerged across the county where residents and businesses can take recyclables and C&D. Over the years, the list of materials that these facilities accept has grown from paper, cans, and bottles to items such as printer cartridges and cellular telephones. To connect residents and businesses with these recycling services, the division's Web site features a drop-down menu called "What do I do with ...?" The menu lists many of the items that customers commonly ask about. Clicking on an item opens a page with the location, details, and contact information for the reuse, recycling, or proper disposal options available for the material or product.

Collaboration between the county and the cities has helped promote common, regionwide goals. In the 1980s, the county and the cities began offering numerous educational, promotional, and technical assistance programs for a diverse audience of community residents, school children, and businesses. Educational programs in area schools have been a useful means to increase awareness of the importance of WPR and provide tips and assistance to implement projects that reduce garbage and increase recycling both in schools and in students' homes.

In addition, the county provides grant funds and technical assistance to cities to help further WPR programs and services within their communities. In 2008, King County distributed \$1 million in grant funds to cities; these funds are supported by the solid waste tipping fee. All cities in the service area are eligible for the funds. The formula for their allocation includes a base amount plus a percentage based on the city's population and employment.

Currently, much of these grant funds are used by the cities to hold recycling collection events in their communities. The cities and the county may be able to phase out these collection events and use the funds in other ways that support WPR in their communities as enhanced recycling services are added at renovated transfer facilities, curbside collection for bulky items becomes more cost effective and widely available, and product stewardship programs begin to offer more options for recycling. The grant monies can be used to support a number of activities, including:

- Encouraging and promoting waste reduction
- Continuing to implement and improve general recycling programs
- Improving opportunities for the collection of specific commodities, such as paper



King County school children learn about recycling and resource conservation.

- Improving opportunities for the collection and/or composting of organic materials
- Increasing the demand for recycled and reused products
- Fostering sustainable development through the promotion of sustainable building principles in construction projects
- Managing solid waste generated by public agencies in a manner that demonstrates leadership
- Broadening resource conservation programs that integrate WPR programs and messages
- Providing product stewardship opportunities

Ecology also supports WPR programs in King County through the Coordinated Prevention Grant program. Funds are allocated within the county based on population. The division uses funds allocated to the unincorporated areas to support WPR efforts such as recycling collection events, yard waste and food scrap recycling, and natural yard care education and promotion. The cities can apply directly to Ecology for a portion of the funds to support their own communities' WPR programs.

The division is considering establishment of a new competitive grant program to fund innovative projects and services that further the WPR goals outlined in this plan. Both the cities and commercial collection companies would be eligible to apply for the funds. The division would work collaboratively with the cities and other stakeholders to develop the details of the grant program. The new grant program would be funded through the solid waste tipping fee, so it would be included in a future solid waste rate.

Environmentally preferable purchasing is a strategy for purchasing products that have a lesser or reduced effect on human health and the environment when compared with competing products that serve the same purpose and fulfill the basic requirements of price, performance, and availability. King County's Environmental Purchasing Policy was adopted in 1989 in response to concerns about diminishing landfill space and the need to create markets for newly collected recyclables. The policy, updated in 1995 and again in 2003, requires all county agencies to, "whenever practicable," purchase environmentally preferable products. A life-cycle analysis is used in the selection of a product, considering how the raw materials are acquired and manufactured, packaged, distributed, maintained, and finally disposed. Pollution prevention and resource efficiency are also considered.

County agencies have turned to a wide range of environmentally preferable products, such as porous concrete that allows water to drain through the sidewalk, and services, such as the use of goats for managing vegetation. Other purchases include remanufactured toner cartridges, re-refined antifreeze and motor-oil, biodiesel fuel, hybrid vehicles, bio-based oils, plastic lumber, compost, and retread tires. In addition to their environmental benefits, many of these products are more economical and perform as well as those they replace.

King County provides technical assistance to cities by sharing contracts, specifications, and procurement strategies. Many cities in the county have implemented environmentally preferable purchasing programs.

Benefits of Waste Prevention and Recycling Efforts

The regional commitment to WPR has many benefits – financial, social, and environmental.

Financial benefits are probably the most immediate for many county residents and businesses. Not only do convenient recycling services provide an alternative to the higher cost of disposal, WPR will provide a long-term significant cost savings for ratepayers by increasing the lifespan of the Cedar Hills Regional Landfill, which is estimated to be a more cost-effective means of disposal than the other disposal alternatives currently available (discussed in Chapter 6, *Landfill Management and Solid Waste Disposal*). After Cedar Hills reaches capacity and closes, minimizing the amount of waste that requires disposal will translate directly into lower fees for King County ratepayers.

The social benefits of WPR can be described in terms of economic growth and job creation. Materials diverted from the landfill for recycling must be sorted, processed, and transported. A study by the National Recycling Coalition, funded in part by the U.S. Environmental Protection Agency, estimates that for every 10,000 tons of material recycled 14 people are employed in recycling plants and transport operations (R.W. Beck 2001); subtracting the 5 employees required to landfill that same amount of material, there is a net gain of 9 jobs. The reuse industry also contributes jobs and social benefits to the region.

The positive environmental benefits of WPR are local and ultimately global. Environmental benefits are focused in two primary areas, both of which have wide-reaching and long-term impacts. First, the release of pollutants emitted during the production and disposal of products is decreased, reducing the potential for harm to human health and the environment. Second, is the savings in energy, and associated carbon emissions, and natural resources, contributing to a healthier planet.

Recycling and Composting: Calculating the Benefits

While the concept of waste prevention – *less consumption = less impact* – may be preferable from an environmental standpoint, we know that people will continue to produce, distribute, buy, and use a wide range of products. The environmental impacts of a product can occur at many stages of the product's life from extraction of the raw materials to production, distribution, and final disposal of any residual waste. A life-cycle analysis allows us to look at the environmental pollution generated at each stage of the product's life – from air, soil, and water pollution to the secondary impacts on human health, habitat, and ecosystem – and enables us to recognize the cost of those impacts.

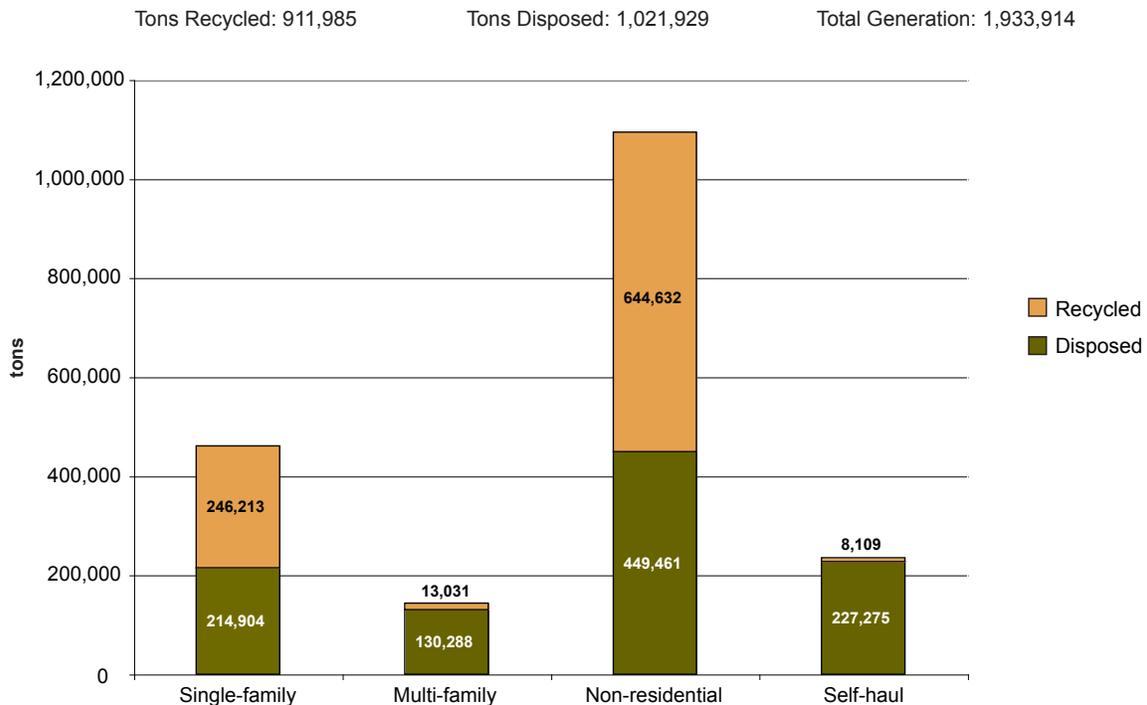
An econometric environmental model developed by Dr. Jeffrey Morris (Morris 2008) performs life-cycle analyses by evaluating areas critical to human health and the environment, including climate change, and then assigns a dollar value to the impact. Dr. Morris' model shows that recycling and composting as much as possible creates fewer environmental impacts than disposal. For example, when the model is applied to the 818,000 tons of recyclable and compostable materials collected in King County in 2007, it calculates a reduction of nearly 950,000 metric tons in greenhouse gas emissions. The model can then calculate a corresponding value for this reduction of more than \$37 million.

Current Data on Regional Waste Generation, Recycling, and Disposal

Figure 3-1 shows the tons of materials recycled and disposed in 2007 by category of waste generator – single-family residents; multi-family residents; non-residential customers such as businesses, institutions,

and government entities; and self-haulers who bring materials directly to the division's transfer stations. More specific information on each generator type (including generators of C&D for recycling and disposal) follows. Because recycling data come from various external sources, data for 2007 are the most complete and up-to-date available and are used for the figures throughout this section; complete data for 2008 will be available in early 2010. Note that the scale on each figure varies.

Figure 3-1. 2007 recycling and disposal by generator type



As discussed earlier, while there has been considerable progress in WPR over the years, there is still room for improvement. As Figure 3-1 illustrates, the non-residential sector provides the greatest opportunity to divert materials from disposal, with nearly 450,000 tons of materials disposed in 2007. While single-family residents are recycling more than one-half of their waste, division studies indicate that a large portion of the remaining materials could be recycled or reused (as discussed in the next section). The multi-family sector generates the least amount of garbage and recycling of all sectors, but also shows a need for improvement in their recycling efforts.

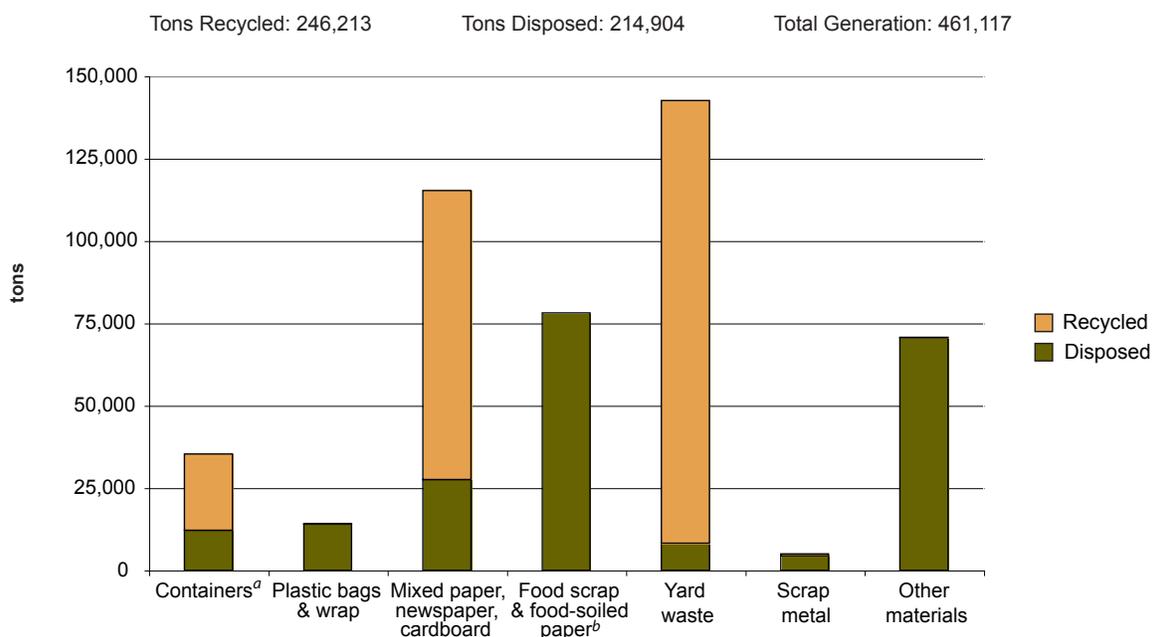
Self-haulers show the least amount of recycling. At this time, many of the division's urban transfer stations are being renovated and other facilities are undergoing major improvements. A goal of the renovation plan is to add space for collection of more recyclables and to build flexibility into the design to allow for collection of additional materials as markets develop. Adding space for collection of greater amounts and a wider array of materials is expected to result in higher recycling rates at the transfer stations.

With studies indicating that more than one-half of the waste that reaches the landfill could have been recycled or reused, and specific data on what those materials are, we can focus on areas that will have substantial influences on the region’s per capita disposal rate. The following sections address each category of generator and identify some of the more significant areas for improvement by material type.

Single-Family Residents

Sixty-eight percent of the households in King County’s service area are single-family homes. In 2007, these single-family households recycled on average about 53 percent of their waste. More than 94 percent of the yard waste and 76 percent of the paper were recycled by this sector in 2007 (Figure 3-2). While food scraps and food-soiled paper made up about one-third of the waste disposed by single-family residents in 2007, recycling is expected to increase as the curbside program for recycling these materials with the yard waste continues to grow. Considerable amounts of the standard curbside recyclables – glass and plastic containers, tin and aluminum cans, mixed waste paper, newspaper, and cardboard – while easily recyclable, are still present in the waste disposal stream.

Figure 3-2. 2007 recycling and disposal by single-family residents



^a Tin, aluminum, glass, and recyclable plastic.

^b Currently, food scraps and food-soiled paper collected with residential yard waste are reported as yard waste tons; methods to determine the amount of residential food scraps/food-soiled paper in the yard waste are under development.

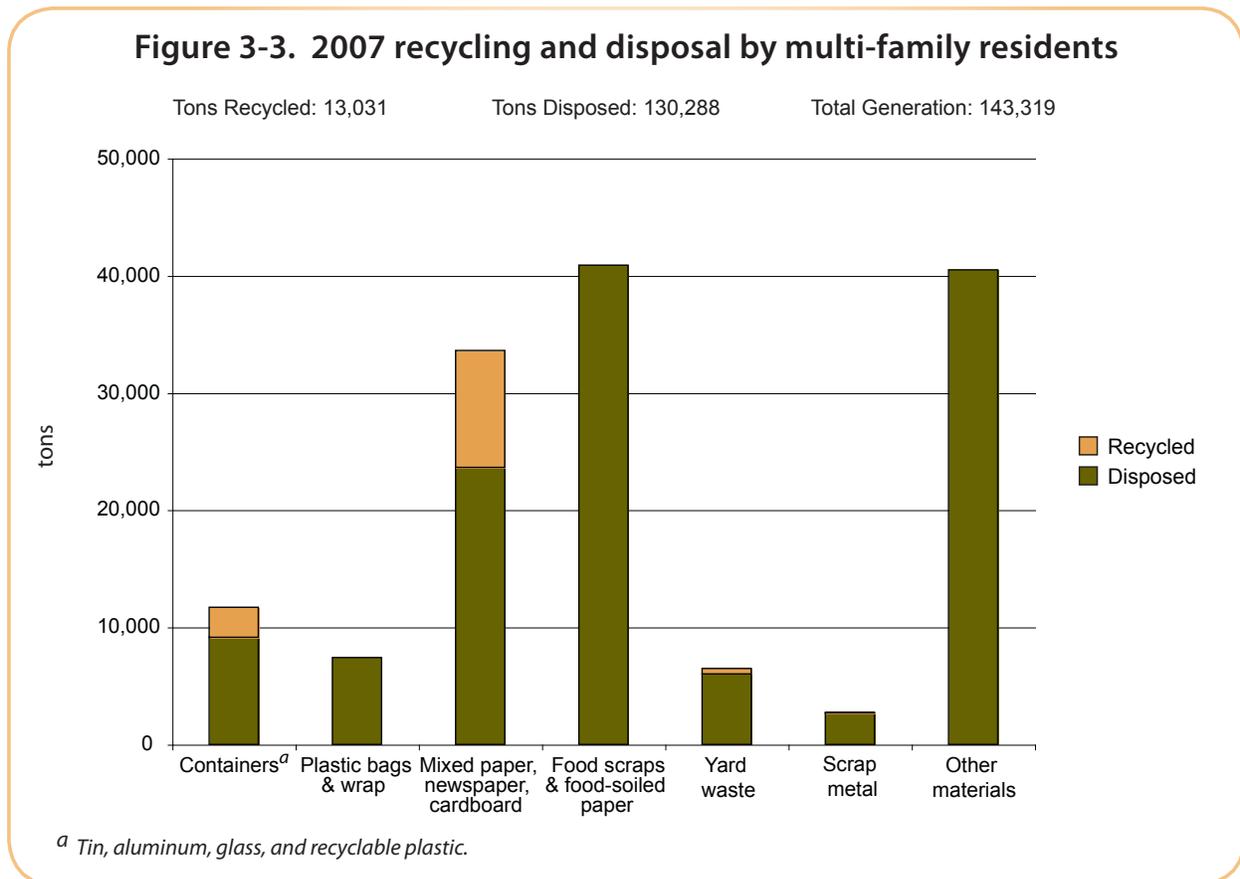
As we saw with the Recycle More Neighborhood Challenge, increased recycling of food scraps and food-soiled paper, as well as the standard curbside recyclables, could boost single-family recycling significantly. Recommendations for improving and standardizing curbside collection for single-family residents are discussed in Chapter 4.

Other recyclables found in the single-family waste stream in smaller amounts include scrap metal, textiles, and some C&D, such as clean wood and gypsum wallboard. Plastic bags and plastic wrap also make up a noteworthy portion of the total, although it is unclear how much of this material could be recycled, partly because it is unknown how many of the bags contain non-recyclable materials such as garbage or pet wastes.

Nearly one-third of the non-recyclable materials in the single-family waste stream are disposable diapers and pet wastes, as well as a variety of plastics for which there are currently insufficient recycling markets.

Multi-Family Residents

Thirty-two percent of the households in King County’s service area are in multi-family complexes. In 2007, the average multi-family recycling rate in the county’s service area was 10 percent. While this rate is considerably lower than the single-family rate, overall generation and disposal from multi-family residences is lower as well. As with single-family residents, the primary areas of opportunity are in recycling food scraps and food-soiled paper and the standard curbside recyclables (Figure 3-3).



Other materials present in the multi-family waste stream, both recyclable and non-recyclable, are similar to those found in the single-family waste stream.

It is difficult to track multi-family recycling rates because of 1) the varied nature of multi-family complexes, 2) the growth in construction of mixed-use buildings that contain both residential and non-residential units, and 3) the varied levels of recycling services provided. What is clear is the need to provide adequate space for garbage and recyclables collection at these complexes and to standardize collection across the county.

A detailed discussion of ways to improve recycling at multi-family and mixed-use complexes is provided in Chapter 4, *Collection and Processing*.

Non-Residential Generators

Non-residential generators – businesses, institutions, and government entities – recycled an estimated 59 percent of their waste in 2007. Despite having the highest recycling rate of any sector, non-residential generators present the greatest opportunity for increasing King County's overall recycling rate (Figure 3-4). As of March 2007, there were an estimated 690,000 employees in the service area working at an estimated 30,000 businesses and organizations. The make-up of the non-residential sector ranges from manufacturing to high-tech and retail to food services. The recycling potential for any particular business or industry varies depending on the nature of the business. For example, restaurants and grocers are the largest contributors of food waste, while manufacturers may generate large quantities of plastic wrap and other packaging materials. Because of the diversity of business and industry in the region, a more individualized approach is needed to increase recycling in this sector.

There are significant opportunities in the non-residential sector to increase the diversion of food scraps and food-soiled paper. The largest increase will be realized as more restaurants and grocers contract with private-sector companies to collect their food scraps for composting and more cities begin to offer commercial organics collection.

Smaller-scale efforts can also contribute. For example, in spring 2007, the division helped forge a partnership between county school districts and Food Lifeline and Northwest Harvest to distribute food left over from the school year. Five school districts donated more than 5,000 pounds of produce, dairy products, baked goods, and other staples that would have spoiled or reached their pull dates over the summer. Donations amounted to about 3,900 meals for area food banks and other programs.

Another opportunity for reducing overall disposal is with commercially generated paper. While large amounts of paper are being recycled, more than 90,000 tons of recyclable paper was disposed by businesses in 2007. Paper may also provide an opportunity for waste prevention – not just moving from disposal to recycling, but aiming to reduce the generation of waste paper.

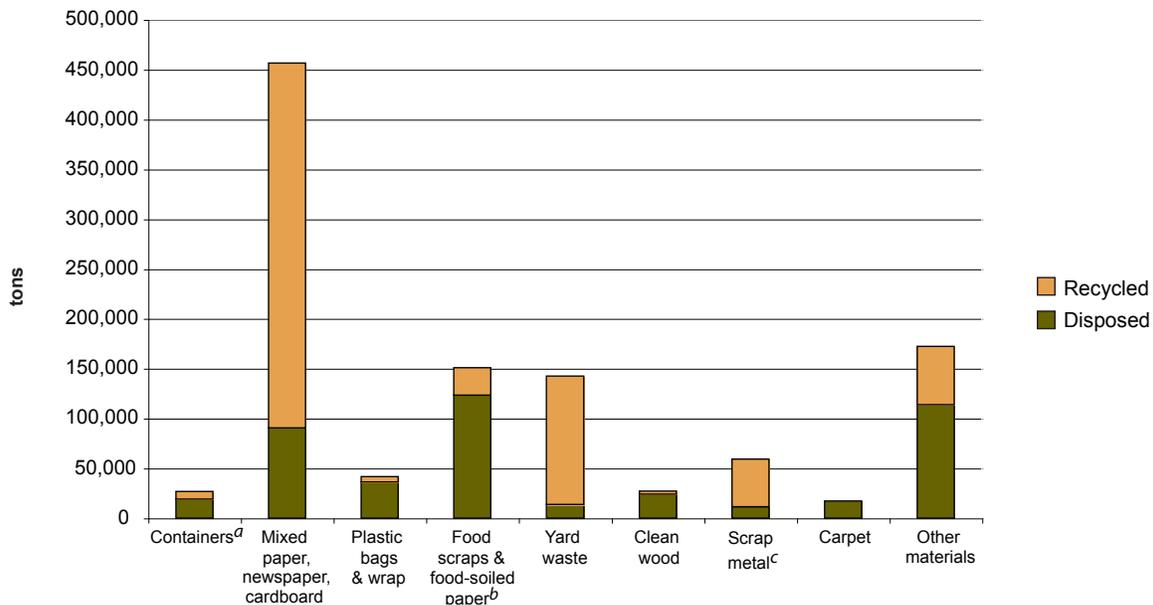
Other materials being recycled in smaller amounts by the non-residential sector include electronics and textiles. Non-recyclable materials present in the waste stream include disposable diapers, treated or contaminated wood, and a variety of plastics.

Figure 3-4. 2007 recycling and disposal by non-residential generators

Tons Recycled: 644,632

Tons Disposed: 449,461

Total Generation: 1,094,093



^a Tin, aluminum, glass, and recyclable plastic.

^b Includes used cooking oil.

^c Includes only 20 percent of tonnage reported to Ecology; the remaining 80 percent is estimated to be from auto bodies, which have been excluded from King County recycling calculations because they have not historically been disposed as solid waste.

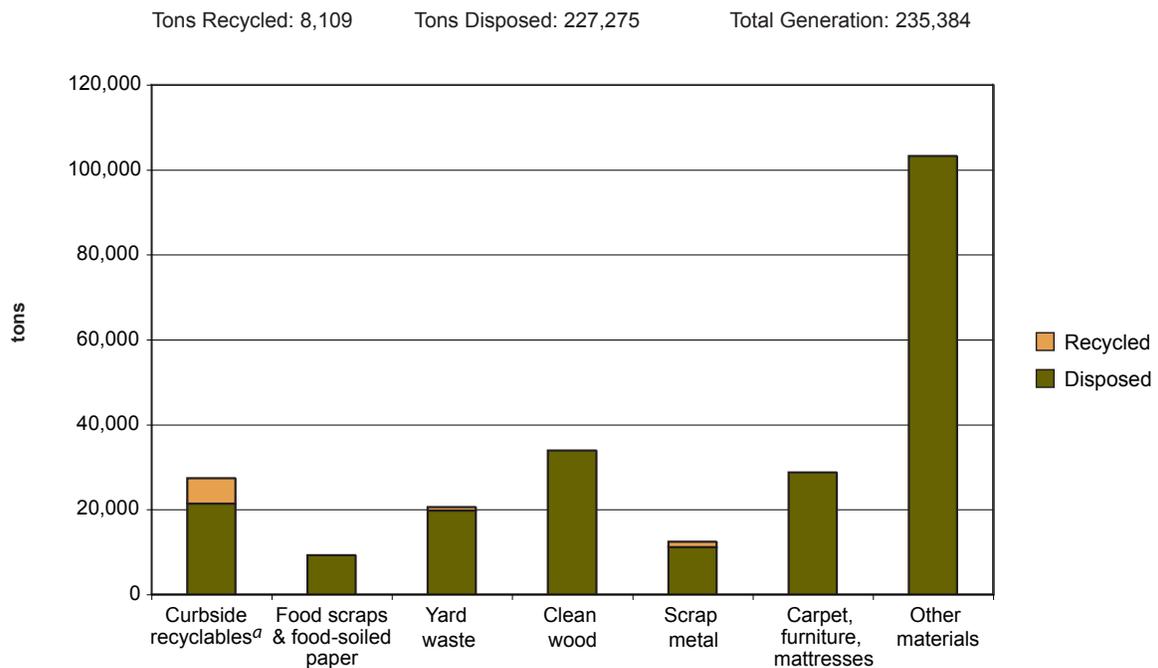
Note: Non-residential recycling data include recyclables from residents who self-haul materials to private-sector drop boxes and recycling from buy-back centers.

Self-haulers

Self-haulers are residential and non-residential customers who choose to bring garbage and recyclables to the transfer facilities themselves. According to telephone surveys conducted as part of the division's waste characterization studies, the most common reasons given for self-hauling are having a large quantity of waste and having large or bulky items to dispose (discussed in more detail in Chapter 5, *The Solid Waste Transfer System*). About one-half of the materials disposed by self-haulers has the potential for recycling, most significantly clean wood, yard waste, scrap metal, and paper (Figure 3-5).

According to the division's 2007 waste characterization study, the percentage of clean wood in the waste stream recently surpassed yard waste. This may be partially explained by the fact that the Shoreline Recycling and Transfer Station, which has traditionally received a large amount of yard waste, was closed during the study period, or by the increase in remodeling and construction activity between the last study and late 2007.

Figure 3-5. 2007 recycling and disposal by transfer facility self-haulers



^a Glass and plastic containers, tin and aluminum cans, mixed waste paper, newspaper, and cardboard.

Currently, six of the eight transfer stations provide collection containers for the standard curbside recyclables, which include glass and plastic containers, tin and aluminum cans, mixed waste paper, newspaper, and cardboard. At some of the stations, textiles and large appliances are also collected. There are a number of materials still prevalent in the self-haul waste stream for which there are currently insufficient or no recycling markets, such as treated and contaminated wood, carpet, and a variety of plastics.

As discussed previously in this chapter and in Chapter 5, *The Solid Waste Transfer System*, many of the division's urban transfer stations are being renovated and other facilities are undergoing major improvements. A goal of the renovation plan is to add space for collection of more recyclables and to build flexibility into the design to allow for collection of additional materials as markets develop and needs change.

At some point, it may be prudent to eliminate the acceptance of most standard curbside recyclables at transfer facilities, as it is more efficient and cost effective to collect them at the curb. The space and resources at the stations could be used instead for collection of other materials that are not easily collected curbside.

The fee for recycling materials at county transfer facilities is less than the fee for disposal. King County code (KCC 10.12.021.G) does not require that fees for recyclables recover the full costs of handling and processing these materials, thus the fees can be set lower to encourage recycling over disposal. In fact,

for materials such as the standard curbside recyclables, there is no fee at all, even though the division pays the cost to have the materials picked up for processing by recycling firms. For some materials, such as appliances, disposal is not an option and the fee reflects the actual cost to the division of handling the material. As collection services for new recyclable materials are added at transfer facilities and more tons of materials are recycled, fees will be evaluated on a regular basis and adjusted as necessary to optimize the financial and environmental benefits.

Shoreline Recycling and Transfer Station

Recycling Rate Increases with Expanded Services

The Shoreline Recycling and Transfer Station opened on February 16, 2008 with expanded recycling services for self-haulers. Customers are now able to recycle a wider array of materials at the station than the standard curbside recyclables. In addition, weekend events have been held at the station to collect reusable building materials. Thus far at the new Shoreline station, about 20 percent of materials received from self-haulers was recycled, far more than at any other county transfer station.

The following recyclables, and associated amounts, were collected from the Shoreline station in 2008^a:

Curbside recyclables	469 tons	
Organics ^b	1,944 tons	
Clean wood	78 tons	
Scrap metal	426 tons	
Appliances	283 tons	
Household batteries	0.5 tons	
Textiles	3 tons	
Televisions	58 tons	(collection began 6/1/08)
DVD/VCR/CD players	13 tons	(collection began 6/1/08)
Fluorescent bulbs and tubes	0.5 tons	(collection began 6/1/08)
Reusable building materials	3.5 tons	(through 3 collection events)

^a Materials were collected from 2/16/08 through 12/31/08, unless noted. Tonnage figures are rounded.

^b Of the organics collected, 88 percent was from self-haulers and 12 percent was from commercial collection companies.

Note: Collection of televisions and household batteries ended in fall 2009.

Generators of Construction and Demolition Debris

The division contracts with Waste Management and Allied Waste to take C&D for both disposal and recycling. A number of private-sector firms not under contract with the county also accept C&D for recycling. A detailed discussion of the status and planned improvements for C&D collection and recycling is provided in Chapter 4, *Collection and Processing*.

In 2007, more than 1.2 million tons of C&D was generated in King County. C&D includes debris from the construction, remodeling, repair, or demolition of buildings, other structures, and roads. It includes clean wood, painted and treated wood, gypsum wallboard, roofing, siding, structural metal, wire, insulation, packaging materials, and concrete, asphalt, and other aggregates. Of the more than 1 million tons of C&D diverted from disposal in King County in 2007, about 87 percent – more than 900,000 tons – was concrete, asphalt, and other aggregates. Other materials that are being diverted, either to recycling or beneficial use (see adjacent description), include clean wood and gypsum and small amounts of metals, paper, and other assorted materials.

Wood makes up about 40 percent of the C&D that is being disposed. While much of it is not recyclable because it has been painted or treated, in 2007 about 60,000 tons of clean wood that could have been diverted was disposed. Other recyclable C&D materials that are being disposed include a variety of scrap metals, clean gypsum, and asphalt shingles.



What is Beneficial Use?

The accepted hierarchy of waste management is to prevent or reduce, reuse, and recycle. But there is another potential use for some materials referred to as “beneficial use” (or sometimes “beneficial reuse”). As an example, wood from C&D processing facilities is sometimes chipped and burned for fuel, commonly referred to as hog fuel. While there is no standard definition for what constitutes beneficial use, this practice is generally accepted as a beneficial use because it produces energy that would otherwise require some other material as fuel.

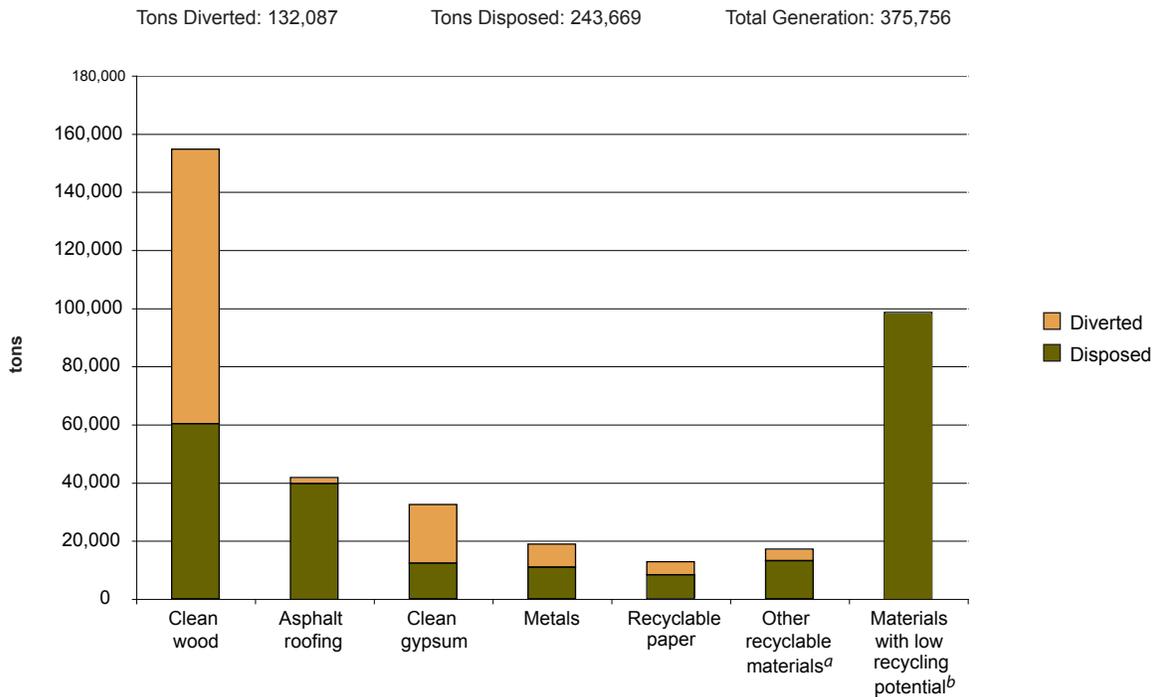
Other practices that might be considered beneficial use are more controversial. For example, fine-particle residuals produced during the processing of C&D materials may have no value for recycling, but could be used as daily cover for a landfill. These residuals would replace the use of soil or other cover material in the landfill, which sometimes must be imported for this use. However, because the material is still being disposed of in a landfill, there is some question as to whether this would constitute a beneficial use.

One issue that complicates the definition of beneficial use is the underlying goal to find the highest end use for a recycled product. Notions about what the highest use is could evolve and change over time. For example, given the current status of energy demand, is it more beneficial to use a portion of recycled wood as a source of fuel or as a recycled wood product?

To look at these and other issues regarding beneficial use, the county is participating in a statewide dialogue with Ecology, the City of Seattle, and other stakeholders. Deciding what constitutes waste versus beneficial use versus recycling will have far-reaching effects on energy production and resource conservation in the future.

Figure 3-6 shows the composition of C&D materials – other than concrete, asphalt and other aggregates – diverted and disposed in 2007 (Cascadia 2009a). Most concrete, asphalt, and aggregates are recycled; in 2007 only about 20,000 tons, or 2 percent, was disposed.

Figure 3-6. 2007 C&D diverted and disposed
(excludes concrete/asphalt/aggregates)



^a Includes yard waste, carpet and pads, textiles, and plastics.

^b Includes painted and treated wood, painted/demolition gypsum, plastics, and other mixed C&D.

Over the last 10 years, recycling at the job site has become more commonplace. Green building programs discussed earlier in this chapter, such as LEED and Built Green™, have been instrumental in promoting C&D recycling.

The cities and the county may consider encouraging increased diversion from disposal through permitting requirements. Other cities and counties around the country are doing so through a variety of land use and building permit processes, such as:

- Expediting the permit process for projects with higher rates of C&D diversion or more green building elements.
- Mandating that all job sites meet a specific level of diversion as in San Diego, Santa Monica, and Chicago.

- Requiring that C&D processing facilities meet target rates of C&D diversion for certification, and then requiring contractors to take materials to these certified facilities. For example, San Jose requires contractors to take materials to C&D facilities that divert at least 50 percent of their C&D.
- Requiring developers to pay a deposit when applying for their building permits, which specify a target rate of C&D diversion. The contractor receives the deposit back by submitting facility receipts showing they have reached their targeted diversion level. Several jurisdictions in California are implementing this practice.

TURNING WASTES TO RESOURCES

In 2004, King County adopted “Zero Waste of Resources” as a principle designed to eliminate the disposal of materials with economic value. Zero Waste does not mean that no waste will be disposed; it proposes that maximum feasible and cost-effective efforts be made to prevent, reuse, and reduce waste. The division has been taking steps to eliminate the disposal of materials for which there is economic value and a viable market.

Several factors determine which materials will be the focus of recycling efforts in the county:

- The amount present in the waste stream
- The ability to handle the material – both collection and processing
- Markets for the material
- Environmental considerations

Since the county’s last comprehensive solid waste management plan was issued in 2001, the list of materials that can be recycled has grown substantially, primarily due to growth in the infrastructure and markets. According to Ecology’s surveys, the following materials have been recycled in King County:

Paper

Corrugated paper
 High-grade paper
 Mixed paper
 Newspaper
 Aseptic packaging^a
 Polycoated paper^b

Organics

Food scraps
 Food-soiled paper
 Oil - cooking
 Yard waste

Containers

Aluminum cans
 Tin/steel cans
 Container glass
 #1 PET plastics^c
 #2 HDPE plastics^d
 #5 Polypropylene^e

Plastic Wrap and Bags

#4 LDPE plastics^f

Clean Wood

Unpainted, untreated wood

Scrap Metal

Ferrous metals
 (contain iron)
 Nonferrous metals
 Large appliances

Carpets and Pads

(continued)

Electronics

Audio/video equipment
 Cellular telephones
 Circuit boards
 Computer monitors
 Printers/peripherals
 Computers and laptops
 Copier/fax machines
 PDAs/pagers
 Tapes/discs
 Televisions

Textiles

Rags/clothing/etc.
 Upholstery

Furniture and Mattresses**C&D**

Asphalt shingles
 Asphalt/concrete/bricks
 Gypsum wallboard
 Roofing/siding wood
 Roofing material

Other Materials

Anti-freeze
 Auto bodies
 Batteries - household
 Batteries - vehicle
 Fluorescent lights
 Glass - non-container

Other Materials (cont.)

Landclearing debris
 Manure
 Oil - used
 Oil filters
 Paint - latex
 Photographic films
 Polystyrene foam
 #3 PVC plastics^g
 Tires
 Topsoil

^a A mixture of plastic-coated paper and a small percentage of aluminum, which forms a tightly sealed container that eliminates the need to refrigerate certain products; used to produce juice and other beverage or soup containers.

^b Plastic-coated paper, used to produce items such as milk and ice cream cartons and frozen food containers.

^c Polyethylene terephthalate plastics, used to produce items such as pop and water bottles and food jars.

^d High-density polyethylene plastics, used to produce items such as grocery bags; milk and juice jugs; and laundry detergent, bleach, and fabric softener bottles.

^e Used to produce items such as ketchup bottles, yogurt containers, and dairy tubs.

^f Low-density polyethylene plastics, used to produce items such as dry cleaning bags, bread and frozen food bags, squeezable bottles, and shrink wrap.

^g Polyvinyl chloride plastics, used to produce items such as medical tubing, wire insulation, pipes, and siding.

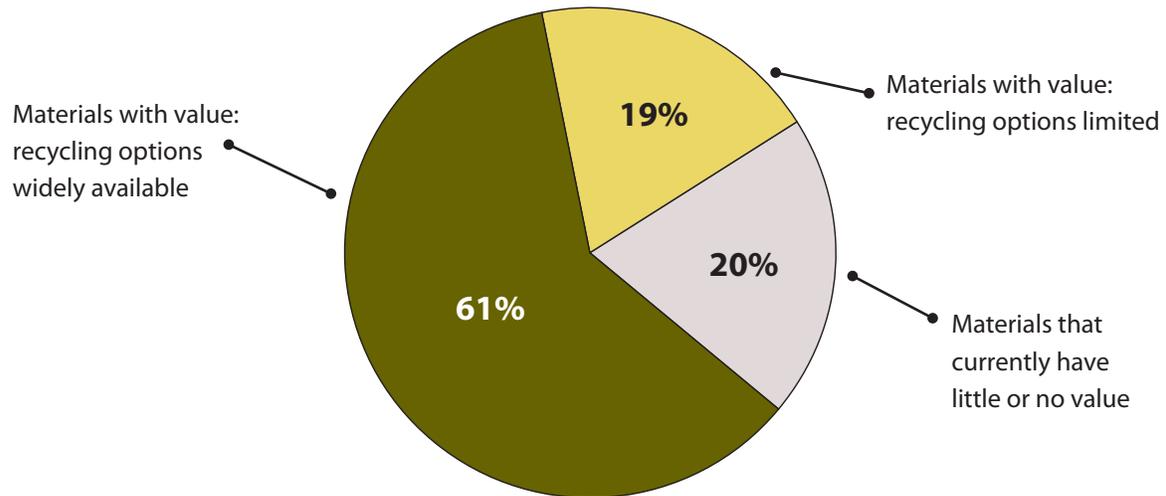
While the list of potentially recyclable materials is extensive, there are only limited markets for some of the materials. Zero Waste of Resources targets the materials in the waste stream that have the most value in the market. In 2007, about 1 million tons of solid waste was disposed at the Cedar Hills Regional Landfill. As shown in Figure 3-7, there exist at least limited options in the market for the recycling of about 80 percent of the materials disposed.

Materials with widely available recycling options include food scraps and food-soiled paper, paper, clean wood, yard waste, metals, and tin, aluminum, glass, and plastic containers. Materials that currently have more limited options include plastic wrap and bags, carpet, polystyrene foam and other plastic packaging, gypsum wallboard, and asphalt products. Materials such as treated and contaminated wood and miscellaneous C&D wastes have little or no value in the marketplace at this time.

Priority Materials for Curbside Collection

With each comprehensive solid waste management plan, new materials that can be efficiently and cost-effectively captured for recycling are added to curbside collection programs. Adding materials for curbside collection requires sufficient infrastructure and markets for their collection, processing, and end use. Standardizing the materials collected across the county simplifies recycling education, reduces confusion among consumers as to what is recyclable, and increases collection efficiency.

Figure 3-7. Recycling potential of materials disposed in 2007



As new materials are identified, they are added to the “minimum collection standards” discussed in greater detail in Chapter 4, *Collection and Processing*. With this plan the following materials have been added to the collection standards recommended in Chapter 4: polycoated paper, shredded paper, aseptic packaging, plastic jugs and tubs, food scraps and food-soiled paper, and smaller scrap metal.

Priority Materials for Collection at King County Transfer Facilities

The division has identified several priority materials to collect at all transfer stations once they are renovated:

- Organic waste, including yard waste, food scraps, and food-soiled paper
- Cardboard
- Clean wood (not treated or painted)
- Scrap metal

Some materials designated for curbside collection and/or as priority materials for transfer station collection will also be collected by private-sector businesses.



Scrap metal is collected for recycling at the new Shoreline Recycling and Transfer Station.

Markets for Recyclable Materials

The division conducts periodic market assessments for recyclables in King County. These market assessments help identify opportunities, establish priorities, and guide programs for market development and increased diversion of recyclable materials from the waste stream. Data from the market assessments help guide the direction of future recycling programs and services recommended in this plan.

Cascadia Consulting Group conducted the most recent market assessment for the division in 2006 (Cascadia 2006b). The study indicated that local, regional, and global markets for recyclables have matured in the last 10 years, and that markets for most materials, particularly for paper and metals, are strong. General findings of the 2006 study included:

- Manufacturers and other end users can easily handle additional quantities of some materials, including plastic containers, glass, paper, tin and aluminum cans, organics, clean wood, electronic products, and textiles.
- A ban on the disposal of select residential and/or business recyclable materials could help provide additional supply to markets.
- Asia continues to grow as a major market destination for materials such as paper, plastics, and, increasingly, metals.

Since the 2006 study was conducted, markets have fluctuated widely in response to the downturn in the economy that began in 2007. Commodity prices have plummeted from their all-time highs. It is anticipated that prices will continue to fluctuate locally, nationally, and globally until the overall economy improves. As noted in the 2006 study, markets for some materials have also fluctuated in response to changes in technology or shifting market demands.

The county is working to expand markets for the use of recyclable and reusable materials through its LinkUp Program. The program helps to facilitate partnerships among businesses, public agencies, and other organizations to increase the use of recycled materials for manufacturing, processing, and resale. Through the LinkUp Program, the division has been monitoring market developments for materials such as container glass, asphalt shingles, polystyrene foam, and clean wood, and is seeking ways to foster their use through local manufacturers, public agencies, and businesses.

A brief description of the markets for several materials is provided below based on the 2006 market assessment and more recent data and trends. The division will continue to monitor technologies and markets for the handling of these and other materials.

Electronic Products

The recycling of electronic products has advanced rapidly in the last several years on a nationwide scale, due in large part to safety concerns. Many electronic products contain potentially hazardous materials, such as lead, mercury, and cadmium, which should be recycled or disposed of in a safe and environmentally sound manner.

Recent technological changes in the electronics field are driving some changes that will affect the amount of electronics waste or e-waste generated in the region. For example, in June 2009, television stations stopped broadcasting in analog signals and converted to digital signals. While there were various options for consumers other than purchasing new televisions (such as buying converters or subscribing to cable services), the change to digital is expected to result in an increased quantity of televisions recycled over the next year.

There are several other notable trends in the e-waste industry:

- The quantity of cathode ray tube (CRT) glass from televisions and monitors available for recycling is likely to increase in the short term as consumers purchase new flat-panel televisions and computers, discarding their older CRT products. Liquid crystal displays and plasma screens are two of the most common types of flat-panel devices.
- CRT glass contains lead, which must be recycled in a manner that protects human health and the environment. There are currently no CRT recycling facilities in the U. S., thus the material must be exported for recycling. The E-Cycle Washington program requires manufacturers to provide documentation of all recycling processes for materials of concern, such as lead in the CRT glass.
- The number of flat-panel monitors that are discarded for recycling will also increase in the long term as more of these products enter the market. Recycling processes for them are still being developed, and little is known about the potential toxicity of the components or health effects of recycling these products. It is known that liquid crystal displays contain small mercury lamps to backlight the screens. These lamps must be removed by the recycler to contain the mercury before the device can be put into a shredder or otherwise processed; however, not all recyclers are currently following this practice. Research is being conducted on how to reclaim other materials in the monitors such as indium, a rare and valuable metal used in the production of liquid crystal displays.

Container Glass

In many areas across the country, including King County, single-stream recyclables collection has become the standard, whereby all curbside recyclables are placed in one large cart for pickup at the curb. While the conversion from separate bins for each commodity to a single cart has made recycling easier for consumers and has resulted in increased recycling, it presents some challenges for the recovery and processing facilities. One of the challenges is cross contamination of materials as they are



Since January 1, 2009, more than 3 million pounds of e-waste has been received at take-back locations across Washington.



sorted and separated. In the case of glass, even small amounts of contamination in the sorted material can reduce the quality and affect the potential end use of the recycled glass.

Most recycled glass in King County is purchased by two end-users; one company manufactures new bottles and the other sells the glass for use as construction fill. While new bottles have a higher market value, because of the lower quality of the recycled glass collected and processed in the region, much of it has been used as fill material. Some material recovery facilities are tackling this problem by investing in updated sorting equipment, such as optical scanners, to improve the separation process and hence the market value of the materials.

Plastics

During the study period for the 2006 market assessment, rising oil prices and strong overseas demand led recycling markets for traditional plastics to all-time highs, although prices varied considerably by type. A brief summary of the market status for various types of plastics follows:

- Recycling rates for plastic bottles are low in King County and across the country; however, markets for the most common types of plastic bottles (PET and HDPE) are currently strong.
- Market prices and demand for other types of plastic, including PVC, LDPE, and polypropylene, are high, but are still far lower than for PET and HDPE plastics.
- Markets for plastic wrap that comes from large generators such as manufacturers that use it for wrapping pallets are strong. The division is exploring a pilot program to link retailers, warehouses, and other generators of large amounts of plastic wrap with material processors.
- Plastic bags have been gaining attention as a commodity with recycling potential; however, current recycling rates are low. Plastic bags mixed with the curbside recyclables and picked up through curbside collection programs present problems for material recovery facilities. There have been growing efforts both regionally and internationally to address this issue. The division is using a two-pronged approach to find effective ways to manage plastic bags. One approach is to encourage the use of reusable bags by consumers at grocery and other retail stores, and a second approach is to work with area retailers to establish a wide-scale take-back network for used plastic bags. Other jurisdictions have opted for different approaches. Most recently, the City of San Francisco passed

legislation that bans non-compostable plastic bags from disposal. The City of Seattle proposed legislation that would require retailers to charge a 20 cent fee for providing disposable paper and plastic bags at the point of purchase; however, the legislation did not pass a public vote in August 2009.

Organics

Yard waste collection programs have been extremely successful in diverting yard waste from the disposal stream. Markets for using yard waste to make compost are strong and could handle more supply. The added collection of food scraps and food-soiled paper with the yard waste has taken off, with the service now available to nearly all single-family curbside collection customers in the county. Education and promotion are underway to encourage the recycling of food scraps and food-soiled paper by single-family residents, as well as multi-family residents and businesses.

There are several privately owned and operated facilities in the region permitted to handle organics, including food scraps. Cedar Grove Composting, Inc. processes nearly all of the organics collected in King County, with facilities located in Maple Valley and Everett in Snohomish County. The Everett facility may be expanding in 2009, which would further increase the capacity for organic material processing. Land Recovery, Inc. in Pierce County and Silver Springs Organics in Thurston County also handle food scraps in addition to yard waste.

Currently, most organics are taken to the processing facilities and converted into compost. However, technologies exist to further maximize this resource prior to composting by using the bulk of the organics collected to generate energy through a process called anaerobic digestion. This process converts the methane gas generated during decomposition into energy such as natural gas or electricity. The resulting green energy can be sold to local power companies, offsetting demand for fossil fuels. The decomposed organic material can then be processed into compost. Facilities in the region are exploring opportunities to expand their operations to capture these resources and maximize their benefits.

Clean Wood

Significant quantities of clean wood (unpainted and untreated) remain in the waste stream even though markets for the material are strong, particularly



Wood beams from a deconstruction site are salvaged for use in new building construction.

for use as hog fuel. Although most clean wood goes to the hog fuel market, the division is working through the county's LinkUp program to develop local higher-value options, such as use in wood pulp and manufactured/milled wood or wood-composite products.

The salvaging of building materials during deconstruction has increased significantly in recent years. End markets for salvaged clean wood need continued development to ensure there is sufficient demand for the materials. The division is encouraging the practice of stamping salvaged clean wood with the grade of the lumber, which helps determine its potential end use, e.g., a higher grade wood has more structural integrity which would allow its use in new construction.

Asphalt Shingles

Local markets for using recycled asphalt shingles are limited, but there is growing potential to use this material in hot mix asphalt pavement and other paving applications. Local processing capacity is developing, and the division is working in partnership with state and local transportation agencies and the hot mix asphalt producers to develop this end-use market.

The division's LinkUp program is currently leading a paving trial to demonstrate the use of recycled asphalt shingles in hot mix asphalt pavement. In 2008, the county's Department of Transportation, Road Services Division agreed to sponsor the project by providing a roadway for the paving trial. The LinkUp team worked with shingles processors and the Washington State Department of Transportation to determine the optimal mix of recycled asphalt shingles and recycled asphalt pavement for the hot mix asphalt pavement. Roadway paving and testing is occurring in 2009, with study results expected in 2010.

Gypsum Wallboard

Green building programs and a strong local construction industry are contributing to a significant supply of scrap gypsum wallboard for recycling. At this time, however, the supply of recycled gypsum exceeds the demand for it by local manufacturers. New initiatives and entrepreneurs are emerging in the gypsum market to research and develop other uses for the material.

TRACKING OUR PROGRESS

The division uses a wide range of available data, both qualitative and quantitative, to evaluate the success of our WPR efforts. Over the years, the division has assimilated a robust collection of surveys and data from a variety of sources to track our progress. In most cases, more than one source of data is needed to accurately quantify how well we are doing in diverting materials from the waste stream. For example, to track our progress toward the goal of 22.9 pounds of waste per employee per week, we take the number of employees in our service area for a given year and divide it into the annual tons of garbage generated by the non-residential sector, as reported in customer surveys conducted at our transfer stations and information submitted to the division by the collection companies. Using these data, we can calculate a

pounds per week figure. The goals are tracked using aggregate data for the county's service area, rather than using data by individual city or unincorporated area.

Provided in this section is information on the types of data collected, how those data are calculated, and how reliable the data are, as well as recommendations on how the data might be improved. Chapter 2, *Solid Waste System Planning*, presents additional information on data sources used for long-term system planning.

Reports from the Collection Companies

The private-sector companies that provide curbside collection of residential garbage and recyclables throughout most of King County submit monthly tonnage reports to the division. These reports are also provided to the cities. Data for single-family households are the most complete, providing the following monthly information for each city and for unincorporated areas operating under a Washington Utilities and Transportation Commission tariff:

- Tons of garbage disposed
- Tons recycled by material type
- Tons of organic materials recycled (yard waste, including food scraps for most areas)
- Number of garbage, recycling, and organics collection customers

Generally, customer counts and tonnage numbers for single-family garbage, recycling, and organics are the most reliable because they are based on weights measured at the entrance scale of either county transfer stations (for garbage) or material recovery facilities (for recyclables). To estimate the tons of individual materials (such as newspaper, aluminum cans, and so on), collection companies take periodic random samples and determine the percentage of each material present in the loads. As overall recycling tonnage is weighed, tons for individual materials are allocated based on the percentages obtained in the random sampling. There is no standard protocol for the sampling methodology and frequency of sampling. Although collection companies have been putting increased resources into improving their sampling methods, this is an area where a standardized protocol would be beneficial. The cities and the county will be working with the collection companies to standardize sampling methodology and frequency.



Curbside collection services for garbage, recyclables, and organics are available nearly countywide for single-family residents.

The same information provided for single-family residents is provided for multi-family residents and non-residential generators; however, the per capita data are less accurate because the number of apartment units and business customers is not provided. In some cases, the same truck collects multi-family and non-residential wastes, so collection companies must estimate how much waste comes from each generator type. Even though some waste may be allocated to the wrong generator type, overall changes in recycling and disposal will still be reflected in tonnage totals, thereby providing a reasonable indicator of change.

Because many other companies provide commercial recycling services, a non-residential recycling rate cannot be calculated from the collection company data, nor can an overall systemwide recycling rate be calculated using these data alone.

Ecology Survey Data

Data on the total tons recycled come from the annual statewide survey of recycling companies conducted by Ecology. These data supplement curbside collection data by including recyclables collected by private-sector companies across the region. Recycling companies are required by state law to report tonnage data on the survey, which asks for tons by material type, by generator type (residential or non-residential), and by the county in which the materials were generated. For King County, companies are also asked if materials were generated in the City of Seattle.

The division uses the Ecology survey data to estimate both our non-residential and overall recycling rates. All of the recycling tonnage reported by Ecology is counted as non-residential except for tonnage that was included in residential collection company reports and recycling tonnage from transfer stations. Use of this accounting method means that recyclables taken by residents to privately owned drop boxes or recycling centers is included in the non-residential recycling tonnage. Ecology survey data are also used to estimate C&D diversion.

While the Ecology data provide the status of statewide efforts, there are some limitations to the usefulness of the data for local planning and evaluation, including the following:

- Data are self-reported by recycling companies, with few resources available to Ecology for checking accuracy.
- Companies make unverified estimates about the county in which the recyclables were generated, and the reporting for data between King County and the City of Seattle has been inconsistent, resulting in tonnage variations from year to year which seem unlikely.
- City-specific information, other than for the City of Seattle, is not available.
- The identification of residential versus non-residential sources is not reliable.
- The identity of the companies that report data is kept confidential, limiting the ability to verify the quantities reported.
- There is a one-year lag time in receiving the data.

Improving the reliability of recycling data would greatly benefit our ability to evaluate progress in reaching our recycling goals. To improve data quality, the division will work with Ecology to improve data reporting

through voluntary agreements with recycling companies serving the county that would allow division staff to review data reported to Ecology and to work directly with the companies to resolve data inconsistencies.

Waste Characterization Studies

Consultants retained by the division conduct periodic studies to analyze the municipal solid waste received at county facilities for disposal at the Cedar Hills Regional Landfill. For these studies, the waste stream is examined by collecting and sorting sample loads delivered to transfer facilities in King County. These studies help the county and the cities understand the composition of both the overall waste stream and what is received from different types of generators, such as residents of single-family homes and apartments, non-residential customers, and self-haulers. Separate analyses are conducted of the C&D and organics waste streams.

Division waste characterization studies are designed to provide a statistically valid picture of what is being disposed by the different generator types. Samples are taken over the course of a full year to account for seasonal variations. The sampling method is designed to ensure that all generator types and geographical areas are sufficiently sampled. The studies provide a high level of confidence of what is in the waste stream. Each study, described below, is conducted by the division as necessary to provide up-to-date information for planning purposes.

Solid Waste Characterization Studies

The most recent study of solid waste destined for the Cedar Hills landfill was conducted in 2007 (Cascadia 2008a). For this study, 420 samples were collected on 28 sampling days. The waste stream was separated into 78 categories of material. For each material and generator classification, the study was designed to achieve a 90 percent confidence interval for the amount of waste disposed countywide. In other words, the study tells us that we can be 90 percent sure that the amount of cardboard disposed in 2007 was 5.8 percent of the total waste stream (59,074 tons), plus or minus 0.9 percent.

These waste characterization studies were not designed to characterize each city's waste stream. However, based on sampling done in a variety of communities, the types of materials disposed by residents are similar, while the amounts may differ. For example, jurisdictions with food waste collection programs will have lower percentages of food in their garbage than those without. These differences are reflected in the recycling rates and pounds disposed per household for each jurisdiction.

Unlike the residential waste stream, non-residential waste disposed may differ considerably by city depending on their mix of business or industry. Additional information about waste generated by business type would be useful when developing programs. The county will be developing a strategy to provide information about waste disposed by business type to assist the cities in tailoring programs to their business sectors.

Organics Characterization Studies

Now that most single-family curbside collection customers in the county have collection services for food scraps and food-soiled paper with their curbside yard waste, we face a new challenge in measuring the amount of these materials collected. Reports from the collection companies provide information about total tons of organics delivered to compost facilities, but cannot differentiate between yard waste tons and food scrap tons. In addition, the solid waste characterization studies described above will measure decreases of food scraps and food-soiled paper in the waste stream, but will not determine whether the decreases result from curbside collection or from other diversion, such as home composting or the use of in-sink garbage disposal units.



Food scraps and food-soiled paper can now be mixed with yard waste for collection at the curb.

To improve our ability to measure progress in organics recycling and establish achievable diversion goals, the division is beginning to conduct periodic characterization studies of organics collected at the curb from single-family households. In 2007, preliminary data were collected on current participation levels in organics recycling; a follow-up study is being conducted in 2009.

Construction and Demolition Debris Characterization Studies

In 2001, the division began to conduct characterization studies of C&D debris disposed at select private facilities by commercial and self-haulers, as well as small quantities delivered to division transfer stations by self-haulers. The study measures the composition of C&D that continues to be disposed instead of recycled. Only two studies have been conducted to date, with the last study completed in 2008 (Cascadia 2009a). A future study is planned for 2012-2013.