DEQ Report to the Legislature

Solid Waste Management Program Information Update for 2009-2010

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Oregon Solid Waste Management 2009-2010 Update

Executive Summary

This Solid Waste Management biennial report describes solid waste generation and management in Oregon using 2009 data (the most recent available), as well as historical trend information. This update addresses waste composition, waste prevention, recycling, composting, beneficial use, disposal, household hazardous waste, and product stewardship. The report satisfies legislative reporting requirements (ORS 459A.015 and 459A.020, Oregon's Integrated Resource and Solid Waste Management Plan update). The full report and related information is on the DEQ Solid Waste Program's web page at www.deq.state.or.us/lq/sw/.

Trends in Waste Generation and Management

Municipal solid waste generated in Oregon has continued to decline since 2007, after years of steady increases. In 2009 Oregonians generated 4.7 million tons of municipal solid waste, or 6.7 pounds/per person/day. As a result, Oregon continues to meet its waste prevention goals. [1] Waste generation typically trends with the economy, but other factors may also be affecting this decline. The following are highlights on the management of the waste generated in 2009.

- After peaking at 49.2% in 2005, Oregon's waste recovery rate leveled off to 48.4% in 2009. The state did not meet its 2009 recovery rate goal of 50%.[2] The recovery rate includes materials recycled by households and businesses or sent offsite for composting and some materials burned for energy recovery.
- Energy savings and greenhouse gas reductions from recycling, composting, and energy recovery are significant. Energy savings from recycling in 2009 equaled roughly 27 trillion BTU—2.4 percent of total energy used in 2009 by all sectors of Oregon's economy. Estimated greenhouse gas reductions equaled 2.8 million metric tons of carbon dioxide—the equivalent of reducing the emissions from 570,000 average passenger cars (about 3.9 percent of the estimated statewide greenhouse gas emissions in 2009).
- Solid waste disposed of at municipal solid waste facilities in Oregon, including waste from out-of-state, contaminated soil, and other special wastes, decreased to 5.3 million tons in 2009, down from a high of 6.8 million tons in 2007.
- Annual disposal of municipal solid waste declined to 1,351 pounds per person, the lowest level measured in Oregon in two decades.
- Oregon continues to receive a significant amount of waste for landfilling that is generated outside of Oregon. In 2009, about 39% of the waste disposed of in Oregon's municipal solid waste facilities was from out-of-state.
- Oregon exports only a small fraction of its waste for disposal in other states. In 2009, only 1.1% of Oregon's municipal solid waste was landfilled out-of-state.

Program Directions

Solid waste policies and programs continue to shift in response to the growing awareness of the significant environmental impacts materials and products have throughout their life cycles – from resource extraction and manufacturing to transport, use, and disposal. For many products, impacts from production are much greater than impacts from disposal. DEQ continues to implement its Waste Prevention Strategy, targeting waste prevention in the design and construction practices for residential buildings and in business packaging. DEQ also conducted research to help both public and private sectors focus efforts toward more effective waste prevention.

DEQ is also working with stakeholders to develop product stewardship as strategy to reduce the impacts of products through all life cycle phases and to manage the increasing volume and complexity of waste products. Product stewardship shifts primary responsibility for impacts over the life of a product to the producers of the product. In addition to the Oregon Bottle Bill, DEQ is implementing two legislated product stewardship programs—Oregon E-Cycles and the pilot Paint Product Stewardship Program, which began in 2010.

DEQ has also begun a process to develop a vision and key strategies for materials management in Oregon for 2050. The vision will provide a foundation to update the Oregon

[1] Statutory generation goals (ORS459A.010) are: no increase in per-capita generation of municipal solid waste in 2005 and subsequent years, and no increase in total generation of municipal solid waste in 2009 and subsequent years.

[2] The statutory recovery goals (ORS 459A.010) are: 45% for 2005 and 50% for 2009.

State Integrated Resource and Solid Waste Management Plan.

In addition, the Environmental Quality Commission revised rules for composting facility permits in 2009 and adopted new rules for the beneficial use of solid wastes in 2010. Both rule packages promote resource recovery in lieu of disposal.

Waste Generation & Waste Reduction Data

This section summarizes data and information on waste generation, recovery rates, disposal tonnages, and waste characterization.

Waste Generation

Waste generation is defined as the sum of materials disposed and recovered. It is a rough measure of the total amount of materials discarded by households, businesses, institutions, and governments. It includes garbage as well as materials separated for recycling, energy recovery, and off-site composting.

Methods to reduce waste generation include:

- Waste prevention – Using and wasting less by acquiring fewer items as raw materials, packaging, or consumables or by purchasing more durable goods;
- Reuse – Using something again in its original form (as opposed to recycling's reformulating materials into new products);
- Composting on site so that materials do not enter the solid waste stream.

Year	Generation (tons)	Per Capita Year (lbs.)	Per Capita Day (lbs.)
1993	3,255,196	2,128	5.8
1995	3,623,705	2,277	6.2
2000	4,544,280	2,645	7.2
2001	4,643,157	2,676	7.3
2002	4,772,537	2,724	7.5
2003	4,913,666	2,775	7.6
2004	5,240,525	2,926	8.0
2005	5,549,824	3,057	8.4
2006	5,728,518	3,104	8.5
2007	5,686,131	3,036	8.4
2008	5,218,207	2,753	7.6
2009	4,671,845	2,444	6.7

Generation of solid waste in Oregon grew between 1993 and 2006, from 3.3 million to 5.7 million tons/year. While population growth contributed to this increase, Oregonians, including individuals and businesses, produced on average 46% more discards per-capita in 2006 than in 1993.

Beginning in 2007, waste generation decreased slightly. It continued to fall in 2008 and 2009—down to 4.7 million tons in 2009. On a per-capita basis, measured solid waste generation in Oregon grew from 5.8 pounds per day in 1993 to 8.5 pounds per day in 2006, and again beginning to decrease in 2007—down to 6.7 pounds per day by 2009. The table below illustrates Oregon's waste generation.

Environmentally, the decline in both total and per capita waste generation is a positive development. Generation is a crude measure of consumption, and for many materials, the environmental impacts of production (the corollary of consumption) is many times higher than the impacts of disposal. However, some of this decline is attributed to the current economic situation and it is not known if the decline in generation can be sustained once the economy begins to recover.

Recent analysis by the U.S. EPA suggests that roughly half of the country's greenhouse gas emissions are associated with the production and transportation of goods. The leveling off of waste generation may indicate a leveling off in the emissions of unwanted greenhouse gases in all stages of the life cycle of materials. Further research is needed to evaluate this hypothesis.

Recovery Rates

Oregon recovered 2,088,265 tons of materials in 2009, which is a decrease of 239,289 tons from 2008. Thus, the state's calculated recovery rates show a decrease in 2008 and 2009 from its high of 45.5% in 2005 (see table). However, these calculated rates do not include the 2% credits for wastesheds that operate reuse and backyard composting programs. These activities decrease waste generation, but are hard to quantify, so the Legislature created these credits and mandated their inclusion in the state's official recovery rate, starting in 2001.

Year	Tons	Calculated Rate	Rate w/ 2% Credits
1992	839,679	27.1%	
1995	1,257,204	34.7%	
2000	1,765,817	38.9%	
2001	1,999,085	43.1%	46.8%
2002	2,029,261	42.7%	46.3%
2003	2,116,880	43.1%	46.8%
2004	2,317,064	44.2%	48.0%
2005	2,523.367	45.5%	49.2%
2006	2,495,050	43.5%	47.3%
2007	2,437,569	42.9%	46.6%
2008	2,377,554	44.6%	48.3%
2009	2,088,265	44.7%	48.4%

Materials. Oregon's 2009 recovery rate of 48.4% includes materials collected for recycling or composting, as well as some material burned for energy recovery. Major categories of recyclables include:

Metal. The amount of recovered metals dropped 6% in 2009. Most areas of the state saw noticeable drops in scrap metal collection.

Paper. After staying nearly steady at the same level of recovery for three years, paper fiber recovery dropped nearly 25% and cardboard 14.5% in 2009. This drop was likely due mainly to a decrease in generation of cardboard and other paper rather than a decline in the recycling rate of paper.

Organic material (wood waste, yard debris, food waste. Recovered organic material (food, yard and wood wastes) decreased 9% in 2009. The largest decrease was wood waste at 16%. Collection overall is down, likely due to decreased construction activity as a result of the depressed economy.

Electronics: The recovery of electronics increased 44% in 2009. This is due to the first year of operation for the Oregon E-cycles product stewardship program which provided new statewide recycling opportunities for televisions, computers and monitors.

Glass. Glass recovery rose 7% in 2009 after an increase of 4% in 2008. Some of this increase may be attributed to improved accuracy of reported data.

Wasteshed rates. In 2009 25 of Oregon's 35 wastesheds exceeded the recovery goals they set for themselves. However, only 11 of the wastesheds had recovery rates in 2009 greater than their 2008 rates. Wastesheds that do not meet their 2009 goals must prepare a technical review to determine why they are not meeting them and find ways to achieve their goals. DEQ provides assistance to wastesheds if requested. All wastesheds were required to update their goals in 2010.

Energy savings. Manufacturers save large amounts of energy when they use recycled materials instead of virgin resources. Recycling in Oregon in 2009 (not including composting or energy recovery) saved about 27 trillion BTU (British thermal units), the equivalent of 216 million gallons of gasoline. It is equivalent to 2.4 percent of 2009 estimated total statewide energy use.

Greenhouse gas reductions. The estimated greenhouse gas reductions from recycling, composting, and energy recovery in 2009 are equal to 2.8 million metric tons of carbon dioxide (dropping from 3.6 in 2007), or the equivalent of reducing the emissions from 570,000 passenger cars. It is also equivalent to reducing 3.9% of 2009 estimated statewide greenhouse gas emissions. The greenhouse gas benefits of waste recovery are partly the result of the large energy savings industries gain by using recycled materials in manufacturing.

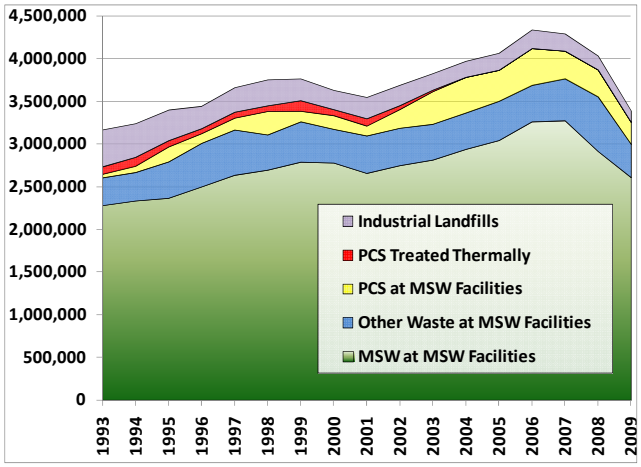
More detailed information on waste generation, material recovery, and specific wasteshed programs can be found in the 2009 Oregon Material Recovery and Waste Generation Report on the DEQ solid waste web page at www.deq.state.or.us/lq/sw/

Disposal Data

The amount of "counting" solid waste disposed in Oregon in 2009 was 2,583,579 tons or 1,351 pounds per person per year, based on a statewide population of 3,823,465[3]. This is the lowest per-capita disposal measured in Oregon in more than two decades. With the increase in population, this means that the per capita disposal fell 21.8% between 2007 and 2009.

After years of per capita disposal amounts rising steadily until 2007, the decreasing per capita disposal is a positive sign environmentally. However, presently it is difficult to know if this represents a shift toward real sustainability, a reflection of difficult economic times, or a combination of both.

Oregon Wastes Disposed 1993-2009 (tons)



Disposal facilities. Oregon has 26 operating municipal solid waste landfills, one mixed solid waste energy recovery facility, and one mixed solid waste incinerator. With so many landfills that have closed in the past two decades, Oregon has the potential for some of them to leak contamination. Thus, the need for regulatory oversight continues well beyond the date at which a facility stops accepting waste for disposal. Continued monitoring of groundwater and methane gas levels may be necessary for decades after a facility closes.

Many of the landfills that remain open are larger facilities that accept waste on a regional rather than a local basis. Some of these landfills are among the nation's largest, providing Oregon with sufficient disposal capacity for many years to come.

[3] "Counting" solid waste includes municipal solid waste, waste tires, construction and demolition debris, animal waste and grease, and some inerts such as gypsum.

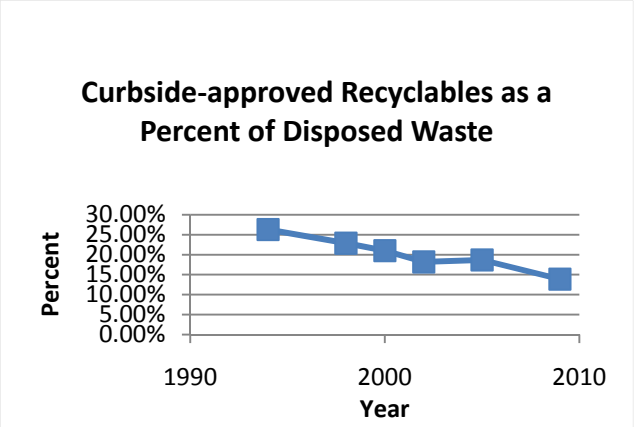
For detailed information about disposal and amounts and types of waste disposed, see the 2009/2010 Disposal Status document on the DEQ web page at www.deq.state.or.us/lq/sw/

Waste Characterization

Oregon has just completed a new solid waste composition study. Metro, Marion County, Lane County, and the cities of Eugene and Portland all contributed to the study, in order to obtain sufficient samples to draw meaningful conclusions about the composition of wastes within their jurisdictions. The final report for the 2009/2010 waste composition study is still being completed, but data tables and results published to date are available at www.deq.state.or.us/lq/sw/disposal/wastecompstudy2009.htm. DEQ conducts regular waste composition studies as required under Oregon Revised Statutes 459A.035. Previous studies were conducted in 2005/06, 2002, 2000, 1998, 1994/95, and 1992/93. Data for a recycling composition study were also gathered in 2004/05.

The information gained by these studies allows local governments and recycling businesses to target recycling efforts toward materials that are still being thrown away. It is also used to determine the recycling rate for rigid plastic containers. Oregon law establishes recycling or reuse requirements for rigid plastic containers sold or offered for sale in Oregon. Plastic container manufacturers and product manufactures utilize the aggregate recycling rate for plastic containers, calculated by DEQ based largely on waste composition data, to remain in compliance with state plastics requirements.

The recent statewide waste composition studies show some continuing positive trends. The percentage of Oregon's disposed waste that is potentially curbside-recyclable—paper, plastic, glass, and scrap metal--has dropped continuously since the first DEQ studies were done in 1992/93. In 1993, these materials made up close to 25% of Oregon's disposed waste. By 2009, they had dropped to less than 14%. Over most of that time period, the decrease was caused by increases in recovery of these materials. In the past two years, reduced generation of materials - particularly paper - has also contributed to the decline in disposal. As of 2009, paper (recyclable and non-recyclable) is no longer the largest material category being disposed, with food waste now equaling or surpassing paper in the disposed waste stream.



Commingled Recycling Characterization

In conjunction with the Oregon Commingled Recycling System Improvement Workgroup, DEQ also conducted composition work at the five Oregon processing facilities that sort out almost all of the commingled recycling collected in Oregon. There were two parts to this study:

- To determine the contamination levels of materials that households and businesses were setting out for recycling collection as part of a commingled recycling program, and
- To determine the effectiveness of the processing facilities at sorting out materials and getting them to proper markets.

The first part of the study found that about 9-10% of the materials collected through commingled collection are contaminants that should not have been set out for recycling. Prominent among these are large plastic items, nonrecyclable paper such as freezer boxes, glass that should have been kept separate, and miscellaneous garbage. Film plastic also contributed significantly to the contamination on a count basis, and poses a large problem to the processing facilities because it wraps around the spinning elements of the sorting equipment. The contamination level is substantially higher than it was five years ago, but that is probably mainly due to switching recycling collection from using small bins to using large roll-carts. People did not have room for large plastic items in the small bins, but do put these in the large carts evidently in the hope that someone will figure out how to recycle them.

The second part of the study looked at the effectiveness of Oregon's 5 main processing facilities in separating out the commingled recyclable materials and marketing them to appropriate markets. In all, the study determined that on the order of 92-94% of the recyclable material brought to the sorting facility in commingled form did in fact get sorted out and marketed to appropriate markets. Recovery was highest for newspaper and other compatible bleached paper. About 7% of corrugated cardboard ended up in newsprint, where it ends up disposed or pulped with the newspaper, and degrades the brightness of the paper produced. About 84% of recyclable plastic containers were properly sorted, meaning that 16% failed to make it into the plastic bales produced by the processors, and ended up

being disposed. Most of the lost containers ended up as contaminants in the newspaper bales. Nearly a third of aluminum cans also ended up either in the paper or the garbage rather than being recycled with aluminum. Oregon has relatively few aluminum cans in its curbside recycling program, since most aluminum cans get recycled under the bottle bill. Two of the rarest materials in the commingled recycling stream, paper beverage cartons and aluminum foil, also showed the worst sorting, with only a fraction of these materials ending up being sorted into the correct commodity category. However, together the aluminum foil and the paper beverage containers made up less than one half of one percent of the total commingled recycling by weight.

2009 Legislation

Paint Product Stewardship

In 2009 Oregon became the first state in the nation to enact a law requiring paint manufacturers to safely manage leftover latex and oil-based paint from consumer and contractor painting jobs. This historic product stewardship legislation responds to the problem of managing leftover paint—the largest component of local household hazardous waste collection programs.

The new paint stewardship law, signed July 23, 2009, is expected to result in the proper management of up to 600,000 gallons of leftover paint each year. HB3037, 2009 directed manufacturers of paints sold in Oregon to set up and run a "convenient, statewide system" for the collection of post-consumer latex and oil-based paint through a stewardship organization that will:

- Establish an environmentally sound and cost-effective architectural paint stewardship program;
- Undertake responsibility for the development and implementation of strategies to reduce the generation of post-consumer architectural paint;
- Promote the reuse of post-consumer architectural paint; and
- Collect, transport and process post-consumer architectural paint for end-of-product life management.

DEQ's role in the program is to review and approve the program plan and provide compliance oversight. In June 2010, DEQ approved the Oregon Paint Stewardship Pilot Program Plan submitted by PaintCare, the industry stewardship organization. The approved plan established the assessment on each container of paint sold in Oregon. The assessment, which must be incorporated in the purchase price of new paint and charged at the time of the sale, is:

½ pint container or less	$0.00
>1/2 pint to 1 quart container	$0.35
>1 quart to 1 gallon container	$0.75
>1 gallon to 5 gallon container	$1.60

The program began on July 1, 2010 and was rolled out over six months. The approved stewardship plan called for 90 locations to collect leftover paint statewide, including both local government sites and retail outlets, by the end of December 2010. After PaintCare submits its first annual report in September 2011, DEQ will prepare a report to the Oregon Legislature by December 2011.

Expansion of the Bottle Bill

The Oregon Bottle Bill remained unchanged (except for minor modifications) from its passage in 1971 until the 2007 Legislature expanded it by:

- Adding a 5-cent refundable deposit to water and flavored water beverage containers, effective January 1, 2009.
- Changing the requirements for retailers. Those with stores larger than 5,000 square feet in size are now required to accept back all brands of containers for the kind of beverages they sell. Stores less than 5,000 square feet in size have to take back only the brands they sell, and can limit returns to 50 per customer per day
- Creating the Bottle Bill Task Force to study and make recommendations on bottle bill matters such as whether other beverages should be added to the bottle bill, the refund value should be raised, and new redemption centers should be established.

The addition of water bottles to the Bottle Bill in 2009 was implemented fairly smoothly, with only a brief period at the beginning of 2009 when some stores were still stocking water bottles that were not properly labeled with the Oregon refund value. The return rate for water bottles is considerably lower than the return rate for other beverage containers, but this was expected based on experience in other states and the fact that water is frequently consumed away from home, making it more difficult for people to hang on to the empty containers until they get back to where they collect them.

The changed requirements for retailers also led to the establishment of the Oregon Beverage Recycling Cooperative (OBRC), providing a uniform statewide system for collecting and redeeming containers from stores. Currently, OBRC reports that their members represent roughly 95% of bottle bill beverages sold in Oregon.

The Oregon Bottle Bill Task Force met many times and developed a set of proposals to improve the current system. Task Force recommendations for the 2009 Legislature included:

- Support an industry proposal to run a statewide system of redemption centers;
- Expand the list of beverages to include sports drinks, coffees, teas, juices, liquors and other beverages (except milk or milk substitutes), effective January 1, 2013;
- Increase the refund value to 10 cents, effective January 1, 2011;
- Allow the state to collect unredeemed deposits only if the industry-run redemption center system is not successful and a state-run system is implemented.

The full report is available at www.leg.state.or.us/comm/commsrvs/Bottle_Bill_Final_Report.pdf.

The 2009 Oregon Legislature considered but did not pass legislation based on the Bottle Bill Task Force recommendations. There was strong interest on the part of the beverage and retail industries to wait for a biennium until the new return system was well established before tackling these new proposals. OBRC also proposed eventually establishing a large set of redemption centers to be directly operated by OBRC in conjunction with nearby major grocery stores in order to increase the convenience of returning containers for customers as well as ease the burdens of returns for the retailers. One such redemption center has been established in Wood Village, and a second opened in Oregon City in January 2011. OBRC will then hold off on establishing new centers for a year until they have gathered data and experience in operating these first two facilities.

Another bill (HB 3704, 2010) considered by the Oregon Legislature during the special session would have made it easier for stores and OBRC to handle beverage containers from distributors who are not members of the coop. Under the proposal, OBRC would not have to physically separate containers from non-members, as they do now, but instead would just send the non-member distributors a bill for the redemption value of each of the non-member's containers that OBRC collects. The net effect of this would have been to provide strong incentives for the non-member distributors to join the coop. This bill passed the Legislature, but was vetoed by the Governor.

At this time, most of the factors that lead to the Bottle Bill Task Force adopting their recommendations are still in effect. Return rates generally have fallen in the last two decades as inflation has eaten away at the value of the nickel deposit. There are a plethora of juices, teas, energy drinks, and other non-carbonated beverages in single-serve containers that are not covered under the Oregon law even though the containers are very similar to the soft drinks and other beverages which are covered. Complaints continue to be received by DEQ of stores that are not providing convenient redemption service, and where many redemption machines are frequently out-of-service or jam. Raising the deposit, expanding the list of beverages covered under the law, and expanding a system of convenient redemption centers or redemption practices are all actions that could help keep Oregon's law up-to-date and effective.

Programs

Planning

The 1991 Oregon Recycling Act required the Environmental Quality Commission, DEQ's governing board, to adopt an Integrated Resource and Solid Waste Management Plan by January 1, 1994 to cover a ten-year period. A review of solid waste planning issues is mandated by law every two years and the plan is required to be updated as needed.

Much has changed in the world of solid waste since the plan was adopted in 1994. Materials, products, and waste streams are changing; new technologies are emerging to convert wastes to energy or other resources; and awareness of the benefits of waste prevention is growing. Studies are demonstrating the significant environmental impacts materials and products have throughout their life cycles – from resource extraction and manufacturing to transport, use, and disposal. And we are learning that for many materials, the upstream impacts from production are much greater than impacts from disposal – underscoring the importance of taking a life-cycle perspective, looking both upstream and downstream, for effective environmental protection.

To address these changes and focus efforts on reducing environmental impacts of products and materials most effectively, DEQ has begun a process to develop a vision and key strategies for materials management in Oregon for 2050. The 2050 Vision will provide the foundation to update the Oregon State Integrated Resource and Solid Waste Management Plan (1995-2005).

Waste Prevention

It has long been the policy of Oregon that prevention and reuse, which both reduce waste generation, have priority over recycling, composting, energy recovery, and landfilling as methods of managing solid waste. The 2001 Legislature set Oregon's first statutory waste prevention goals, noting that: "There are limits to Oregon's natural resources and the capacity of the state's environment to absorb the impacts of increasing consumption of resources, including waste generation and increasing solid waste disposal….It is in the best interests of the people of Oregon to conserve resources and energy by developing an economy that encourages waste prevention and recycling." The goals are:

- For the calendar year 2005 and subsequent years, no annual increase in per capita municipal solid waste generation; and
- For the calendar year 2009 and subsequent years, no annual increase in total municipal solid waste generation.

In December 2007, DEQ adopted a Waste Prevention Strategy as a framework for its work to reduce solid waste generation in Oregon over the next 10 years. The strategy also contains a summary of actions DEQ is undertaking in specific focus areas. The strategy and periodic updates on implementation can be viewed at www.deq.state.or.us/lq/sw/wasteprevention/wpstrategy.htm

Design, Construction, Remodeling and Demolition of Buildings

Broadly speaking, choices about building design, materials, construction, and remodeling practices all have significant bearing on Oregonians' overall environmental impacts. Because buildings are long lasting, design choices made today will impact the environment for decades.

In 2010, DEQ completed a groundbreaking report that evaluates and compares the environmental benefits of a wide range of waste prevention practices in residential buildings. The report combines whole-building energy modeling with life cycle analyses of building materials in order to provide a comprehensive view of the environmental impacts of different building materials and practices, such as different methods of wall framing, material reuse, impacts and benefits of highly durable materials, and impacts of single-family vs. multi-family housing, changes in house size, and "green" certification.

The report, available at www.deq.state.or.us/lq/sw/wasteprevention/greenbuilding.htm, was prepared in partnership with Earth Advantage, the Oregon Home Builders Association, and individual Oregon architects, builders, and remodelers, as well as organizations that serve them, such as deconstruction operations. Study results are helping DEQ, other agencies, and private industry understand the environmental impacts of material selection and waste prevention practices, and to prioritize efforts in areas that offer the most potential for achieving environmental improvements.

Business Practices — Packaging

Businesses may generate almost half of all municipal solid waste, and product design and packaging decisions made by businesses shape the waste generated by other sectors (households, construction). Enhancing business sector waste prevention efforts also supports the state's efforts to be more sustainable in its own operations.

DEQ has a short-term focus on packaging that capitalizes on our recent experience in this area and the burgeoning interest in "sustainable packaging" at the national level. For example, DEQ is a member of the Steering Committee of Wal-Mart's Packaging Sustainable Value Network and in this capacity is helping Wal-Mart achieve greater levels of waste prevention and broader environmental improvement through its far-reaching influence up the supply chain. DEQ also periodically provides information to Oregon businesses seeking to prevent waste in packaging.

Foundation Research and Analysis

Ongoing research and analysis improves the effectiveness of DEQ and others in preventing waste. DEQ continues to build capacity in Oregon around environmental analysis of materials and wastes. In the last two years, significant progress was made in two specific research projects:

Life cycle analysis of drinking water delivery. Water bottles are one of the fastest-growing components of waste generation: 32 million bottles were disposed in Oregon in 1998, rising to 125 million disposed in 2005. There is growing interest in the impacts of bottled water, but limited transparent evaluation on its impacts, particularly for the United States. In part to help DEQ and Oregonians understand the relative environmental benefits (and impacts) of disposal, recycling, and prevention, DEQ commissioned a life cycle inventory and impact analysis of options for delivering drinking water. The study, completed in 2009, evaluated the impacts of choice of packaging materials, recycled content, distance traveled, end-of-life recycling rate, washing of reusables, and many other factors for single-serve bottles, 5-gallon reusable water coolers, and tap water. The study analyzed energy requirements and environmental emissions for fuel consumption, material production for containers, fabrication processes, drinking water treatment, water bottling operations, bottled water distribution, drinking water cooling processes, container washing, and waste management. Study results confirm the waste management "hierarchy" in Oregon statute; while recycling single-use bottles is environmentally preferable to disposal; drinking water from the tap in a reusable container (waste prevention) typically has significantly less impact on the environment. The full report can be viewed at www.deq.state.or.us/lq/sw/wasteprevention/drinkingwater.htm

Greenhouse gas accounting. The conventional method for inventorying greenhouse gas emissions at the level of a state or community significantly undercounts the emissions resulting from waste generation and the "upstream" consumption (and production) of goods. Further, by mixing consumption- and production-related emissions together, conventional inventories mask some of the ultimate drivers of emissions. In 2009 and 2010, DEQ made significant progress in developing a draft "consumption-based" greenhouse gas inventory for Oregon. This approach is intended to supplement the state's traditional greenhouse gas inventory, which focuses primarily on in-state emissions. Once finalized, this alternative inventory perspective will help policymakers and the general public better understand the role of consumption; imports; and local, domestic, and international supply chains in contributing to greenhouse gas emissions.

DEQ is also working with other partners to encourage changes in greenhouse gas inventory protocols for state and local governments to better document and understand the role of materials and the potential benefits of waste prevention and recycling.

Single-use retail take-out bags. Local governments and the Legislature both took up the problem of single-use retail take-out bags in 2010. DEQ supported legislation in 2010 that would have banned single-use plastic bags in some retail applications, largely because of concerns over litter and the negative impact these bags have on recycling operations.

Other Waste Prevention Work

DEQ Solid Waste Program technical assistance staff provides guidance to individuals, private businesses, and local governments on many aspects of waste prevention and recovery. These staff members are located in DEQ's regional offices in Eugene, Salem, Portland, Bend, Pendleton, and The Dalles.

Waste prevention information is available on DEQ's webpage, including a commercial waste reduction

clearinghouse. DEQ staff also provides numerous presentations on waste prevention to audiences such as industry groups and Master Recycler organizations.

Solid waste grants. Since 1991, DEQ has awarded 216 solid waste reduction grants to local governments (another 51 grants have been awarded for household hazardous waste collection and facilities and 19 for waste tire collections). Due to falling revenues from solid waste disposal fees, commensurate with decreased waste generation since 2007, DEQ was unable to award any solid waste reduction grants for 2009-10.

Product Stewardship

Product stewardship is a policy approach where those who produce, sell, distribute and use a product take responsibility for the environmental and human impacts of that product across its entire lifecycle. Those who have the greatest ability to reduce the impacts have the greatest responsibility and are typically the producers of the product.

Product stewardship employs a wide range of tools and mechanisms to influence improvements in product design and reduce public health and environmental effects. Examples include producer collection and recycling programs, restrictions on product ingredients, purchasing guidelines, and product design incentives and goals as well as voluntary design changes by producers.

DEQ in collaboration with Metro convened a multi-interest stakeholder group in 2010 to further the understanding of product stewardship as a policy tool and inform future use of product stewardship. As a follow-up to these discussions DEQ developed a report recommending Oregon pursue product stewardship as a strategy to reduce the environmental and public health impacts of products. It also recommends eight key elements to be included in product stewardship programs in Oregon. The recommendations in this report are DEQ's. While stakeholder discussions informed the recommendations, they do not represent stakeholder consensus.

In addition to long standing product stewardship type laws such as the Bottle Bill and the Rigid Plastic Container Law, Oregon benefits from two relatively new product stewardship laws for electronics and paint. The paint program is described in the section on "2009 Legislation" on page 6. An update for electronics is below.

Oregon E-Cycles

The Oregon E-Cycles program completed its second year of operations in 2010, collecting and recycling TVs, computers and monitors. The program collected and recycled just under 19 million pounds in 2009 and 24.15 million pounds in 2010, a 27% increase over the first year. The 2010 statewide disposal ban for covered products and a greater awareness of the program contributed to these increases. In addition, over 51,000 electronic products were collected for reuse during the first two years of the program.

Four recycling programs operated under the Oregon E-Cycles umbrella during the first two years of the program. Three were DEQ-approved manufacturer programs representing 25 and 26 manufacturers in 2009 and 2010, respectively. The fourth was the contractor program run by the National Center for Electronics Recycling under contract with DEQ with 146 and 173 participating manufacturers in 2009 and 2010, respectively. These programs provide about 220 collection sites throughout the state.

Manufacturers cover the costs of operating the recycling programs and internalize those costs as business costs. Each manufacturer program determines how to fund its program. Manufacturers in the state contractor program pay recycling fees to cover its costs. DEQ administration of the E-Cycles program is funded by manufacturer registration fees.

The 2007 Electronics Recycling law was amended in 2010 to change the method for calculating the return share by weight (minimum recycling obligation) for TV manufacturers. DEQ is continuing to meet with the E-Cycles Advisory Group to implement the program and may initiate rulemaking in 2011.

Program information, along with a "Find an E-Cycle collector near you" locator, is available at the website (www.Oregonecycles.org) and hotline 1-888-5ecycle (888-532-9253).

Other Products

In 2009 and 2010 DEQ participated in work locally, regionally, and nationally on a number of other individual products including fluorescent lamps, thermostats, carpet, rechargeable batteries, and packaging.

Fluorescent lamps. With the emphasis on energy conservation, the use of fluorescent lighting has increased, creating a need for safe end-of-life handling systems as well as improved product design to eliminate concerns related to mercury releases from broken lamps. In 2009 DEQ participated in a national dialogue with manufacturers, retailers, environmental groups, and state and local governments. The purpose of the dialogue was to reduce the environmental impact of lamp manufacturing, increase the use of environmentally preferred lighting, and maximize the safe collection and recycling of fluorescent lamps, including compact fluorescent lamps, through a product stewardship approach. DEQ continued in 2010 to support the development of a product stewardship solution in Oregon for mercury containing lamps.

Mercury thermostats. Following national product stewardship discussions between governments (including DEQ) and manufacturers, the amount of mercury used in thermostats has decreased significantly. However, DEQ estimates that there are many mercury thermostats still in use or being replaced with programmable digital devices. The Thermostat Recycling Corporation (TRC), operated by the National Electronics Manufacturers Association (NEMA), provides free collection of mercury thermostats for heating ventilation and air conditioning (HVAC)

contractors through the wholesale distribution system, household hazardous waste facilities, and some specific HVAC contractor and retail locations. DEQ pays the one-time cost ($25) to purchase the collection bins for these points of collection.

Carpet. Oregon is one of twenty-two states who signed a voluntary agreement with carpet manufacturers in 2002 to increase the amount of post-consumer carpet reused and recycled. The voluntary program has not been successful in achieving its goals and has not resulted in sufficient markets and collection programs for carpet in many parts of the country, including the Northwest. In 2010 the signatories to the original agreement began looking at the results and reasons for the deficiencies in the original agreement and are working toward an improved memorandum of understanding to replace the one that expires in 2012. The carpet manufacturers have also expanded their interest beyond voluntary programs and supported the adoption of a legislative product stewardship approach for carpet in California in 2010.

Rechargeable batteries. The Rechargeable Battery Recycling Corporation (RBRC), a voluntary manufacturer organization, sponsors the collection and recycling of rechargeable batteries in Oregon through a retail collection program. However, the program collects a low percentage of batteries for recycling and because it is voluntary is not available in all retail locations that sell batteries and products containing batteries.

Packaging. As noted earlier, DEQ serves on the Steering Committee of Wal-Mart's Packaging Sustainable Value Network. This is a voluntary product stewardship initiative by Wal-Mart to drive efficiencies and environmental improvements related to packaging throughout its supply chain through goals, collaboration, and the use of a packaging "scorecard" where all packages are scored against numerous environmental criteria. In 2009, DEQ helped Wal-Mart to evaluate claims regarding oxodegradable packaging (plastic packaging that degrades in the environment). Wal-Mart has decided not to use oxodegradables for the time being, due to concerns regarding their potential negative impact on recycling and climate. DEQ also helped Wal-Mart to improve the environmental data and metrics that underlie its packaging scorecard.

Household Hazardous Waste

Opportunities to safely dispose of household hazardous waste (HHW) continued to expand due to the efforts of locally and DEQ sponsored programs. In 2009, 69% of Oregon residents had access to local facilities that collected HHW on multiple days throughout the year, and another 16% had convenient access to at least one special collection event.

DEQ-sponsored HHW collections. DEQ sponsored three household hazardous waste collection events in 2009 that attracted 1,205 participants who disposed of their waste free of charge. The average amount of waste collected per participant was 108 pounds and included pesticides; mercury; and paint, automotive and cleaning products. Due to budget reductions, DEQ did not sponsor any HHW events in 2010 DEQ offered collection of conditionally exempt generator (CEG) and agricultural pesticide waste at all DEQ-sponsored HHW events. The participants pre-registered with DEQ's contractor and paid for disposal.

During 2009 and 2010, DEQ maintained its focus on increasing the collection of mercury and mercury-containing products.

- DEQ continued a program to collect mercury and mercury-containing articles free of charge from conditionally exempt generators at local and DEQ-sponsored collection programs.
- DEQ continued a program designed to collect elemental (liquid) mercury from homeowners who had large quantities of mercury. DEQ's contractor collected the mercury if the household was unwilling or unable to deliver it to a permanent HHW facility.
- DEQ continued to offer a mercury thermometer exchange program. At most locally-sponsored and all DEQ-sponsored events, DEQ provided digital thermometers to participants who brought in mercury thermometers for disposal.

DEQ began a new program in 2009 to clean out unneeded chemicals from school labs. Under this program, 39 school labs in 6 counties were cleaned out and 25,844 pounds of unneeded school lab chemicals were collected. In addition, training sessions for teachers were held in each County on safer chemicals to use in their lab classes and the best ways to manage them.

Local government HHW collection programs. Many local governments provided HHW collection services in 2009 and 2010 at permanent facilities, one-day events, or a combination of facilities and events. Six of these locally-sponsored events were provided under DEQ's "purchaser program" that allows local governments to use DEQ's contract and contractor, although the local governments pay for the service.

HHW grants. Due to budget reductions, no grants were awarded in 2009. In 2010, DEQ offered only HHW collection facility grants (no HHW planning or education grants) and awarded a HHW facility grant to Coos County. The Coos County HHW collection facility will also provide HHW collection services to Curry County.

HHW prevention. DEQ continued to distribute two educational resources to help Oregonians reduce their use of toxic substances at home: *Natural Gardening* and *The Hazardless Home Handbook*, which was updated with information on managing unwanted pharmaceuticals. DEQ distributes both documents via the Internet and in hard copy to city and county governments and nongovernmental organizations that distribute them to interested residents.

Additional information on DEQ's HHW activities and HHW collection services available statewide is available at www.deq.state.or.us/lq/pubs/docs/sw/hhw/HHWReport20082009.pdf .

Compost Facility Rulemaking

When DEQ began permitting compost facilities in 1999, about 300,000 tons of organic materials were composted at facilities throughout Oregon. The industry has grown, more types of materials are collected for composting, and new technologies are under consideration or in use. In 2009 more than 425,000 tons of materials were composted by compost facilities in Oregon.

The Environmental Quality Commission adopted revised regulations for compost facilities in 2009. These rule amendments create a performance-based regulatory system that screens individual sites for environmental risks, reduces potential water quality impacts, and tailors operating plans and permit requirements to each facility.

Beneficial Use of Solid Waste

In Oregon and elsewhere, awareness of potential opportunities to beneficially use wastes is increasing. DEQ receives numerous requests every year to approve beneficial uses of various solid wastes that would otherwise require permitted disposal. DEQ researched how other states regulate the beneficial use of solid wastes and worked closely with a group of affected stakeholders to develop beneficial use rules, which the Environmental Quality Commission adopted in 2010. The new rules provide a regulatory process and funding mechanism for DEQ to respond to and authorize requests for approval to use wastes beneficially as an alternative to disposal.

Beneficial use often involves either using an industrial waste in a manufacturing process to make a product or using the waste as a substitute for fill materials. Examples are the use of spent foundry sand from the steel industry as a substitute for virgin sand in making concrete, or the upland placement of dredged sediments as construction fill material. The use of industrial waste materials conserves energy, reduces the need to extract virgin resources, diverts waste from landfills, and supports DEQ’s goal of promoting sustainability.