
PART 1



Chapter 1 Planning for Zero Waste

A portion of the 1.14 million paper bags used in the US every hour.



Partial zoom.



Detail.



Click on thumbnail to view larger image.
Click on larger image to close.

CHRIS JORDAN

Running the Numbers
An American Self-Portrait
Paper Bags, 2007
60"x80"

Everyone produces waste – all the out-of-fashion clothes, broken gadgets, outgrown toys, packaging, scraps of food, newspapers, office paper, outdated inventory, residue from household projects, manufacturing and construction – on and on. In 2005 Olympia residents and businesses generated a total of about 64,700¹ tons of material – one and a half tons for each City resident. About half of this waste is recycled or composted, and the remainder is sent to the regional landfill, but all of it must be managed. As people consume more, the amount of waste increases, causing an array of environmental problems from resource depletion to air and water pollution, and increasing the costs of disposal.

Toward Zero Waste: Olympia's Waste ReSources Plan is intended to set the City firmly on a course of gradually reducing total waste by identifying waste prevention and recycling programs to be implemented over the next six years. It establishes a long-term direction, anticipates future needs and serves as a reference for future implementation decisions. The Plan has been developed in the spirit of the Washington State 2004 Beyond Waste Plan and to supplement Thurston County's regional comprehensive solid waste plan, which is currently being updated.

This chapter gives the rationale for aiming towards Zero Waste and presents the City's long-term goals to guide the Utility.

WHY PLAN FOR ZERO WASTE?

Zero Waste has been defined as "a philosophy and a design principle for the 21st Century." It includes recycling but goes beyond recycling by taking a whole system approach to the vast flow of resources and waste through human society.

"Zero Waste maximizes recycling, minimizes waste, reduces consumption and ensures that products are made to be reused, repaired or recycled back into nature or the marketplace." (Grassroots Recycling Network, 2007)

Strategic Issues for Olympia

The ever-increasing quantity of waste is a global problem resulting from a growing population and the spread of consumer values and consumption. Society generally supports exploitation rather than conservation of raw materials and non-renewable natural resources.

¹ This total includes the actual measure of all residential garbage, recycling and yard debris; commercial garbage; and estimated commercial recycling.

Increasing consumption and insufficient conservation result in air and water pollution, environmental exposure to toxic materials, and rising greenhouse gas emissions. Because manufacturers are not accountable for the costs of managing products at the end of their life, they have no incentive to make end-of-life management cheaper or more environmentally sustainable.

Olympia residents and businesses contribute to this global problem. Even here, a growing population and increasing quantities of waste are creating environmental problems and pressuring an already strained regional waste management system.

The movement towards Zero Waste is a response to the environmental, economic and operational issues created by increasing waste:

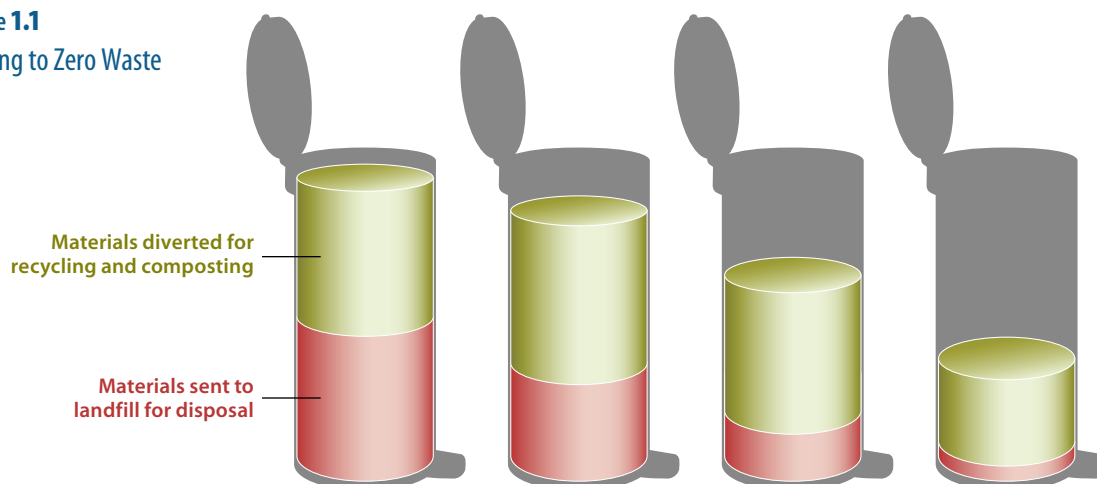
- Zero Waste strategies consider the whole life cycle of a product and ways to reduce waste in “upstream” production and distribution processes, as well as in “downstream” consumer choices and waste management practices.
- Zero Waste strategies support operational efficiency by reducing the overall amount of waste to be handled, and by facilitating shared public and private responsibility for end-of-life waste management.

The contemporary Zero Waste paradigm imagines a future when “waste” is considered an inefficient use of resources. As a result, less waste will be generated and discarded, and the remaining discarded material will be composted or recycled.

Figure 1.1 illustrates the parallel goals of Olympia’s long-term Zero Waste strategy:

- Reducing the total quantity of discarded material. The total “pile” of waste generated – everything “thrown away” or discarded – gradually shrinks over time.
- Recycling and composting the remaining discarded material. Of the shrinking pile of waste, the amount of material disposed in a landfill also shrinks as more and more material is recycled or composted.

Figure 1.1
Moving to Zero Waste



A Short History of Waste Management – From Dump to Zero Waste

Early 1900s to 1980

Years ago, most waste material was organic, and decomposed readily. Usable items were often gleaned from the dumps by “rag and bone men” with their carts. Local governments began managing solid waste initially for public health purposes – literally to get garbage out of the streets. Waste was collected and hauled to empty spaces where it was dumped.

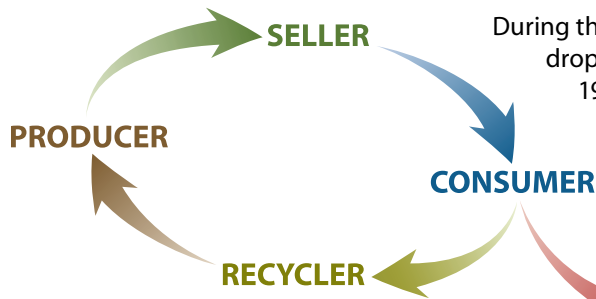


This basic linear paradigm continued into the 1960s, and many of today’s facilities, such as transfer stations, were designed to support a system of collection and disposal.

However, products and materials changed, and especially after World War II, toxic chemicals and plastic products became commonplace. Unlined, uncontrolled dumps leaked toxic materials into the environment, spawning federal regulations in the early 1970s to mandate proper management of landfills and cleanup of old ones.*

People also became increasingly aware that the large quantity of waste going to landfills was not only a waste of materials, but also a waste of money. They realized that non-renewable raw materials were being mined at a great rate, and thrown into landfills or incinerators. The concept of recycling took on a new importance.

1980s to Present

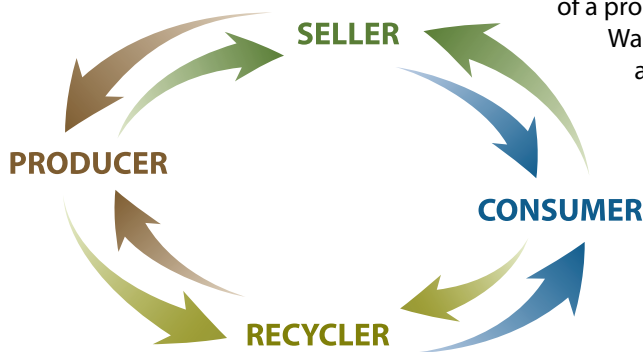


During the 1970s in Washington, small private recyclers provided drop sites and the occasional collection program. Then in 1989 the State legislature passed the Waste Not Washington Act requiring local governments to prepare solid waste plans, and to incorporate waste reduction and recycling as the highest waste management priorities.

The paradigm had shifted to a more circular system where at least some discarded materials were separated for composting and recycling. The three “R’s” of Reduce, Reuse and Recycle were considered the three-legged stool of waste management.

Today’s paradigm builds on the “3Rs” and the circular model. Zero Waste envisions a completely closed-loop, “cradle-to-cradle” system where no material is “wasted.”

21st Century



The 3Rs paradigm, like the linear model, was focused on managing wastes at the end of a product’s lifecycle – or “downstream.” Achieving Zero Waste depends not only on consumer behavior and choice and on systems for handling discarded products and materials, but also on the way products are manufactured and marketed in the first place – “upstream.” Zero Waste can only work if products are made more recyclable, if toxic and non-recyclable components are eliminated, and if producers and manufacturers work with public agencies to provide systems to reuse and recycle efficiently.

* Major federal laws are the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), which regulates Superfund cleanup sites.

Benefits of Moving Toward Zero Waste

Reducing overall waste generation (waste prevention) and diverting the remaining discards from disposal to recycling or composting has environmental, public health and economic benefits.

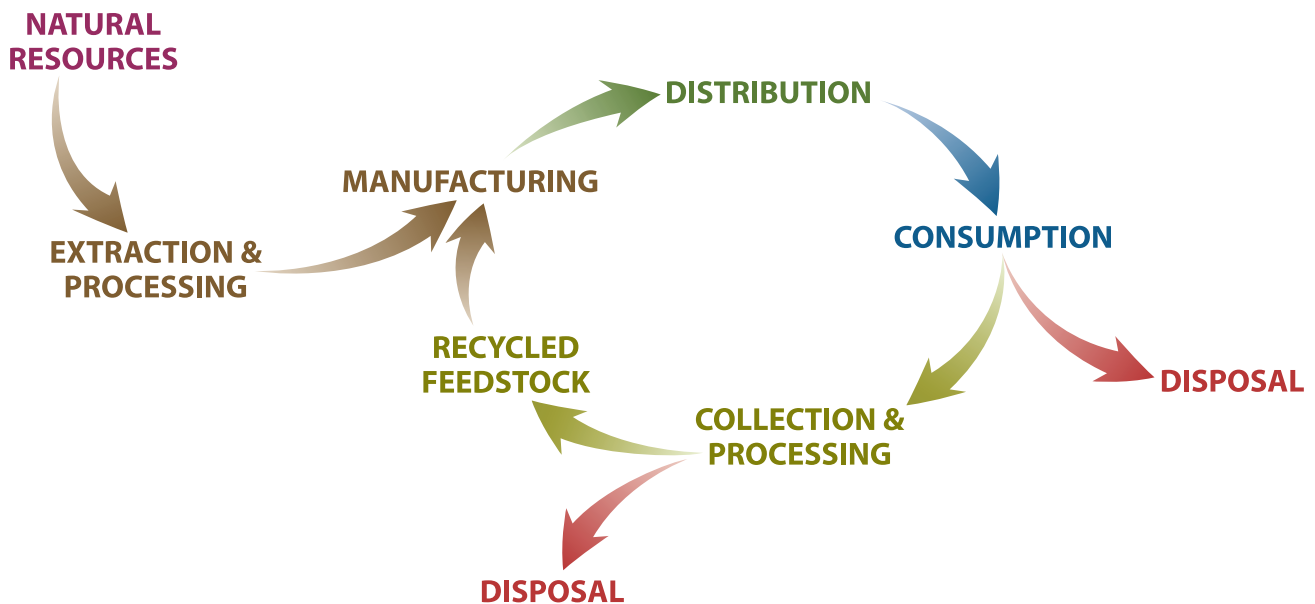
Environmental and Public Health Benefits

Conventional production processes extract raw materials and use them to manufacture products. Recycling and reuse replaces the raw material extraction stage by providing a recycled feedstock for manufacturing.

Reduced Resource Depletion

As **Figure 1.2** shows, recycling is a loop, which can be repeated, whereas the traditional path is a dead end because it depends on continually obtaining raw materials by exploiting natural resources – many of which are non-renewable. Non-renewable resources such as iron ore, oil and bauxite become harder to extract as they are used up, resulting in greater impacts of extraction and higher costs. Eventually, if this practice continues, non-renewable resources will be completely depleted.

Figure 1.2
The Disposal Dead End and the Recycling Loop



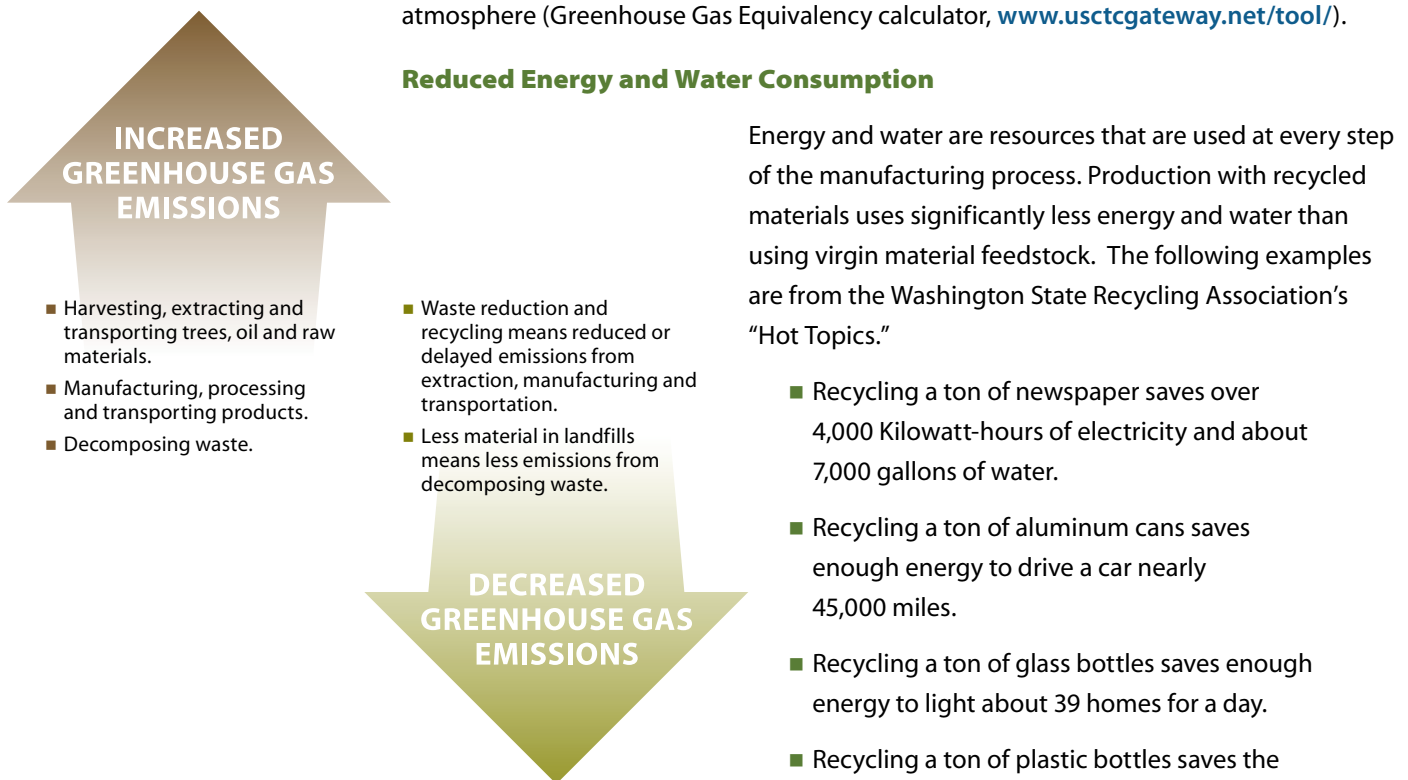
Reduced Greenhouse Gas Emissions

Waste prevention and recycling can significantly reduce the greenhouse gas emissions that cause global warming as illustrated in **Figure 1.3**. The U.S. EPA estimates that increasing the national recycling rate from its current level of 27 percent to 35 percent would reduce greenhouse gas emissions by 11.4 million metric tons of carbon equivalent (MTCE, the basic unit of measure for greenhouse gases) over landfilling the same material.

Waste prevention also makes an important difference: cutting the amount of waste by just 5 percent would reduce greenhouse gas emissions by another 10.2 million MTCE. Together, these levels of recycling and waste prevention slash emissions by more than 20 million MTCE – an amount equal to the average annual emissions from the electricity consumption of roughly 12 million households (equivalent to four cities the size of New York).

If just one household generated 5 percent less waste (newspapers, aluminum and steel cans, and plastic containers), and then recycled the rest, it would reduce carbon equivalent by 374 pounds (EPA, 2007). Every ton of municipal solid waste that is recycled instead of going to the landfill means roughly three fewer tons of carbon dioxide entering the atmosphere (Greenhouse Gas Equivalency calculator, www.usctcgateway.net/tool/).

Figure 1.3
Waste and Greenhouse Gas Emissions



Reduced Air and Water Pollution

In the same way, emissions to the environment that have detrimental impacts on terrestrial and aquatic ecosystems and human health are less when recycled materials are used in the production process (Morris, 2004). Use of recycled feedstock results in reduced emission of:

- Acidifying compounds such as sulfur dioxide and nitrogen oxides.
- Nitrogen and phosphorus compounds which cause eutrophication or stagnation of water bodies.
- Toxic compounds with negative impacts on terrestrial and aquatic ecosystems.
- Air pollutants including particulates known to aggravate asthma and other respiratory disorders.

End-of-Life-Cycle Benefits

The benefits described above are gained at the beginning of the product life cycle. Additional benefits occur at the end of the life cycle by reducing – and ultimately eliminating – the need for disposal:

- Although modern landfills are designed to control leachate and gas emissions, landfill owners are only required to maintain and monitor emissions for 20 years after the landfill is closed (WAC 173-304-407 (7)). Once the liability of the former owner has expired, any environmental problems end up being the responsibility of the public sector. While liners and covers are robust, it is inevitable that in the long run they will be breached, with possible negative impacts. Reducing the quantity and toxicity of materials entering the landfill reduces this long-term potential impact.
- Organic materials (such as paper, wood, yard debris and food debris) in landfills are potential sources of methane emissions resulting from anaerobic decomposition. When organic materials are diverted to aerobic composting, carbon dioxide is released. Each pound of methane traps 23 times more heat than a pound of carbon dioxide. Aerobic composting has been estimated to provide significant greenhouse gas reduction benefits over landfill disposal (Visse, 2004).



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Waste Prevention Benefits

The benefits of waste prevention are similar to the benefits of recycling, but even greater. Preventing waste in the first place eliminates all the impacts of manufacture, transportation, processing and disposition – whether through disposal or recycling. For example, in production, use of recycled feedstock requires less energy than using virgin material, but it still requires some energy use. Waste prevention means less material is

flowing through the system altogether; the energy cost to not produce or recycle something is zero. Similarly, reducing the amount of waste that must be collected, processed and recycled or disposed means less energy is used and costs are lower.

Economic Benefits

Zero Waste strategies applied widely could result in significant economic benefits both locally and globally. These include the economic value of reducing the kinds of environmental impacts described above, creating jobs and saving waste management costs for individuals and businesses.

Economic Value of Reduced Environmental Impact

All the environmental benefits described above result in economic benefits to global society. For example, in 2004 the City of Seattle estimated that increasing recycling from 40 to 60 percent would reduce environmental impacts, with a net benefit of over \$100 million, assuming a specific set of programs. Reducing Seattle's waste by 2 percent would further reduce environmental impacts, with an additional net benefit of nearly \$16 million (Seattle Public Utilities, 2005).

Product Redesign for End-of-Life Management

Most products are not designed with the costs of end-of-life management in mind. For example, they may be made of non-recyclable materials, be difficult to disassemble for recycling, or contain toxic components. Around the world, some countries are requiring manufacturers to bear the costs of end-of-life management. This creates an incentive to design products that are more recyclable and less toxic – and therefore less costly to manage. Here are two examples of American companies designing this way:

- **Hewlett-Packard** recently won a “design for recycling award” from the Institute of Scrap Recycling Industries, Inc. (ISRI). “Some of the design features include using modular design to allow components to be removed, upgraded, or replaced, eliminating glues and adhesives by using, for example, snap-in features, reducing the number and types of materials used, using single plastic polymers and using molded-in colors and finishes instead of paint, coatings, or plating.”²
- **DaimlerChrysler** builds environmental protection into its vehicles.³ One example is the Jeep, which uses “mono material systems for the underbody protection and bumpers. This allows simple dismantling and high quality material recycling.”⁴

² www.treehugger.com/files/2006/04/hp_wins_design.php

³ www.daimlerchrysler.com/dccom/0,,0-5-199082-1-199129-1-0-0-199073-0-0-8-7166-0-0-0-0-0-1,00.html

⁴ www.jeep.co.uk/jeep/page.aspx?ID=1007,,,

Job Creation

Recycling has been shown to add value to the U.S. economy by creating jobs. According to one study, the recycling and reuse industry employs over 1.1 million workers, nearly five times as many as the waste management industry, and about the same as auto and truck manufacturing. Jobs in the recycling industry generally pay above the average national wage. The study also calculates that the recycling and reuse industry contributes directly to \$2.6 billion in local tax revenues throughout the U.S. (R.W. Beck, Inc. 2001).



The recycling and reuse industry employs over 1.1 million workers nationwide.

A 2001 Washington recycling survey found that “in addition to preserving resources, recycling contributes to economic growth as private-sector companies conduct nearly all handling of recyclable materials.” At the time of the survey, Washington State’s recycling industry employed about 3,600 people and had invested over \$850 million in capital assets. The levels of employment in the recycling industry in Washington State were the fourth largest of resource-producing industries – surpassing cherry production, fishing and mining, but trailing the aluminum industry, logging and apple production. The economic recession had not significantly impacted the

State’s private recycling industry. In 2001, King County firms employed at least 1,470 people to collect, haul, transport, process or remanufacture recyclable materials. (Cascadia Consulting Group, 2002.)

Based on these studies, increased recycling and reuse in the Olympia area could be expected to generate new local businesses and employment.

Reduced Solid Waste Management Costs

Waste prevention and recycling practices result in cost savings for waste generators – from individuals in their homes to businesses large and small. For large companies, savings can be significant. For example, the Xerox Corporation reported a savings of \$47 million in 1999 as a result of its reduce, reuse and recycling initiatives, and Epsom Portland, Inc. saved over \$308,000 by sending no waste to the landfill.

In some cities, businesses that recycle save money by reducing the size of their garbage containers, and may receive revenue for their recyclables if they have sufficient quantities of higher value materials. Businesses that generate smaller quantities of recyclables may have to pay for collection, but may create indirect customer service benefits (Resource Venture, 2007).

Similarly, Olympia’s residents and businesses can save on their garbage bills by implementing Zero Waste practices. Landfill disposal costs at WARC are approximately \$72 per ton (spring 2007). For each additional ton of recycled materials, the City saves between \$45 and \$72 of disposal costs. Every ton of waste not generated in the first place saves the City \$72 in disposal costs. These savings, less any increased labor and equipment costs, could be passed on to ratepayers.

PLANNING FOR ZERO WASTE

Given the strategic issues related to waste management – both globally and locally – waste management planning is shifting toward Zero Waste strategies. This trend is reflected in Washington State, Thurston County and Olympia.

State of Washington: Moving Beyond Waste

State law (RCW 70.95.260) requires the Department of Ecology to coordinate development of a statewide solid waste management plan. The 1989 State Solid Waste Plan set the stage for the now-familiar “3Rs” – reduce, reuse, recycle. The State’s 2004 solid waste and hazardous waste plans, developed through the Beyond Waste project, shift the focus of waste management further towards a more sustainable future. Goals are:

- To influence significant reduction of wastes and toxic substances used.
- To shift toward a system where resources are used more efficiently, and excess materials are reused as resources.
- To support efforts in Washington State to make sure businesses’ needs are met, while protecting the environment.
- To incorporate sustainability principles into waste-related decisions.

The State’s Beyond Waste project envisions that: “We can transition to a society that views wastes as inefficient uses of resources and believes that most wastes can be eliminated. Eliminating wastes will contribute to environmental, economic and social vitality.” (Ecology, 2004.)

As required under State law, Thurston County is updating the 20-year countywide solid waste management plan, following the guidance of the State’s “beyond waste” goals and priorities. For details on State planning requirements, see [Chapter 3](#).

“We can transition to a society that views wastes as inefficient uses of resources and believes that most wastes can be eliminated. Eliminating wastes will contribute to environmental, economic and social vitality.”

Olympia's Commitment to Zero Waste

In June 2006, the City Council passed Resolution M-1641, embracing Zero Waste as a long-term vision. This action reflects and reinforces Olympia's long-standing commitment to the policies and practices of sustainability. The resolution directs staff "to focus planning efforts on strategies towards achieving this vision." This Plan is the City's first step towards its Zero Waste vision.

NOW, THEREFORE, BE IT RESOLVED, that the City Council hereby adopts a vision of achieving Zero Waste, and

BE IT FURTHER RESOLVED, that the City focus planning efforts on strategies towards achieving this vision, and to work with all City Departments to identify and implement internal Zero Waste strategies; and

BE IT FURTHER RESOLVED, that Olympia will assume a leadership role, partnering with other Zero Waste local, regional, and international communities and sustainability advocates to actively pursue strategies to advance Zero Waste principles for materials management, system re-design, highest and best use of discarded products and materials, and a closed-loop sustainable production and consumption society, so that Olympia remains a healthy and vibrant community for families and individuals to live, work, and play for generations to come.

Excerpted from Council Resolution M-1641, June 2006. See Appendix 2.

Toward Zero Waste:
A closed-loop sustainable production and consumption society.

Waste ReSources Mission

Waste ReSource's mission is "to lead and inspire our community toward a waste-free future." The Utility's strategic role is to create opportunities to eliminate waste.

Waste ReSources Mission:
To lead and inspire our community toward a waste-free future.

Olympia's Zero Waste Plan

To complement Thurston County's 20-year countywide plan, Olympia has prepared this shorter term, six-year plan. While not mandated by the State, this Plan identifies goals and strategies tailored to meet the needs and interests of Olympia's businesses and citizens, and sets priorities for working toward Zero Waste. Unlike other cities in Thurston County, Olympia manages its own garbage and recycling collection services. Therefore, the Plan is also intended to provide accountability to the City's ratepayers and customers, and to address operational issues related to new programs.

This Plan lays out strategic elements of a progressive waste management program for Olympia over the next six years, with the intention of ultimately achieving Zero Waste.

The long-term goals guiding the development of the Plan are:

1. **Reduce the overall waste generated in Olympia (garbage and recyclables).** The quantity of products and materials used and ultimately discarded by Olympia residents and businesses is steadily decreasing over time.
2. **Increase the quantity of recyclable and compostable materials diverted from the landfill.** The percentage of discarded products and materials that are reused, recycled or composted by Olympia residents and businesses is steadily increasing over time.
3. **Manage Olympia's waste system responsibly.** Discarded materials are collected, processed and disposed of reliably, with minimal impact on environmental and public health and worker safety.

These goals reflect the “3Rs” of waste management: first *reduce* consumption, then *reuse* and *recycle* as much as possible, and dispose of the rest responsibly. They also recognize the role of producers and manufacturers in designing products that are less “wasteful” – products that are durable and repairable, that can be recycled or composted, that contain fewer toxic materials, and that do not create excessive packaging waste.

