

Section 1 Introduction and Purpose

1.1 Why a Master Plan?

A master plan is a comprehensive plan of policies, programs, and implementation steps to achieve a vision. It guides the development and evolution of an organization through an intentional design of future activities. In this instance, the Solid Waste Services Master Plan (Master Plan) is a road map to guide the Solid Waste Services Department (Department) toward its vision of resource recovery and supports the City's vision to achieve Zero Waste by 2040.

Having a master plan in place supports the coordinated growth of the Department's facilities and functions and helps avoid ad-hoc development of its infrastructure. If all future decisions about the design and development of the Department's services are made with respect to the Master Plan, the future programs and policies will be more coherent and mission-specific toward the Department's Zero Waste journey. The Master Plan is a living document, with moving parts. It will be reviewed and updated every five years to keep up with the on-going challenges of providing services to the citizens of Austin.

The Department's master planning occurs through a three-tiered process, comprised of strategic planning, master planning, and project design.

A strategic plan is the first step toward distinguishing the fundamental goals and overall vision of the Department. The scope of a strategic plan includes intangibles such as the current status of the Department, future goals and objectives, possible partnerships, organizational plans, and program goals. The Austin City Council, in January 2009, adopted the Austin Zero Waste Strategic Plan (Strategic Plan). The Strategic Plan summarizes the analysis and input received from the community on Zero Waste and makes general recommendations on how to proceed toward Zero Waste. The Strategic Plan was presented as a long term planning vehicle that further directs the Department to incorporate the Strategic Plan into the development of the Master Plan.

The Master Plan looks at the Department for the next 30 years. Here, the scope is the planning and development of a city-wide implementation action plan. Concept plans, diagrams, and estimates of costs and schedules demonstrate how the Strategic Plan will be realized physically within the City. The Master Plan looks at the Department in its entirety, laying a framework of how departmental staff and citizens relate to one another. The Department is viewed as a service provider to the citizens of Austin and other City Departments, as well as a visionary leader moving the City toward its long-range Zero Waste goals. Implementation plans for each proposed project, service, or policy will be developed within the context of the Master Plan, each one in synergy with the other to ensure consistency between the service message and physical development of the service program.

Project design is the physical design of each program or infrastructure facility. It turns estimations and ideas from the Master Plan into realizable solutions. The timeline of a project design is generally 6 months to 3 years. Here, specifics such as service needs, barriers, type and size of facilities, and new policies are determined and detailed. Each project design follows closely to each fiscal budget year, and is identified in the annual business plan as a Departmental priority.

Each step of development builds on the previous. The Master Plan is derived from the objectives laid out in the Strategic Plan. Then, each project design will build off of the Master Plan. During project design, new information may suggest a re-thinking in the Master Plan. The Department's planning team may look alternately at the Master Plan and the project designs a number of times, each one informing the other, until the plan that best captures the potential of the desired service or objective is found.

Because master planning is building the framework on which future project planning will take place, and uses the Strategic Plan as a foundation, every concept in the Master Plan should fulfill the goals stated in the Strategic Plan. The Master Plan should likewise be developed so that it can direct future project planning and design. It should offer specific directives for the future development of the Department's service array, but should be flexible enough to allow for unforeseeable changes in the City's future.

The final publication of the Master Plan will have many uses, in addition to providing an obtainable plan for future development of programs and policies. Master planning is a process that takes stock of existing resources and asks how they can be maintained, enhanced, or developed to continue to improve our lives and the vitality, livability, and success of our community. Therefore, the Master Plan will be used to market the Department's vision and to gain financial support and grant funding.

The foundation for the Department's strategic and master planning efforts is the United Nations Urban Environmental Accords. The Accords are a set of 21 actions that the United Nations has asked City Governments to adopt and implement. In 2005, in honor of the United Nations World Environment Day, the City signed the Urban Environmental Accords. The Accords are a declaration by participating city governments to build ecologically sustainable, economically dynamic, and socially equitable futures for their citizens. The following three Accord Actions are incorporated into this Master Plan:

- Implement "user-friendly" recycling and composting programs to reduce per capita solid waste sent to landfill and incineration by 20 percent by 2012;
- Adopt a citywide program that reduces the use of a disposable, toxic, or nonrenewable product category by at least 50 percent by 2012; and
- Establish a policy to achieve zero waste going to landfills and incinerators by 2040.

1.2 Planning Timeline

The Master Plan builds on the work of the Strategic Plan which was created based on input from stakeholder workshops held over several months during 2007 and 2008 and adopted by the City Council in 2009. The scope of work for the Master Plan was conceived during stakeholder workshops held in August 2009. HDR and Department staff presented research and findings on the various scope of work

subjects at an August 2010 workshop and held short charrettes during the workshop to identify gaps in information and focus in on high priority issues identified by stakeholders. In November 2010, HDR and Department staff conducted a two-day planning charette open to the public to discuss and evaluate 58 potential Zero Waste initiatives. The recommendations were refined, revised, updated, and prioritized based on stakeholder input at the workshops and input received from online input. In March 2011, HDR and Department staff conducted a public meeting to share additional research and present an overview of the Master Plan's proposed direction.

From April 2011 to September 2011, HDR and Department staff gathered all input to finalize the Master Plan and all related documents. Department staff also took steps to review and discuss specific sections of the Master Plan with various Boards and Commissions including the Solid Waste Advisory Commission, Sustainable Food Policy Board, Water/Wastewater Commission, Resource Management Commission, and Environmental Board. Department staff presented the final Master Plan to the Austin City Council for adoption in October 2011.

1.3 Methodology

Public Input and Planning Context

The Department made a significant effort to ensure that the Master Plan was driven by stakeholder input in order to reflect the vision and aspirations of the City and its community. The Master Plan was prepared by the Department and HDR Inc. over an 18 month period between April 2010 and September 2011 with significant input from stakeholders throughout the community, including Austin residents and businesses, several boards and commission, other City Departments, representatives from communities and public agencies throughout the region, non-profit and private sector service providers, academic institutions, community organizations and environmental groups.

The Master Plan is a culmination of a regular dialogue with the Austin community. Individual policies, programs and infrastructure identified in the Master Plan will be further developed through pilot programs, additional research, and discussions at future public meetings. Several policies may require Council to pass new ordinances and therefore, time for implementation. Additionally, new proposed programs and infrastructure to be implemented by the Department will be subject to the City's annual budget approval process.

The Department will analyze its progress and update its implementation tasks regularly and then provide a status report to the public and the City Council through an annual department report. The Department will also present the results of pilot programs and new research and recommend updates to the Master Plan. The Department will also undertake a formal plan update every five years.

To achieve Zero Waste, the Department and the City will need to engage its stakeholders, including its residential and business generators, to embrace the culture change anticipated by the Zero Waste goal. This will require an active and on-going dialogue throughout the community. Completion of this Master Plan is a step forward on the journey toward Zero Waste.

Background Reports

Background documents developed for the Master Plan were reviewed and discussed by the stakeholders at outreach workshops prior to writing the Master Plan. These “technical memoranda” were posted on the City’s website for review and input and are included in the Appendices:

- Private Sector Assessment, Non-City Programs and Partnership Case Studies, August 24, 2010 (Appendix B)
- Needs Assessment Technical Memorandum, November 2010 (Appendix C)
- Methods for Improving Local Markets for Recycled Materials, Regulating Service Providers, and Establishing Mechanisms for Regional Cooperation, August 24, 2010 (Appendix D)

The recommendations included in the technical memoranda were later revised and expanded in the Master Plan based on input received from stakeholders at the meetings and workshops held in August and November 2010.

1.4 Systems Overview

As part of the planning process to develop the Master Plan, the Department prepared a Needs Assessment Technical Memorandum¹ to collect, review and evaluate the Department’s services, programs, and facilities; describe regional public and private infrastructure; project discarded materials generation over the planning period (through fiscal year 2050); and evaluate 58 existing and new initiatives for consideration in the Master Plan.

The Needs Assessment Technical Memorandum describes the City of Austin’s Zero Waste System to include both:

A **Circle of Control** – services that are directly provided by the City of Austin Solid Waste Services Department or through its contractors; and

A **Circle of Influence** – services that are provided by non-profits and other private sector service providers as a result of policies, ordinances and incentives.

Approximately 1,445,300 tons were estimated to be generated in the City of Austin jurisdiction in Fiscal Year 2009 (FY2009 -October 1, 2008 to September 30, 2009) from both residential and commercial sources. Approximately 69 percent of these materials were estimated to be disposed in landfills and 31 percent were reused, recycled or composted. Approximately 25 percent of total tons generated were controlled by the City, 68 percent were controlled by private sector service providers and 7 percent were self-hauled by residents and businesses.

¹ *Austin Needs Assessment Technical Memorandum*, November 2010,
http://www.ci.austin.tx.us/sws/downloads/needs_assessment_

City of Austin Citywide Generation FY '09

1,000,000 Tons Estimated Citywide Disposal 69%

445,300 Tons Estimated Citywide Diversion 31%

1,445,300 Tons Generated Citywide FY'09

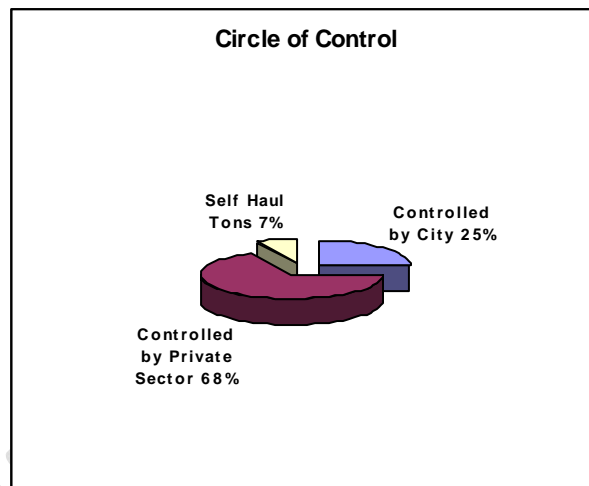
Circle of Control

360,500 Tons Controlled by City 25%

976,100 Tons Controlled by Private Sector 68%

108,700 Self Haul Tons 7%

1,445,300 Tons Generated Citywide FY'09



1.5 Department Evolution

Historically, the role of the Department, once named the Austin Sanitation Department, was to pick up household waste, dispose of dead animals, and sweep streets under the mission of creating a cleaner city through sanitary measures. Over time, the Department's name was changed to reflect an enlarged mission based on the growing need to collect and landfill residential solid wastes in a sanitary landfill, thus the department name - Solid Waste Services. As residents became more environmentally conscious, recycling and yard trimming collections services were added, creating an integrated materials management system.

Throughout this history, the material collected was treated as wastes. Even recyclables and compostables collected were treated as diverted waste streams. Zero Waste is a paradigm shift from waste management to materials management, with a new approach toward treating the material collected as resources that have a secondary life, not as waste streams. Thus, Zero Waste is another turn in the Department's life, redirecting resources toward resource recovery.

With the advent of Zero Waste, material collected at the curb is now viewed as a commodity; material that can be reclaimed as a resource for new product manufacturing. Essentially, we are on the cusp of viewing disposables as raw materials for local industries. This new perspective treats the material as a resource that is recovered for a second life, rather than a waste stream destined for a landfill. With this paradigm shift, the Department name of Solid Waste Services no longer represents the Department's mission. As the Department embraces the Zero Waste goal established by the Austin City Council in January 2009, the corporate name of the Department will change to better reflect the Department's new vision and mission.

Section 3 Zero Waste

3.1 What is Zero Waste?

The Austin City Council endorsed Zero Waste as a significant goal for the City. In doing so, the Council acknowledged that disposing of waste is not inevitable. Zero Waste is a paradigm shift. Recyclables are what we once kept out of the trash. With Zero Waste, trash is what we have left over after we reduce, reuse, recycle, and compost. As the City of Austin travels along the path toward Zero Waste, the Solid Waste Services Department (Department) is transforming from an agency focused on materials management collection to one focused on materials resource management.

The Zero Waste International Alliance presents a peer-reviewed, internationally accepted definition of Zero Waste:

Zero Waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use.

Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them.

Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal or plant health.¹

In this Master Plan, the term Zero Waste will mean the reducing the generation of discarded materials at the source and maximizing diversion methods to avoid landfills and incinerators. The overall goal is to strive for no waste burned or buried.

3.2 Austin City Council Support

In 2005, in honor of the United Nations World Environment Day, the City signed the Urban Environmental Accords.² The Accords are a declaration by participating city governments to build ecologically sustainable, economically dynamic, and socially equitable futures for their residents.

Signatories to the Accords agree to perform the following actions:

- Implement user-friendly recycling and composting programs to reduce per capita solid waste

¹ Zero Waste International Alliance, Zero Waste Definition, <http://www.zwia.org/> (accessed November 3, 2010)

² United Nations World Environment Day, Urban Environmental Accords
www.sfenvironment.org/downloads/library/accords.pdf (accessed January 3, 2011)

sent to landfill and incineration by 20 percent by FY2012;

- Adopt a citywide program that reduces the use of a disposable, toxic, or nonrenewable product category by at least 50 percent by FY2012; and
- Establish a policy to achieve Zero Waste going to landfills and incinerators by FY2040.

In 2007, the City of Austin adopted its Climate Protection Plan³ to reduce greenhouse gas emissions, a primary contributor to climate change, and make Austin the leading city in the nation in the fight against anthropogenic global warming. Landfills are one of the largest sources of methane, a powerful greenhouse gas which is 21 to 75 times more potent than carbon dioxide.⁴ The City can significantly reduce its greenhouse gas emissions levels through waste reduction and recycling. Recycling can reduce greenhouse gases both by reducing methane generation at landfills and by saving energy through recycling.⁵

In November 2007, the City of Austin hired Gary Liss and Associates to develop a community-based Zero Waste strategic plan. In January 2009, Austin City Council adopted a resolution adopted the Austin Zero Waste Strategic Plan (“the Strategic Plan”). The Council Resolution is recorded as follows:

CITY COUNCIL RESOLUTION

No. 20090115-050

WHEREAS, consistent with its goal to make Austin the most livable city in the country, the Austin City Council adopted Resolution No. 20050519-44 in May 2005 supporting the United Nations Environmental Accord and committed the City to achieving a 20 percent reduction in per capita solid waste disposal to landfills and incinerators by 2012, and Zero Waste to landfills and incinerators by 2040; and

WHEREAS, Zero Waste is an ambitious goal to divert 90% of waste from landfills and incinerators by 2040 using a “whole system” approach to evaluate and manage the flow of resources and waste created by our communities; and

³ *Austin Climate Protection Plan*, www.ci.austin.tx.us/acpp/downloads/acppplan_overview.pdf (accessed January 3, 2011)

⁴ *Stop Trashing the Climate*, Institute for Local Self-Reliance, June 2008
http://www.stoptrashingthecclimate.org/fullreport_stoptrashingthecclimate.pdf (accessed January 3, 2011)

⁵ *Waste Management and Energy Savings: Benefits by the Numbers*, Anne Choate and Henry Ferland, (Washington, D.C., U.S. EPA, September 4, 2005)

WHEREAS, Austin is part of a regional waste management system within the Capital Area Planning Council of Governments (CAPCOG) region; and

WHEREAS, as the Capital Area continually grows, outpacing other Texas communities, the region will be faced with a need to expand existing landfills, open new landfills, or divert a drastic amount of waste from current landfills to properly ensure the health and safety of the region. Austin's Zero Waste Plan seeks to extend the life of existing landfills while acknowledging that a certain amount of residual waste is inevitable; and

WHEREAS, the City Council adopts the Zero Waste Strategic Plan, attached hereto as Exhibit A and hereafter referenced as the "Plan," as a long term planning vehicle and further directs the City Manager to incorporate the Plan into the development of a Solid Waste Services Master Plan. City Council recognizes that the policy and program recommendations in Section C of the Plan may necessitate changes to rules, ordinances, and/or policies and will require on-going collaboration with key stakeholders, public private partnerships, and close coordination with public and privately owned regional waste disposal facilities and recycling and compost operations; and

WHEREAS, Austin recognizes the need to encourage and assist in the development of one or more public and/or public/private material recovery facilities which can respond to the solid waste and recyclables markets through composting recycling, landfilling and other appropriate means of solid waste management; and

WHEREAS, in 2007, the City hired to work with community members and develop a Zero Waste Strategic Plan;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF AUSTIN:

The City Council adopts the Zero Waste Strategic Plan, attached hereto as Exhibit A and hereafter referenced as the "Plan," as the long term planning vehicle. City Council recognizes that the policy and program recommendations in Section C of the Plan may necessitate changes to rules, ordinances, and/or policies, and will require on-going collaboration with key stakeholders, public

private partnerships, and close coordination with public and privately owned regional waste disposal facilities.

City Council approval is required for any changes to existing policies in effect as of January 14, 2009 with regard to control over pricing, collection and disposition of commercial solid waste and commercial recyclable materials, or to impose surcharges to, or limit the rights of, area landfill operators to receive waste.

City Council recognizes that the successful implementation of the Plan and achievement of Zero Waste will require the adoption of policies and procedures designed to encourage all stakeholders to work cooperatively toward this ambitious goal.

The City Manager is directed to continue to inform and involve the City Council, the Solid Waste Advisory Commission, and other stakeholders as work progresses on specific programs, and to seek City Council approval on changes to policy and ordinances.

BE IT FURTHER RESOLVED:

The City Council directs the City Manager to develop an interim Zero Waste infrastructure transition plan to manage and implement the following four Zero Waste policy priorities pending completion of the Solid Waste Master Plan:

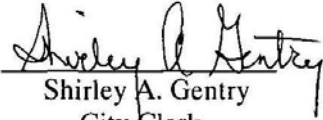
1. Lead by example. Evaluate departmental waste streams for baseline data and future monitoring within one year of adoption of the Plan. Within three years of adoption of the Plan, frame, develop and implement, where appropriate and feasible, waste diversion programs with input from City Departments.
2. Consider and implement proactive education and enforcement methods for the Commercial and Multi-family Recycling regulations. Develop and present to City Council City Code amendments as necessary to require recycling at all commercial enterprises and multi-family residences and include them in the stakeholder process. The proposed City Code amendments should become effective in phases over a three year period.
3. Reach out to institutions, industrial facilities, and manufacturers, to encourage them to adopt and implement zero waste goals.

4. Promote composting to remove organic material and compostables from landfills, which is necessary to reduce methane and carbon emissions. First, identify the best strategies to promote on-site composting at work and home. Second, evaluate infrastructure for residential curbside, commercial, and institutional composting; develop strategies to increase composting capacity; and implement a pilot curbside composting program when composting capacity is available.

The City Council further directs the City Manager to pursue the following Zero Waste items, as staff time and funding permits:

- Until the Master Plan can provide recommendations on the Pay-As-You-Throw rate structure, build on the progress made in the FY09 budget and make the Pay-As-You-Throw rates incentivize waste diversion and fully fund zero waste initiatives and SWS operational requirements.
- Develop and present to City Council, City Code amendments or implement rule changes as necessary to encourage sustainable practices, including recycling and other zero waste practices, at events that require the use of public facilities and rights of way, starting with large events.
- Develop an education program for Appendix D of the Plan, identifying the various resources available to the community.
- Allocate staff time and resources to work with local government officials across Texas to launch a Texas Product Stewardship Council.
- Evaluate and develop a public and private partnership for neighborhood reuse center (possibly a pilot program).
- Play an active role in lobbying the state legislature to improve the Texas Computer Take Back Law and expand producer take back to other products such as TVs, fluorescent lighting, pharmaceuticals, non-rechargeable batteries, etc.
- Recognizing the legislative limits of flow control over landfills, begin a dialogue with regional partners to evaluate ways to influence flow control and enhance Zero Waste in the CAPCOG region.
- Evaluate advancements in technology and facilities that help the city/region achieve zero waste with an emphasis on the economic and environmental impact.

- Encourage existing landfill operators to collect methane gas, and initiate a study of issues surrounding the use of landfill methane as an energy resource and its implications for the City's goals regarding zero waste and climate protection.

ADOPTED: January 15, 2009 **ATTEST:** 
Shirley A. Gentry
City Clerk

3.3 Austin Zero Waste Strategic Plan

The City of Austin Solid Waste Advisory Commission (SWAC) and Department staff developed a scope of work for the Strategic Plan. The City then solicited for a consultant to develop a Zero Waste Strategic Plan that would:

- Consider current and planned public and private solid waste infrastructure;
- Consider the City of Austin's Climate Protection Program and the United Nations Urban Environmental Accords goal to reduce by 20% the per capita solid waste disposal to landfills by FY12 and Zero Waste by FY40;
- Emphasize reduction, reuse, and recycling of waste;
- Include a specific timetable for each priority, including actions to be taken for the greatest impact on the diversion of materials sent to landfills;
- Estimate order of magnitude costs for each priority action;
- Include public education and outreach to promote the concepts of the plan;
- Integrate the concept of eco-industrial parks;
- Include effective methodologies for maximizing Producer Responsibility;
- Address applicable rules, regulations and policies necessary to support Zero Waste goals;
- Address rules, regulations, policies and infrastructure investments that constitute barriers to achieve these goals; and
- Obtain input from the Task Force and SWAC, and seek input from a broad range of stakeholders, including businesses, environmental organizations, and the community at large.

In November 2007, the Austin City Council awarded the solicitation to Gary Liss & Associates to develop the Zero Waste Strategic Plan for the City of Austin. The Strategic Plan summarizes the analysis and

input received from the community on Zero Waste and makes recommendations for the City of Austin on how to proceed toward Zero Waste.

“Although there are several recommendations included in this Plan, there is no one right way to get to Zero Waste. Many paths can be taken. Zero Waste is about the commitment and the journey. Austin has taken the first step to commit to this goal.”⁶

3.4 Austin Zero Waste Goals

The Austin City Council established three major benchmark goals for achieving Zero Waste:

- Reducing by 20% the per capita solid waste disposed to landfills by FY12,
- Diverting 75% of solid waste from landfills and incinerators by FY20, and
- Diverting 90% of solid waste from landfills and incinerators by FY40.

To achieve these goals, this Solid Waste Services Master Plan (“the Master Plan”) provides a roadmap toward Zero Waste. Since Zero Waste is a paradigm shift from the traditional waste management model, these goals establish benchmarks the City is committed to in the journey toward Zero Waste. Because it is necessary to dedicate resources each year toward these goals, interim benchmarks are necessary to gauge progress toward these ambitious goals. The Master Plan establishes the following benchmark goals:

- 50 percent by FY2015
- 75 percent by FY2020
- 85 percent by FY2025
- 90 percent by FY2030
- 95+ percent, working towards Zero Waste by FY2040
- Restorative Economy by FY2050

The City’s diversion goals are based on the citywide generation of discarded materials, including materials generated by residents, businesses, and visitors. The Department handles about 25 percent of discarded materials generated in the City. In FY2010, the Department diverted about 38 percent of these materials from the landfills.

⁶ Gary Liss & Assoc, 2009, http://www.ci.austin.tx.us/sws/downloads/zerowaste_plan.pdf

The Zero Waste policies and programs identified in the Master Plan are slated for implementation in the short-term (FY2012 - FY2015) and in the mid-term (FY2016 – FY2020). Most of the Zero Waste infrastructure will be developed within those time horizons as well. In planning and implementing its Zero Waste policies and programs, the Department will monitor its successes and seek out new opportunities for innovation and advancement in Zero Waste policy development. The Master Plan is designed to be a living document with implementation steps, annual reports, and program assessments every five years.

By FY2050, the City will contribute to a restorative economy. The concept of a “restorative economy” was coined by Paul Hawken:

In a restorative, “least cost economy,” we move to that system of agriculture, forestry, transportation, construction, and communication that has the least cost to the environment... In a least-cost system, those resources, our “natural capital,” are valued at their true replacement cost. Instead of competing to produce the cheapest goods in terms of price, we compete to produce the goods and services we need according to which have the lowest impact on those resources, and thus the lowest cost to current and future generations.⁷

The City’s ultimate Zero Waste vision is to move beyond Zero Waste systems to an economy based on maximizing the value of goods and services while reducing the impact of our ecological footprint in the environment.

3.5 Highest and Best Use

In addition to reducing the generation of discarded materials, the economic development potential of reusing valuable discarded materials locally is an important community value in Austin. The City can encourage local economic development by collaborating with businesses, institutions and the community to adopt policies and programs that incentivize, encourage, or require more environmental responsibility to stimulate a sustainable green market economy.

To efficiently and effectively reuse materials locally, the City has recognized the benefits of source-separation. In its Zero Waste Strategic Plan,⁸ the City established its Highest and Best Use Hierarchy.⁹

⁷ Excerpted from *The Restorative Economy* by Paul Hawken
<http://www.well.com/user/suscon/esalen/participants/Hawken/statement.html> (accessed January 23, 2011).

⁸ *Austin Climate Protection Plan*, www.ci.austin.tx.us/acpp/downloads/acppplan_overview.pdf (accessed January 3, 2011).

ZERO WASTE HIGHEST AND BEST USE HIERARCHY

Highest Use



Redesign Manufacturing & Supply Chain

- Mandate Extended Producer Responsibility
- Produce durable, reusable, recyclable, and recycled-content products
- Use environmentally sustainable feedstocks & materials
- Design for repair, reconditioning, disassembly, deconstruction and recycling
- Make brand owners/first importers responsible to take back products & packaging

Reduce/Refuse/Return

- Reduce Toxicity
- Reduce toxic materials in products
- Replace toxic materials in products with less toxic or non-toxic alternatives
- Reduce Consumption
- Purchase and use less
- Apply Environmentally Preferable Purchasing standards to purchasing
- Reduce Packaging
- Purchase products with less packaging
- Incentive durable, reusable packaging

Reuse/Preserve Form & Function

- Repair and recondition products
- Deconstruct and salvage buildings and building products
- Support thrift stores and charity collection

Recycle/Compost/Digestion

- Recover & return materials to economic mainstream for remanufacture to like-value products
- Recover & return materials to economic mainstream for composting to value-added soil amendment products
- Ambient temperature (<200 degrees) processing of organic materials for recovery of fuels and energy, with composting of residue

Down Cycle

- Recover & return materials to economic mainstream for remanufacture to non- or marginally-recyclable products, such as office paper to tissue paper, or soda bottles to toys or clothing

Waste-Based Energy

- Biological energy recovery technologies, including anaerobic digestion
- Thermal energy recovery technologies including gasification, plasma arc, pyrolysis

Bury/Incinerate

- Bioreactor landfilling, when design incorporates sufficient safety & environmental protections
- “Beneficial” landfill use, such as alternative daily cover or landfill construction
- Traditional landfilling

Lowest Use

⁹ *Austin Zero Waste Strategic Plan*, December 4, 2008, Appendix H, page 47.

3.6 Materials Management

As the City of Austin travels its journey toward Zero Waste, the Department is evolving from a waste collection service provider toward a materials management agency.

“Materials management is an approach to serving human needs by using and reusing resources most productively and sustainability throughout their life cycles, minimizing the amount of materials involved and all the associated environmental impacts.”¹⁰

A materials management systems approach focuses on the life-cycle impacts of materials currently being disposed in landfills and the greenhouse gas emission reductions that are possible by diverting discarded materials from landfills through source reduction, reuse, remanufacturing, recycling and composting. Additional methods of material management include environmentally preferable purchasing policies, upstream re-design, extended producer responsibility systems and clean manufacturing practices.

The success of Zero Waste requires that we redefine the concept of "waste" in our society. In the past, waste was considered a natural by-product of our culture. Zero Waste communities recognize that proper materials management, not waste management, is at the heart of reducing waste sent to landfills.

At home, Zero Waste initiatives encourage reduced consumerism which is ultimately beneficial for each household budget. Zero Waste initiatives educate residents about conservation, reuse, and environmental purchasing patterns through delayed long-term payback. For businesses, Zero Waste initiatives cut costs, improve competitiveness and maximize environmental performance. At the local government level, Zero Waste initiatives reduce the unfunded mandate of trash collection, reduce operational costs, and attract economic vitality to the community.

Zero Waste is a philosophy and a design principle for the 21st Century that includes recycling but goes beyond recycling by taking a whole system approach to the vast flow of resources generated throughout society. It is a goal and guide for people to emulate sustainable natural cycles, where all discarded materials are resources for others to use. The Zero Waste system approach allows us to

¹⁰ Definition adapted from “sustainable Materials Management: The Road Ahead” (US EPA 2009)

examine the materials management opportunities at three major generation sources: Up-stream, Mid-stream, and Down-stream.

Reduce Up-Stream Discards– “Waste Avoidance”

Up-stream discards are defined as materials generated from mining operations (e.g., mining gas release, clear cut deforestation, and the resulting water shed pollution issues, etc.) that create raw mineral or material feedstock for the products our society consumes, and the transportation waste (e.g., vehicle emissions and fluids) to deliver products to market. For every ton of products reaching our local market shelves, seventy-one (71) tons of discards were created to mine, manufacture, store, and finally transport it to market.¹¹ These materials pose a challenge for local governmental control, but are created as a result of consumer demand for products and services. Therefore, this Master Plan addresses the necessary actions consumers, businesses and government can take to reduce the creation of up-stream discards through wise purchasing practices.

Reuse Mid-Stream Discards – “Discard Reuse”

Mid-stream discards are generated locally by every household, school, business, and governmental office, through material wasting inefficiencies, excess packaging, and unnecessary product discard. If the discarded materials generated at this level are not addressed, they become a financial burden to local government in the form of down-stream collection costs. Moving discards into a variety of reuse options eliminates collection costs and is the “heart of waste prevention”, saving local government and taxpayer money from unnecessary disposal expenses. Therefore, this Master Plan addresses the actions local consumers, businesses, and government can take to reduce the impact of mid-stream discards created at the local level through more aggressive reuse and conservation measures.

Recycle Down-Stream Discards – “End-of-Pipe Diversion”

Down-stream discards are generated locally by every household, school, business, and governmental office, with the intent to dispose of unwanted packaging, products, and other discarded materials. Discarded materials at this level must be collected, processed and sent to a final disposal facility. Down-stream captured materials are a direct financial burden to the local government for collection and processing, and include landfilling, composting, recycling and disposal of household hazardous wastes. If

¹¹ Source: USEPA 2006

discarded materials must be handled down-stream, the best options involve the support and expansion of existing recycling collection programs, composting opportunities (e.g. food collection programs, home and work on-site composting) and the reduction of toxics disposal through education and reuse programs. Thus, this Master Plan addresses what actions local consumers, businesses, and government can take to reduce the impact of down-stream discards created at the local level through more aggressive tactics in “rethink, reduce, reuse, recycle and compost.”

3.8 State and National Involvement

To take the journey toward Zero Waste, additional available resources must be utilized to achieve the community’s diversion goals. Participation in national and state efforts provides a platform to implement policies that address discarded materials generated up-stream and mid-stream. These national organizations provide discussion forums, training, networking, and public education opportunities. The Department values these educational opportunities, as innovation and cutting-edge materials management approaches are necessary to reach Zero Waste community-wide. The following state and national organizations are identified as resources for Austin’s Zero Waste efforts.

Zero Waste International Alliance (ZWIA)

The Zero Waste International Alliance was established “to promote positive alternatives to landfill and incineration and to raise community awareness of the social and economic benefits to be gained when discarded materials are regarded as a resource base upon which can be built both employment and business opportunity.”

The simple technology and methods required to achieve Zero Waste exist in every community around the world. The Zero Waste International Alliance can connect Austin to leaders in the field who can provide the Department with access to models, projects, and other resources.

The Zero Waste International Alliance:

- Initiates and facilitates research and information sharing for the promotion of Zero Waste
- Builds capacity to effectively implement Zero Waste
- Sets standards for the application of Zero Waste

The Zero Waste International Alliance operates at the international, national and local level and involves all sectors of society.

National Recycling Coalition (NRC)

The National Recycling Coalition (NRC) is a nonprofit organization dedicated to increasing and improving waste reduction, recycling, composting, and reuse in the United States. Founded in 1978, the NRC has over 4,500 members - including recycling and environmental organizations; large and small businesses; individuals; and federal, state and local governments.

The Coalition, based in Washington, DC, provides technical information, education, training, outreach, and support to its members. It also educates and informs the public on selected recycling issues, shapes public and private policy on recycling and operates programs that encourage recycling markets and economic development.

The goals of the NRC are to:

- Provide national leadership and coordination on recycling issues;
- Provide education and information on recycling;
- Promote increased collection and processing of recyclable materials; and
- Develop markets for recovered materials and products with recycled content.

Through their commitment to maximizing recycling, all NRC members are contributing to the common goal of conserving resources and energy, reducing solid waste, protecting the environment and contributing to social and economic development.

State of Texas Alliance of Recyclers (STAR)

The mission of the State of Texas Alliance for Recycling (STAR) is to promote and enhance recycling and diversion activities in the State of Texas. STAR accomplishes their mission by fostering communication and the exchange of information regarding recycling among professionals, organizations, governmental entities, and individuals; by complementing and coordinating recycling industry initiatives; and by acting as a clearinghouse of recycling resources.

Texas Product Stewardship Council (TxPSC)

The Texas Product Stewardship Council was formed by several local governments to shift Texas' product materials management system from one focused on government funded and ratepayer financed waste diversion to one that relies on producer responsibility in order to reduce public costs and drive

improvements in product design that promote environmental sustainability. TxPSC works to integrate the principles of product stewardship into the policy and economic structures of Texas.

TxPSC's vision is that producers have the primary responsibility to establish, fund, and manage end of life systems for their products with State government setting the performance goals and ensuring accountability and transparency.

TxPSC is an organization of local governments that work with State government, waste and recycling companies, water quality organizations, businesses of all types, non-profit organizations and product consumers to reduce waste and bring good public policy to the materials management industry.

Product Policy Institute (PPI)

Product Policy Institute is a non-partisan research and educational organization promoting policies that advance sustainable production and consumption, and good governance, in North America. Founded in 2003, PPI works with civic organizations, governments and business stakeholders to advocate for policies that establish cradle-to-cradle producer responsibility for products and packaging.

Product Stewardship Institute (PSI)

PSI provides clear, factual analysis and practical recommendations to inform and shape product stewardship policy, focusing on specific products as well as framework approaches. PSI designs, implements, and evaluates pilot projects, and includes recommendations for next steps and the potential for a national roll-out. PSI helps groups share information, identify common interests, reach agreement, and develop and implement priority strategies to promote and implement product stewardship.

PSI develops effective local, state, and federal product stewardship legislation, and harmonizes legislative approaches and elements. Coordinated state laws have the potential to create the foundation for future federal product stewardship legislation. Local legislation is also emerging as a potent force for change.

International City/County Management Association (ICMA)

Founded in 1914, the International City/County Management Association is the premier local government leadership and management organization. Its mission is to create excellence in local

governance by advocating and developing the professional management of local government worldwide. In addition to supporting its nearly 9,000 members, ICMA provides publications, data, information, technical assistance, and training and professional development to thousands of city, town, and county experts and other individuals throughout the world.

ICMA is a 501(c)(3) nonprofit organization that offers a wide range of services to its members and the local government community. The organization is an internationally recognized publisher of information resources ranging from textbooks and survey data to topical newsletters and e-publications. ICMA provides technical assistance to local governments in emerging democracies, helping them to develop professional practices and ethical, transparent governments. The organization performs a wide range of mission-driven grant and contract-funded work both in the U.S. and Internationally, which is supported by federal government agencies, foundations, and corporations.

Local Governments for Sustainability (ICLEI)

ICLEI - Local Governments for Sustainability is an association of over 1220 local government Members who are committed to sustainable development. Our Members come from 70 different countries and represent more than 569,885,000 people. ICLEI is an international association of local governments as well as national and regional local government organizations who have made a commitment to sustainable development.

ICLEI provides technical consulting, training, and information services to build capacity, share knowledge, and support local government in the implementation of sustainable development at the local level. Our basic premise is that locally designed initiatives can provide an effective and cost-efficient way to achieve local, national, and global sustainability objectives.

U.S. Conference of Mayors (USCM)

The U.S. Conference of Mayors (USCM) is the official nonpartisan organization of cities with populations of 30,000 or more. There are 1,210 such cities in the country today. Each city is represented in the Conference by its chief elected official, the mayor. The primary roles of The U.S. Conference of Mayors are to:

- Promote the development of effective national urban/suburban policy;
- Strengthen federal-city relationships;

- Ensure that federal policy meets urban needs;
- Provide mayors with leadership and management tools; and
- Create a forum in which mayors can share ideas and information.

North America Hazardous Materials Management Association (NAHMMA)

The North America Hazardous Materials Management Association (NAHMMA) is a professional organization established in November of 1993, dedicated to pollution prevention and reducing the hazardous constituents entering municipal waste streams from households, small businesses and other entities that may be exempt from local, regional or national regulations.

NAHMMA strives to create a membership-based, professional organization that unites the diverse entities that influence or have an interest in hazardous components of municipal waste streams (product manufacturers, government regulators, provincial, state and local materials management programs, waste handling businesses, non-profit environmental organizations and others) in an active, engaging association that promotes information sharing and cooperative problem solving. NAHMMA also strives to build consensus and foster public/private cooperation, and advance education, foster communication, encourage policy development, recognize exemplary programs and provide professional development opportunities.

Sierra Club – Lone Star Chapter

Sierra Club's mission is to explore, enjoy, and protect the wild places of the earth; to practice and promote the responsible use of the earth's ecosystems and resources; to educate and enlist humanity to protect and restore the quality of the natural and human environment; and to use all lawful means to carry out these objectives.

The Sierra Club adopted a landmark policy on Zero Waste at its Board Meeting in Atlanta, Georgia on February 23, 2008. The new Zero Waste policy provides governments at all levels with a leading-edge plan that links environmental health with economic prosperity: a win-win for business and the environment. The plan proposes specific roles for government, manufacturers, and consumers to address the waste crisis facing our country.

Governments are obligated to protect public health and the environment, but present materials management practices are not protective. In contrast, this Zero Waste Policy fosters an economic system that fully values people and the environment. The Sierra Club's Zero Waste policy addresses not only the quantity of waste generated, but also its toxicity, and its important links to climate change and corporate responsibility. Most importantly it aims to prevent waste by design rather than manage it after the fact.

DRAFT

Section 4 Sustainability

Product consumption contributes directly to climate change because material supply chains require energy for mining, extracting, harvesting, processing, storing, transporting, and distributing raw materials. Even more energy is required to haul products to landfills or to locations for re-processing. Electricity production to run factories, or fuel used for transportation directly contribute to greenhouse gas (GHG) emissions and land pollution.

Sustainability efforts are intended to reduce our environmental footprint including impacts on climate change, energy, water, and land use, and environmental quality including air and water quality. Waste prevention, recycling and composting are activities that support sustainability and slowing climate change. The Solid Waste Service Department's (Department) Zero Waste efforts assist the City in its sustainability efforts by encouraging resource efficiency and managing materials for a second life, rather than managing waste. Zero Waste ensures that products are collected to be reused, repaired, or recycled back into nature or the marketplace. Implementing Zero Waste systems reduce GHGs by:

- Reducing energy consumption associated with extracting, processing and transporting 'virgin' raw materials. Manufacturing with recycled materials uses less energy overall compared with manufacturing using virgin materials;
- Utilizing recycled content products reduces the release of greenhouse gases when compared to mining or harvesting of virgin materials. For example, using recycled paper leaves more trees standing that serve to sequester carbon. In addition, using recycled plastic reduces the reliance of the use of petroleum and eliminates the related environmental impacts of the extraction, transportation, and refinement of foreign based oil
- Reducing and eventually eliminating the need for landfills reduces methane released into the atmosphere. Methane gas is a potent greenhouse gas, 21 times more effective at trapping heat in the atmosphere than carbon dioxide. Each ton of municipal solid waste sent to a landfill produces 123 pounds of methane. (U.S. Environmental Protection Agency, April 1999, EPA 236-R-99-003)
- Reducing transportation impacts by establishing local end markets for the consumption of captured recyclables and compostable materials collected in the community.

Implementing the Austin Zero Waste initiatives has the potential to:

- Generate 1,000 to 5,000 new local green jobs in recycling and organics collection and processing, materials reuse and repair, and remanufacturing;
- Reduce Austin's annual greenhouse gas emissions by 800,000 to 3.6 million metric tons of carbon dioxide equivalent; and
- Reduce Austin's dependence on landfills.

The Department's Zero Waste and operational efficiency efforts will assist the City in its sustainability efforts through the following actions:

- Fuel usage reduction through vehicle routing efficiencies;
- Replacement of diesel fuel with compressed natural gas (CNG), hybrids, electrics, and other alternative fuels;
- Offset of Department Carbon Footprint through the establishment of a local carbon offset fund administered by the Austin Sustainability Office; and
- Fugitive methane emission reduction through reduction of landfilling waste and increase in composting volumes.

4.1 Sustainability's Triple Bottom Line

Sustainability means finding a balance among three sets of goals:

- prosperity and jobs,
- conservation and the environment, and
- community health, equity and cultural vitality.

It means taking positive, proactive steps to protect quality of life now, and for future generations.



Homegrown Prosperity

By investing in local people, companies and innovations, we can grow our own prosperity in a way that reflects Austin's unique character and emphasis on environmental stewardship. Economic sustainability is based on a thriving regional economy that emphasizes green business leadership, clean technology, and expanding opportunity for all. Core concepts include:

- Promoting prosperity, job growth, and affordable housing at all levels in the community.
- Supporting local businesses and buying local to keep our economy thriving.
- Encouraging creativity, resiliency, innovation, and collaboration.

Conservation & Environment

Sustainable communities "go green" by being good stewards of their natural resources. Avoiding waste and pollutants is one way that we can protect the Central Texas ecosystem. Austin is committed to leading the nation by example, as one of the greenest communities in the Country and by protecting the City's natural beauty. Core environmental conservation concepts include:

- Living within our means by meeting today's needs responsibly, without draining more than our generation's fair share of resources.
- Celebrating, protecting, and restoring Austin's green infrastructure by ensuring the protection of the trees and native plants, natural lands, open spaces, habitat, parks and waterways, in and around our city.
- Conserving raw material resources by exemplifying the principle of reduce, reuse, and recycle. We take action to reduce our climate and environmental "footprint."

Health & Equity

To sustain Austin's quality of life over time, we must promote community health, a shared sense of vitality, and bright prospects for all. Social equity is a core value. Our community's sustainability – and commitment to social equity – depends upon wellness, public safety, local fresh food, and active daily lifestyles. It requires compassionate help for our most vulnerable neighbors. Core concepts include:

- Defining sustainable progress as advancements in the health and well-being of all Austinites.
- Taking positive, proactive steps to equitably protect everyone's quality of life.
- Protecting against toxic pollution of our air, water and soil to safeguard everyone's health, including the next generation of children.

For more information about the City of Austin Office of Sustainability, visit:

<http://www.ci.austin.tx.us/sustainability/default.htm>

4.2 Department Sustainability Efforts

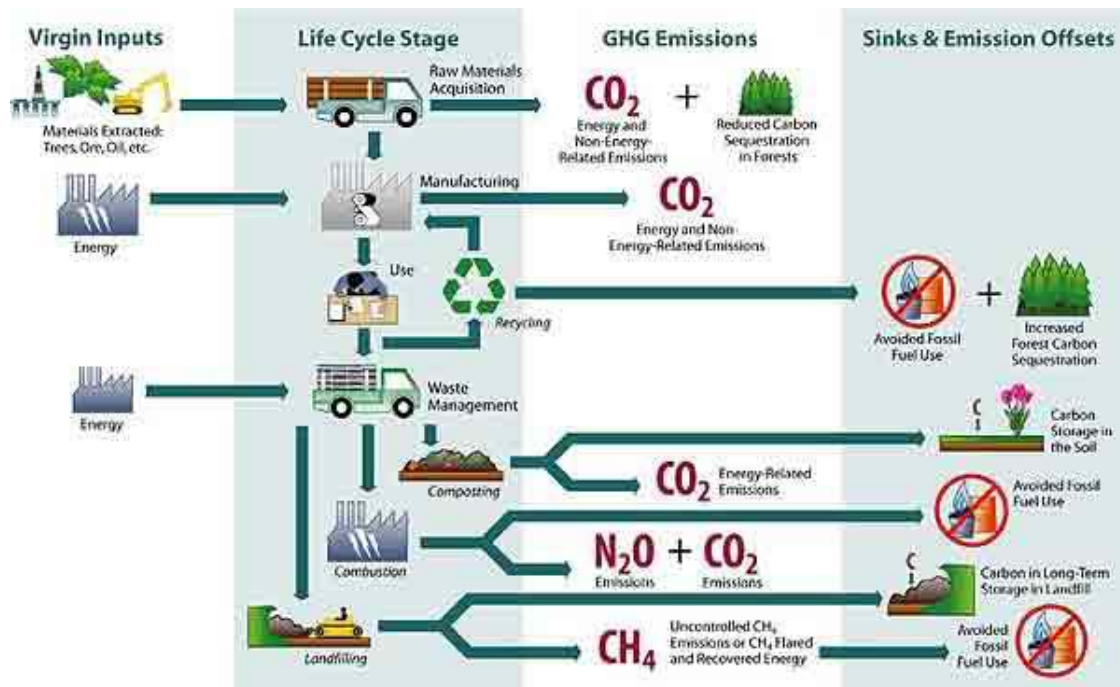
Based on these sustainability concepts, Zero Waste is an integral part of the City's climate change initiatives. The Department commits to a strong partnership with the Office of Sustainability and its Climate Protection Program. In addition, all department facilities, fleets and operations will be integrated in the City's sustainability efforts in part through Zero Waste initiatives and through Departmental operational efficiencies.

Zero Waste Synergy with Sustainability Efforts

The U.S. Environmental Protection Agency has been studying the links between solid waste and climate change for over a decade. Their website contains detailed analysis and summary steps that individuals and businesses can take to reduce their carbon footprint. The EPA graphic below highlights the different sources of GHG emissions from solid waste. The disposal of solid waste produces GHGs in a number of ways. First, the anaerobic decomposition of waste in landfills produces methane, a GHG gas that is twenty-one times more potent than carbon dioxide. Second, the incineration of waste produces various GHGs, including nitrous oxide and carbon dioxide as unwanted emissions. In addition, the transportation of waste to disposal sites produces GHGs from the combustion of the fuel used in the equipment. Finally, disposal of materials indicate that new products are being produced as replacements. This production often requires the use of fossil fuels to obtain raw materials and manufacture the items.

Source: USEPA, May 2011, *Reducing Greenhouse Gas Emissions through Recycling and Composting*, Materials Management & Product Stewardship Workgroup

Life Cycle of Waste



Austin Green Business Leaders Program

The Austin Green Business Leaders (GBL) Program provides an integrated approach for Austin companies to participate in existing sustainability programs in order to go green. The GBL Program consists of six primary focuses: Energy Conservation, Water Conservation, Waste Reduction, Water Quality Protection, Transportation, and Social Responsibility. Businesses may consider a menu of options within each focus area and adopt those initiatives that are appropriate for their situation. Many of the core sustainability initiatives are supported by the City through financial incentives, rebates, and technical consulting by City staff. Each focus area contains performance measures. The program is still under development, led by the Office of Sustainability along with the participation of several key departments. Currently, the area that promotes waste reduction offers the following required activities.

Waste Reduction (Resource Recovery)

1. Provide appropriately sized and labeled containers to effectively recycle at least five materials (Cardboard, mixed paper, aluminum, plastics (#1 and #2), and glass).
2. Consider a 3-bin system including Landfill Trash, Recycling and Organic Compost to reduce the amount of materials sent to the landfill for disposal.
3. Make sure every landfill-trash container has a corresponding recycling container of equal or greater size.
4. Use a networked multifunction printer that can copy and print double-sided, scan to file, and email so you can save money on toner, paper, and staff time.

Businesses are encouraged to complete a Waste Assessment through the Department's Waste Reduction Assistance Program (WRAP), a free on-site waste assessment that can show businesses ways to enact or expand recycling, reduce waste, reduce costs, and benefit the environment.

Solid Waste Services Department Climate Protection Plan

Concern about climate change has altered how communities handle and think about solid waste. The City signed onto the Urban Environmental Accords in 2005, committing Austin to reduce its waste per capita by 20% by 2012 and achieve Zero Waste by 2040. In 2007, the City of Austin adopted the Austin Climate Protection Plan (ACPP), setting an ambitious goal of making Austin the leading city in the international fight against climate change. The intent of the ACPP is to reduce greenhouse gas emissions, the primary contributor to climate change. The ACPP elements include:

- Municipal Plan - Make City of Austin facilities, fleets and operations carbon-neutral by 2020.
- Utility Plan - Expand conservation, energy efficiency, and renewable energy programs to reduce Austin Energy's carbon footprint; cap carbon dioxide emissions from existing power plants; and make any new electricity generation carbon-neutral.
- Homes and Buildings - Update building codes for new buildings to be the most energy-efficient in the nation, pursue energy efficiency upgrades for existing buildings, and enhance Austin Energy's Green Building program.
- Community-wide - Engage Austin citizens, community groups, and businesses to reduce greenhouse gas emissions throughout the community.
- "Go Neutral" Plan - Provide tools and resources for citizens, businesses, organizations, and visitors to measure and reduce their carbon footprint.

The Climate Protection Program was incubated at Austin Energy and in early 2011 the program became part of the Office of Sustainability. To address elements of the ACPP, the Department adopted its own Department Climate Protection Plan (DCPP). The DCPP achieves the following four objectives:

1. Establishes greenhouse gas reduction targets for the SWS Department.
2. Identifies the measures the SWS Department's employees will implement to attain these targets.
3. Outlines a plan to monitor and report on the SWS Department's progress in meeting its targets.
4. Commits the SWS Department to consider the impact climate change may have on its ability to achieve its mission or deliver its services.

Department Climate Protection Plan - Goals

The Department is committed to reducing its carbon footprint through implementing cost-effective energy, water, fuel, and waste reduction measures; adopting environmentally friendly purchasing practices; and educating employees on ways to reduce their climate impact. The following goals were established:

Energy

- Reduce departmental energy use by at least 5% per non-field full-time equivalent by 2012.
- Reduce departmental energy use by at least 5% per square foot by 2012.
- Enroll in 100% GreenChoice Power by 2012.

Water

- Reduce departmental indoor water use by at least 1% per FTE by 2012.

Transportation

- Reduce gas consumption by at least 1% per year among SWS service fleet, beginning in 2012.
- Improve average miles per gallon rating of new SWS service fleet by 2% for each new service vehicle purchased by 2012.
- Improve average miles per gallon rating of non-service fleet by at least 5% by 2012.

Waste

- Within the SWS Department, reduce and/or divert office generated waste by 3% per year to achieve a 90% reduction and/or diversion of waste by 200.
- By 2040, reduce and/or divert customer generated waste by 90%.

Purchasing

- By 2012, identify the top 10 commodity families (by \$ spent) where additional environmental criteria or minimum standards would help to provide guidance to departmental buyers.
- Incorporate “Best Value” contract selection criteria into the solicitation process where appropriate.
- By 2012, eliminate all purchases of Styrofoam cups, chlorine bleach used for cleaning, virgin (no recycled content) printer/copier paper, and incandescent light bulbs where alternatives exist.

Education

- By 2013, have 100% of employees complete the Austin Climate Protection Training seminar or a similar program approved by the Climate Protection Program.
- Hold at least one climate protection-related training session semi-annually.
- Hold at least one Zero Waste-related training session semi-annually.

The Department will measure its progress on each of these goals through an annual assessment including assessing actual conditions, implementing greenhouse gas (GHG) reduction measures, and appointing a responsible party to ensure adherence to reduction measures.

4.3 Carbon Footprint Reduction Efforts

The Austin Zero Waste initiatives, outlined in the Department’s Master Plan, will significantly reduce the City’s GHG emissions through new material management practices and operational efficiencies.

The U.S. Environmental Protection Agency (U.S. EPA) developed the WASTE Reduction Model (WARM) to help planners and organizations track and voluntarily report GHG emissions reductions from several different discarded materials management practices.

WARM calculates and totals GHG emissions for baseline and alternative discarded materials management practices—source reduction, recycling, composting, and landfilling. The model calculates emissions in metric tons of carbon equivalent (MTCE), metric tons of carbon dioxide equivalent (MTCO₂E), and energy units (million BTU) across a wide range of material types commonly found in municipal discards.

Based on the estimated diversion rates in the Department Master Plan, the GHG reduction potential estimated by WARM is shown below.

GHG Reduction Estimates

	2015	2020	2030	2040	2050
MTCO ₂ E ¹	(830,000)	(1,490,000)	(2,526,000)	(3,036,000)	(3,612,000)
Equivalent number of cars removed from the road	152,000	273,000	463,000	556,000	662,000

¹Metric Tons of Carbon Dioxide Equivalent

Source: EPA 910-R-11-003 Publication, May 2011,
http://www.epa.gov/region10/pdf/climate/wccmmf/Reducing_GHGsthrough_Recycling_and_Composting.pdf

Routing Efficiencies

Vehicle fuel usage and route efficiencies affect the Department's efforts to meet the City's sustainability objectives. The Department will invest in new routing software and upgrade its GPS tracking system. Integrating GPS sensor data with the routing program will yield detailed operational reports that will assist staff in establishing fuel efficient routes for trash, recycling, and organics collection routes, as well as street sweeping routes.

The Department is evaluating its routing efficiencies in nine sections of the city, based on participation and setouts. The results of this evaluation will be utilized to restructure the vehicle routes and implement operational efficiencies in miles driven to reduce our carbon footprint. The fuel efficiency and carbon footprint of the Department will be calculated and tracked to determine the success of any changes to the Department's fleet and routes.

CNG and Alternative Fuels

The Department will explore improving fuel efficiency of its fleet through the purchase of vehicles that use compressed natural gas (CNG), hybrid technology, and other alternative fuel technologies. In addition, the Department will explore alternative CNG fueling locations to increase reliance on CNG vehicles and reduce mileage traveled from the routes for fueling purposes.

The Department's fleet is composed primarily of diesel-powered vehicles. Due to the nature of the Department's business and heavy loads transported, the trucks yield poor fuel economy and produce a significant carbon footprint. The ability to improve fuel efficiency while decreasing the amount of carbon dioxide and nitrous oxide generated will require a substantial capital investment in new equipment. The

City's Fleet Department acquired a federal grant to purchase 19 CNG vehicles and four hybrids in FY 2011-12. In addition to investing in more CNG vehicles, the Department may also choose to purchase hybrid trucks that can save an estimated 30 percent on fuel consumption per mile driven. The resulting fuel savings will produce a net decrease of carbon emissions from the Department's fleet.

As vehicles are replaced on a seven-year replacement schedule, the Department will acquire alternative fuel service vehicles. CNG, Hybrids, and All-Electric vehicles will be purchased as replacements of retiring vehicles. The Department, with assistance through Fleet Operations, will explore federal grant opportunities to subsidize any added costs.

An additional challenge will be the added expense of providing multiple fueling locations. As the City invests in new alternative fuel vehicles, the Department and other internal and external partners are considering options for an alternative refueling facility site in the northern part of the City. Currently, CNG vehicles have an approximate range of 132 miles per tank, whereas diesel vehicles have an average range of 350 miles. The northern most routes are 72 miles roundtrip from the landfill, not including miles driven to service the route itself. To efficiently refuel the Department's vehicles and maintain route efficiencies, a fueling center must be located in the northern part of the City, in addition to the current fueling center at the South Service Center.

Carbon Offset Fund

The Department will establish a Carbon Offset Fund in October 2012 to assist in the offset of Department's carbon footprint. The City signed an agreement with two recycling processing facilities to begin servicing the single stream recycling program. The contractual agreements with Balcones Resources and Texas Disposal Systems require a set-aside of funds through a Facility Fee. These funds will be awarded to the Department monthly, and be deposited into a carbon offset fund administered by the Office of Sustainability. Expenditures from this fund will be allocated to activities that reduce the City's carbon footprint and/or capture carbon to reduce impact on the earth.

Sequestration Efforts

Carbon sequestration is the capture of carbon dioxide (CO₂), as the major pollutant affecting climate change. Carbon dioxide is naturally captured from the atmosphere through composting processes, soil enrichment on agricultural lands, and through reforestation.

To support the City's sustainability efforts, the Department will offset its carbon footprint through efforts in the reduction of landfill waste, increased composting volumes, and tree planting.. The use of landfills have been noted as a possible carbon sink, however even the best managed landfills will have breeches in the protective liners, leachate collection systems, and geo-membrane cap. These landfill failures can lead to land, water, and air pollution and may include uncontrolled releases of carbon in the form of methane or other gases. Thus, the use of landfills is not a Department endorsed sequestration method.

STAR Community Index

Austin has been selected as one of 10 cities nationally to help refine the STAR Community Index, a tool for measuring city sustainability being developed by ICLEI – Local Governments for Sustainability. The STAR Community Index will enable local governments to analyze, map, and manage sustainability data in one place and to present that information to the public as well as internally. It is also expected to evolve into a nationally recognized rating system, allowing cities to rank themselves on sustainability using national sustainability standards.

The Department will commit resources toward this project in an effort to seek new measures for reducing the City's carbon footprint. The STAR Community Index sustainability goals that the Department will directly support include the following:

- Waste Minimization - Minimize waste and optimally recycle material resources to protect natural systems by reducing resource extraction, greenhouse gas emissions, and air and water pollution.
- Ecological Literacy - Provide residents with the informational and material resources they need to think critically about and address environmental problems and solutions, and include the environment as an important consideration in their work and daily living.
- Toxicity Reduction - Reduce toxic exposure and manage materials streams to minimize the use and production of toxic substances throughout product and material life cycles.

Section 9 Materials Management

9.1 Conceptual Basis for Materials Management

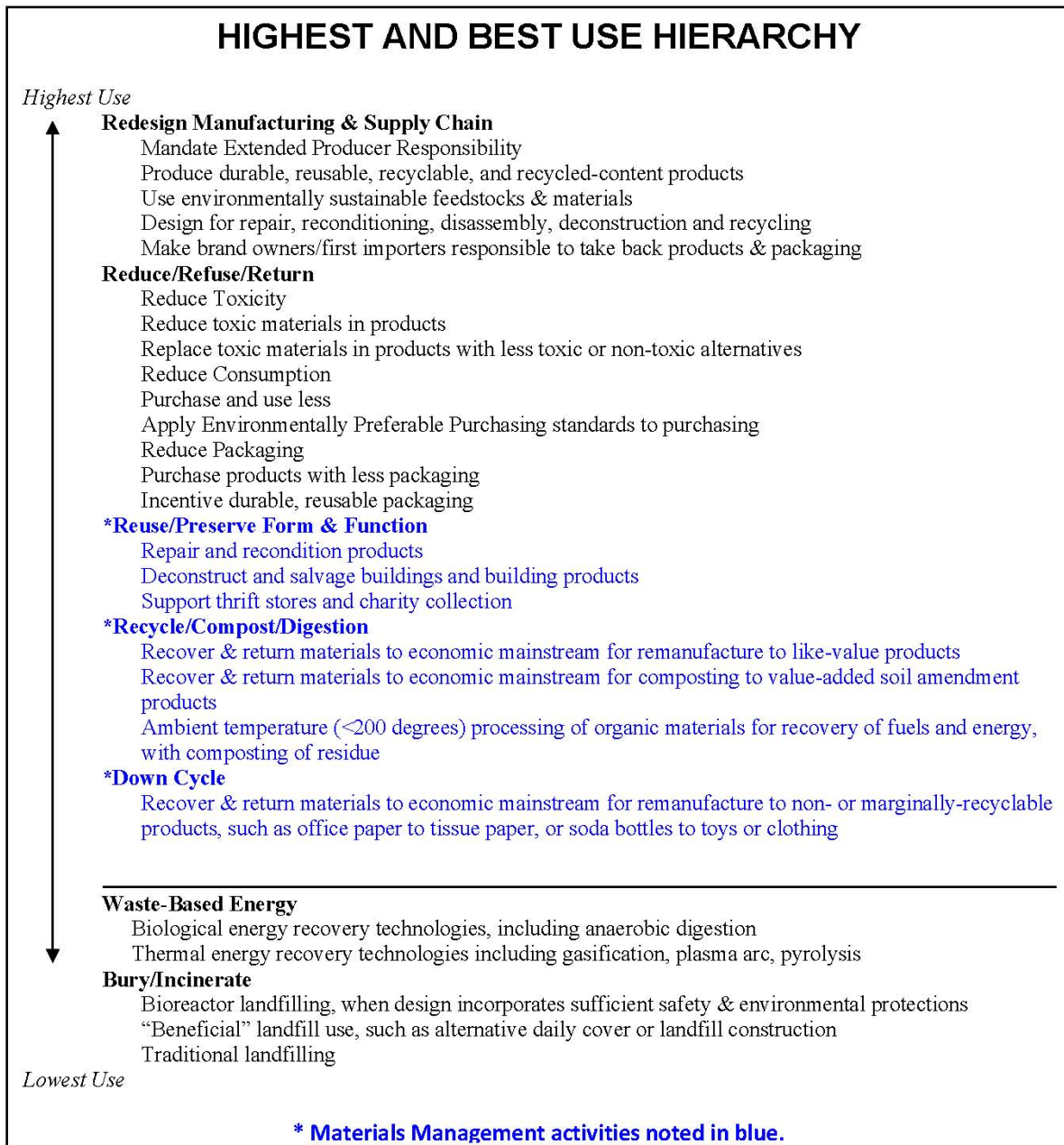
Materials management uses and reuses resources at their highest and most productive level throughout the materials' life cycle. A materials management systems approach considers the life-cycle impacts of disposal and carbon footprint reductions from source reduction, reuse, remanufacturing, recycling and composting. Environmentally preferable purchasing policies, upstream re-design, extended producer responsibility systems and clean manufacturing practices are additional methods of material management.

Zero Waste is a goal and guide for people to emulate sustainable natural cycles, where all discarded materials are resources for others to use. The Zero Waste system approach allows us to examine materials management opportunities. The following sections describe planned materials management facility development to support the Zero Waste mission. These facilities will address the physical repurposing of residential discards. Additional resources are needed to support materials management through product redesign and product stewardship measures, addressed in the Policies Section of the Master Plan.

9.2 Materials Management - Highest and Best Use

In addition to reducing waste generation, materials management provides the City with the economic development potential of reusing valuable discarded materials locally. The City can encourage local economic development by working with stakeholders to adopt policies and programs that incentivize, encourage, and even require more environmental responsibility or use of locally produced products made of recycled content to stimulate a sustainable green market economy.

In the Department's Strategic Plan, the City established its Highest and Best Use Hierarchy (posted in Section 3 – Zero Waste). The general principle of Highest and Best Use applies to the Department's efforts to manage discarded materials for secondary reuse. The following chart outlines the Materials Management section of the Highest and Best Use Hierarchy.



9.3 Twelve Market Categories of Recyclable Materials

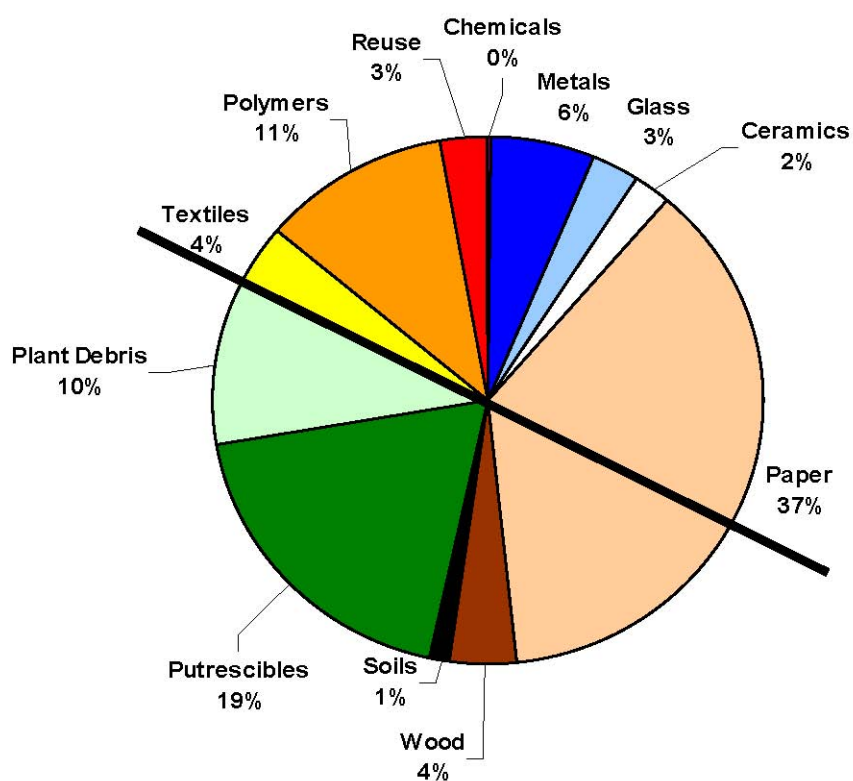
A materials management systems approach diverts materials currently being disposed in landfills through source reduction, reuse, remanufacturing, recycling and composting. All discards can be sorted into twelve (12) basic categories of divertable material, representing 90% of the overall waste stream. This displays that 90% of the discards are either recyclable or compostable in today’s marketplace. To achieve this level of diversion requires 100% of public participation and no loss of materials in the collection, transport and processing processes. Thus, one major activity level of the Department will be to develop the local infrastructure to recover, process and market the recyclable and compostable

streams. However, the main key toward achieving 90% diversion is through public participation, requiring public education, collection convenience and social marketing campaigns. The remaining 10% will be addressed through product redesign, the elimination of single-use disposables, and product stewardship.

An overview of the current American material (waste) stream is presented in the following pie chart.

Material Stream Analysis

Market Categories



These categories were developed by Dr. Daniel Knapp, Urban Ore, Berkeley, California, <dr.ore@urbanore.us>

This characterization of the disposed materials displays the 12 major categories by percentage. Materials presented above the dissecting line represent recyclables and reusables, while materials presented below the line represent compostables. A more detailed analysis of these 12 categories of material is presented in the chart below.

TWELVE MAJOR CATEGORIES of		
-----------------------------------	--	--

DISCARD MATERIAL	CLUSTERS	PROCESSING CENTERS
37% Paper 6% Metals 3% Glass 11% Polymers	Paper and containers; Paper, Metals, Glass, Polymers	Recyclables; Papers, plastic, glass and metal containers
19% Putrescibles 10% Plant Debris 4% Wood	Organics; Food, vegetative debris, food dirty paper, paper, plant debris, putrescibles, wood	Organics; Food, vegetable debris, and food paper, putrescibles, untreated wood and sheetrock
3% Reusable 4% Textiles	Discarded Items; Furniture, appliances, clothing, toys, tools, reusable goods, textiles	Reuse & Repair; Reuse, repair, dismantling, reconditioning, remanufacturing, manufacturing and resale of furniture, large and small appliances, electronics, textiles, toys, tools, metal and ceramic plumbing, fixtures, lighting, lumber and other used building materials
2% Ceramics 1% Soils 0.5% Chemicals	Special Discards; Chemicals, construction and demolition materials, wood, ceramics, soils	C and D; Rock, soils, concrete, asphalt, brick, land clearing debris, and mixed construction and demolition materials
10% No market (diapers, treated wood, etc.)		Regulated Materials Used motor oil, paint, pesticides, cleaners, and other chemicals Product Redesign Extended Producer Responsibility, Design for recycling

As the characterization of the discarded materials do not directly represent the City of Austin waste stream, the Department plans on conducting a waste characterization study of its various waste streams through an inter-local agreement with the University of Texas at Austin. This agreement will employ college interns, trained through a Zero Waste consultant, to perform a 12 market inventory of the City residential, commercial, industrial and institutional waste streams. The results of this study will enable the Department to focus on marketable materials currently disposed in local landfills.

New Resources: Waste Characterization Study

Additional staff resources and college interns will be dedicated to provide planning and management of the waste characterization study. Additional resources are needed to equip the interns with the proper sorting and safety equipment. The Department will contract with a Zero Waste consultant to train the interns and manage the project. Staff follow-up through planning and deployment of materials management programs will be developed upon analysis of the study results. The waste characterization study will be performed every five years to measure diversion progress and refocus diversion programming. Department additional resources include a 0.5 full time equivalent (FTE) Waste Planner estimated to be approximately \$40,000.

City Implementation Tasks for Waste Characterization Study

Task	Lead Responsibility	Participants	Schedule
1. Establish an inter-local agreement with UT-Austin	Strategic Initiatives Division	UT-Austin	2011 and ongoing
2. Contract with zero waste consultant to manage study	Strategic Initiatives Division	UT-Austin	Fall 2011
3. Conduct study through college interns and analyze results	Strategic Initiatives Division	UT-Austin	Fall 2011
4. Redesign diversion programs based on results of study	Strategic Initiatives Division	UT-Austin	2012 and ongoing
5. Conduct waste composition studies every five years and readjust diversion programming	Strategic Initiatives Division	UT-Austin	2016 and every five years

9.4 New Policies: Materials Management

The Material Management components of the Master Plan include several opportunities for The development of new policies that support the City's Zero Waste goal, such as:

Universal Recycling and Composting Ordinance – An ordinance designed to increase diversion through comprehensive recycling and organics collection from all sectors throughout the City.

Construction, Demolition, and Deconstruction Debris Ordinance – An ordinance designed to require the recycling of construction debris through a city-required permitting process.

Extended Producer Responsibility (EPR) Initiatives – EPR initiatives call for an active role in advocating for legislation requiring product manufacturers, retail establishments, wholesale distributors and other

appropriate entities to take back certain products or packaging that currently are difficult to recycle or harmful to dispose.

Policies to reduce single-use and non-recyclable products and packaging – Initiatives to reduce single-use and non-recyclable products and packaging such as consideration of a plastic bag ordinance and a take-out container ordinance.

These new policies will support and increase new opportunities in Material Management. Detailed descriptions of these proposed policies are described in Section 21.

9.5 New Programs: Materials Management

The Material Management components of the Master Plan include several opportunities for the development and deployment of new programs that are expected to be undertaken in response to City policies, such as:

Reuse Austin – An enhanced system of bulk collection services that diverts collected material through local reuse opportunities, further described in this section and Section 7 Reuse.

Clean Austin – An enhanced bulk and brush collection service with increased focus on high need areas, further described in this section, Section 7 Reuse and Section 10 Organics.

Storm Ready Austin – Increased responsiveness to violent storm debris clean-up needs, further described in this section and Section 10 Organics.

9.6 New Facility Development: Materials Management

The Material Management components of the Master Plan include several opportunities for the development of Zero Waste infrastructure through public-private partnerships and private sector initiatives that are expected to be undertaken in response to City policies, such as:

Eco-Depots – Drop-off facilities located around the City for collection of reusable items, recyclables and hard-to-recycle materials, further described in this section and Section 7 Reuse.

Materials Recovery Facilities for recyclables – MRFs constructed and operated by two private sector Companies under contract with the Department, to support the Single Stream Recycling Collection Program and the Zero Waste initiatives of the Master Plan, further described in Section 8 Recycling.

Resource Recovery Centers – For the collection of hard-to-recycle materials such as appliances, tires, furniture, carpet and paint, further described in this section and Section 13.

Composting facilities for organics – Expanded organics processing capacity at the Hornsby Bend Biosolids Management Plant. In addition, pilots are proposed in response to the Universal Recycling and Composting Ordinance and through contracts with the City. The City may contract for additional composting services if deemed appropriate, further described in Section 10 Organics Composting.

Construction and demolition debris process facilities – For the recovery and recycling of debris from construction sites, in response to a future Construction and Demolition Debris Ordinance, further described in this section.

Eco-Industrial Park – Industrial plants constructed by the private sector to utilize discarded materials as raw materials in the production of new products, further described in this section and Section 12.

9.7 Reuse Austin

This new program, entitled *Reuse Austin*, will enhance the bulk collection services with increased focus on diversion opportunities. The Department will make a stronger effort to recycle or reuse bulk items collected from customers. The City will team with reuse and resale partners that are structured to collect and sell gently used furniture, building materials, and other reusable items to increase diversion of items currently landfilled. Additional description and planning of the Reuse Austin program is noted in Section 7.

New Resources: Reuse Austin

Reuse Austin will utilize existing resources dedicated to the Bulk Collection Program and the Resource Recovery Facility to be located at the Todd Lane Transfer Facility. Existing staff resources will be dedicated to provide planning and management of the new Reuse Austin Program. Additional resources are needed to re-purpose and equip the Transfer Facility, as noted in Section 13.

9.8 Eco-Depots

Eco-Depots are drop-off facilities for reusable items, recyclables and hard-to-recycle materials, such as carpet, electronics, batteries, motor oil, latex paint and anti-freeze materials (also known as BOPA). Eco-Depots can be developed and operated through service agreements with non-profit organizations, with adjacent communities, and through potential partnerships such as the Capital Metro Park and Ride Lots. They can also collect materials such as carpet that is not ordinarily accepted and marketed. There are different approaches the Department can take to implement Eco-Depots. The proposed Zero Waste initiative for Eco-Depots is to sign a service agreement with one or more organizations to host City Eco-Depots at a number of sites throughout the City. The Eco-Depot will collect materials that the City wishes to recover, and the non-profit will charge a fee to operate the Eco-Depot.

Eco-Depots can be developed in many different forms including trailers, small sheds/stations or just a formalized area to collect many different types of recyclable, reusable and repairable materials. The purpose of Eco-Depots is to provide enough facilities to ensure convenience for the public so that these materials are diverted from the disposal stream. A good way for the City to implement the Eco-Depot Zero Waste initiative is to work with organizations which already have sites city-wide.

Materials collected here could include traditional recyclables such as plastic bottles and aluminum cans; reusables such as clothing, shoes and furniture; and not so easy to market materials such as carpet and tires.

The Department will place eight (8) Eco-Depots around the city to be utilized for residential drop-offs of large bulky items, as well as other reusables. This additional infrastructure will enhance and support the Reuse Austin program. Additional description and planning of the Eco-Depots are noted in Section 7.

New Resources: Eco-Depots

It is estimated that approximately eight eco-depots would be needed. Each Eco-Depot could handle up to five to ten tons per day depending on the particular location, storage space available, and location for accessibility to the public. Conceptually, the sites would be staffed by a non-profit organization through a contract with the Department. Additional staff resources will be dedicated to provide planning and management of the Eco-Depot sites. Additional resources are needed to construct and equip the sites. These additional resources include a 1.0 full time equivalent (FTE) Waste Planner estimated to be approximately \$80,000.

9.9 Bulky Material Collection and Management

The Department collects items that are too large for the trash cart during specially scheduled semi-annual bulk collections. Department staff mails a flyer to all households a few weeks before their large bulky material collection. Residents are requested to separate their materials into three piles for collection of metal items, passenger car tires, and all other non-metal items. Common household items collected through the Bulky Material Collection Program include:

- Appliances
- Barbeques
- Doors
- Furniture
- Lawn mowers
- Lumber
- Mattresses and box springs
- Pallets
- Railroad ties and utility poles, no more than 6 feet long
- Rolled fencing
- Tires

The current collection method mixes the materials for final disposal. To deploy a materials management approach to support the City's Zero Waste goals, the Department plans to reorganize the bulky collection program to increase reuse and diversion of the materials collected and minimizing disposal. Collection equipment will be replaced to support a new style of collection that respects the integrity of the material collected and create new diversion activity. In addition to reorganizing the existing bulky collection program, the Department will encourage new diversion through the establishment of three new collection and diversion programs: Clean Austin, Reuse Austin and Tire Recycling.

Clean Austin

A new program, called Clean Austin, will enhance the bulk collection services with increased focus on high need areas. The Clean Austin program will enhance bulk collection cycles where needed and offer a new call-in service. The Department will pilot an enhanced collection cycle that will offer residents bulk collection four times per year in high need areas. The pilot program is needed to test collection scheduling and set-out requirements, offering residents two extra scheduled collections per year. The areas selected for this enhanced service will be determined by field observations of neighborhoods experiencing heavy out-of-cycle set outs. The selected areas for the pilot will be geographically representative of all areas of the City.

The Department will also pilot an on-call scheduling for bulk item collections. These services are needed for residents moving out of their homes and apartments, with the resulting high need for extra collection services of large bulky items. The pilot program is needed to test collection scheduling and set-out requirements, offering residents' a fee-based cost-recovery service for additional on-call services. The Department will work closely with the Austin Apartment Association and the Austin Realtors Association in coordinating the implementation of this new program. Additional description and planning of the Clean Austin program is noted in Section 7.

Reuse Austin

This new program, entitled *Reuse Austin*, will enhance the bulk collection services with increased focus on diversion opportunities. The Department will make a stronger effort to recycle or reuse bulk items collected. The City will team with reuse and resale partners (e.g. Goodwill Industries, Habitat for Humanity, Salvation Army, and other non-profits) that are structured to collect and sell gently used furniture, building materials, and other reusable items to increase diversion of items currently landfilled. Additional description and planning of the *Reuse Austin* program is noted in Section 7.

Tire Recycling

The City currently collects tires from residents and City operations, and then transports the tires to a private company that operates a tire shredder. The shreds are utilized as a fuel supplement for various boiler operators. As this type of end use is classified as a form of final disposal, the Department plans on upgrading this activity through new diversion options. The Department will explore various reuse and recycling options, and develop and finance a pilot demonstration project in collaboration with the Austin Public Works Department.

New Infrastructure: Bulk Collection Services

Both the Clean Austin program and the Reuse Austin programs will require infrastructure improvements. The Austin Resource Recovery Program, located at the FM812 landfill, is intended to be a public drop-off of large bulky items, including tires, large appliances, and furniture. Through public feedback, the location was identified as a major barrier. In addition, collection and processing of these items at the landfill offers operational challenges with the weather exposure and employee working conditions. In consideration of these needs, the Department will relocate the Resource Recovery Program to the Todd Lane Transfer Facility. The repurposed transfer facility will house the public drop-off service as well as the bulk collection and reuse program. Items collected, either through the drop-off

or the curb collections, will be dropped off on the concrete floor of the enclosed facility, allowing for proper separation and cleaning under roof and not exposed to weather conditions. The public access to the facility will be redesigned to encourage a safe driving loop for the public that does not cross other operational services. This redesigned facility will service the public and the bulk collections program.

In addition, the Department will place eight Eco-Depots around the city to be utilized for residential drop-offs of large bulky items, as well as other reusables. This addition infrastructure will enhance and support the *Reuse Austin* program. Additional description and planning of the Eco-Depots are noted in Section 7.

New Resources: Bulky Materials

Additional staff and equipment resources will be dedicated to provide planning and deployment of the new bulky material diversion programs. A description of the new resources needed is noted in Section 7.

9.10 Storm Debris Materials Management

The Department collects brush and tree trimmings that are too large for the trash cart during specially-scheduled semi-annual brush collections. Department staff mails a flyer to all households a few weeks before their brush material collection. Residents are requested to stack the brush and tree trimmings in one row no more than 15 feet long by 4 feet high. The Department hauls the brush to Hornsby Bend Composting Facility for grinding.

The Department also collects large brush and tree trimmings after major storm events. This special collection is periodic and requires the deployment of staff dedicated to other collection programs. This disruption to Department operations usually requires delayed services that can cause unmet service needs throughout the City. In addition, many residents have noted that the semi-annual brush collection may not coincide with the appropriate pruning season or does not equally spread out the collection cycle to allow customers to tend to their yards during varying climate changes. To address both of these service needs, the Department will deploy two new collection and diversion programs; the Clean Austin and Storm Debris Management.

Clean Austin

The Clean Austin Program, as noted above, will also enhance the brush collection services with increased focus on high need areas. The Department will increase brush collection services for identified high need pruning seasons. The Clean Austin program will enhance brush collection cycles where needed and offer a new call-in service.

The Department will pilot an enhanced collection cycle that will offer residents brush collection four times per year in high need areas, in coordination with the bulk collection program. The pilot program is needed to test collection scheduling and set-out requirements, offering residents two extra scheduled collections per year. The areas selected for this enhanced service will be determined by field

observations of neighborhoods experiencing heavy brush set-outs. The selected areas for the pilot will be geographically representative of all areas of the City.

The Department will also pilot an on-call scheduling for brush item collections. These services are needed for residents pruning in an out-of-cycle time period, with the resulting high need for extra collection services of large brush and tree limbs. The pilot program is needed to test collection scheduling and set-out requirements, offering residents' a fee-based cost-recovery service for additional on-call services. The Department will work closely with the Austin Apartment Association and the Austin Realtors Association in coordinating the implementation of this new program. Additional description and planning of the *Clean Austin* program is noted in Section 10 Organics.

Storm Ready Austin: Storm Debris Management

This new program, entitled Storm Debris Management, will enhance the responsiveness of the Department to violent storm debris clean-up needs. The National Weather Service has declared the Travis County and Austin Emergency Operations Communications Center as a Storm Ready community, prepared to respond quickly to hurricane or tornado events striking the area, and the resulting damaging winds and flooding. The Storm Debris Management team will be prepared to act on an emergency activation notice, capable of responding to and assisting residents to the removal of tree and brush debris from public right-a-ways, as well as other storm related debris.

The Storm Debris Management team will work in cooperation with Austin Energy response teams, as well as the Austin Emergency Operations Command Center. This response is an enhancement to the existing Brush and Bulk Collection programs. In the event of a major damaging storm, the Collection crews will postpone existing planned services and respond immediately with storm debris collection and material management. The Department will explore potential contractual relationships with private companies to provide brush shredding services in the event the collected material exceeds the capacity of City dedicated resources. Additional description and planning of the Storm Debris Management program is noted in Section 10 Organics.

New Infrastructure: Brush Collection Services

The Department's brush collection services are focused primarily on the Hornsby Bend Composting Facility in the far eastern sector of the City. There is a need for more convenient drop-off sites around the City to increase the Department's operational efficiencies and reduce its carbon footprint. In addition, there is a need for public drop-offs of large brush, to reduce the need for city on-call services. The Department will research the use of various parks and natural settings as potential drop-offs of large brush and tree limbs, with the caution of that many areas have environmentally sensitive concerns. The Department will seek out four emergency collection sites for brush and woody compostables, in the four quadrants of the City.

New Resources: Brush Collection Services and Storm Debris Material Management

Existing staff resources will be rededicated to provide these new brush collection programs. Existing resources are available at the Hornsby Bend Composting facility that will be used to divert more brush through a dedicated resident drop-off area. Four additional collection sites for brush and woody

compostables, in the four quadrants of the City, will be sited for public use. Additional resources are needed to design and implement the Clean Austin and Storm Management programs. These additional resources include a 0.25 FTE Waste Planner estimated to be approximately \$20,000.

9.11 Construction Materials Management

Construction and demolition debris (C&D) accounts for over 20 percent of citywide disposal. Local construction companies generate and landfill significant volumes of construction and demolition debris. Through the requirements of a construction debris ordinance, most construction and demolition debris will be collected and processed private sector service providers.

Construction, Deconstruction, and Demolition Debris Ordinance

The Department will significantly impact the diversion of construction and demolition debris through development and adoption of a Construction, Deconstruction, and Demolition Debris Recycling Ordinance (CDDDDRO). The ordinance will be developed based on stakeholder input, including the building industry and private sector service providers. Key aspects of the ordinance could include:

- Adopting policies to increase reuse, recycling and composting of products used in remodeling and new construction;
- Requiring larger project building permit holders to provide diversion plans;
- Transitioning to higher rates of diversion requirements; and
- Registering construction and demolition debris facilities and haulers.

The Department will also provide technical assistance to construction and demolition debris generators in support of the CDDDDRO; including:

- Training in soft demolition, deconstruction, and building materials reuse;
- Promotion of building adaptive reuse;
- Information on recycling and reuse outlets and deconstruction services; and
- Information about rates and services available through private sector service providers and non-profits.

Non-profit and private sector service providers will play a significant role in collection and processing of construction and demolition debris generated in the City.

A comprehensive CDDDDRO initiated in the short-term and implemented by 2015 will provide a signal to the private sector of an investment opportunity in C&D processing capacity. The City can take several different approaches to implementing a CDDRO. Requirements can be placed on C&D generators, C&D haulers or C&D facilities. The City will conduct a series of stakeholders meetings, targeting the building community to ensure that needs of C&D generators are taken into account and that processing capacity is available to divert C&D materials from landfills.

The new CDDDDRO will essentially expand the requirements of the Universal Recycling and Composting Ordinance to the building community citywide. This will be accomplished through a stand-alone

ordinance or an amendment to the Universal Recycling and Composting Ordinance.

Cost and Diversion Estimates for C&D Debris Ordinance Implementation

Initiative	Initial Year at Full Implementation	Annual Costs	Annual Diversion Tons ¹
C&D debris ordinance	2015	\$168,000	39,000

Resources for Construction and Demolition Debris Ordinance Implementation

One additional staff member within the Strategic Initiatives Division will be needed for Ordinance development, implementation, new rules development, technical assistance and training.

Implementation Tasks for Construction and Demolition Debris Ordinance

Task	Lead Responsibility	Participants	Schedule
1. Co-host regional workshop on best practices in C&D diversion; invite local and national experts	Strategic Initiatives Division	Austin Energy, CAPCOG, C&D generators, private sectors service providers	Fall 2012
2. Conduct stakeholder workshops on a comprehensive C&D Ordinance	Strategic Initiatives Division	C&D generators, building community, private sector service providers	Spring 2013
3. Present C&D Ordinance to City Council	Strategic Initiatives Division		Fall 2013
4. Develop agreements with registered service providers	Strategic Initiatives Division	Private sector services providers	Spring-Summer 2014
5. Conduct stakeholder workshops on New Rules for the C&D Ordinance	Strategic Initiatives Division	C&D generators, private sector service providers	Summer-Fall 2014
6. Provide C&D technical assistance and community-based social marketing to	Strategic Initiatives Division	C&D generators	Fall 2014-ongoing

Implementation Tasks for Construction and Demolition Debris Ordinance

Task	Lead Responsibility	Participants	Schedule
C&D generators			
7. Assess and refine C&D Ordinance	Strategic Initiatives Division	All stakeholders	2015 and every 5 years

Construction and Demolition Debris Processing



C&D Processing

C&D debris processing facilities receive and process construction and demolition debris. These types of facilities provide different levels of processing depending on accepted materials, and may produce a variety of commodities at each facility. Typical C&D materials accepted include asphalt, concrete, Portland cement, brick, rocks, lumber, wallboard, roofing material, ceramic tile, plastic pipe, and associated packaging. Commodities typically produced include gypsum, clean wood, ferrous metal, aluminum, inert material (including engineered fill) and alternative daily cover for landfills. Most C&D facilities are developed based upon one of three basic processes: 1) an outdoor receiving area for floor-sorting **without** on-site processing equipment, 2) an outdoor receiving area for floor-sorting **with** on-site processing equipment and 3) floor sort and processing equipment with all operations located inside a building:

The City does not operate any C&D debris processing facilities. Processing this debris into recyclable or reusable materials is provided by private contractors as most C&D materials are generated by private entities.

There is potential for existing facilities to expand or for additional facilities to be built as Zero Waste policies and programs are implemented. The City's role will be to adopt the C&D ordinance to divert C&D materials from landfill to appropriate C&D processing facilities. These C&D facilities can charge fees based on the types and amounts of materials received, the contamination level, and the current market pricing of the materials recovered.

Projected Need for Construction and Demolition Debris Processing

Based on information gathered from regional service providers, the current C&D processing capacity in the region can handle the currently generated C&D debris. However, when Zero Waste initiatives are implemented, expansion of existing capacity or the development of new facility(s) by the private sector will be needed. The new regulations and ordinances provide opportunities for the private sector to construct additional capacity. This capacity will occur through one or more facilities with a total capacity of 500 tpd.

City Implementation Tasks for Construction and Demolition Debris Processing

Task	Lead Responsibility	Participants	Schedule
6. After C&D program initiatives take effect, encourage the private sector operators to develop more capacity to meet the increased C&D debris stream.	Diversion Facilities Division	Private sector operators	2015 - ongoing

9.12 Resource Recovery Center

The current Resource Recovery Center located at the FM 812 Landfill site will be redeveloped at the Todd Lane Transfer Facility, as part of the expanded bulk floor-sort noted above. This new collection center is envisioned to handle BOPA materials (Batteries, Motor Oil, Latex Paint, Anti-freeze), brush, and numerous other recoverable materials. It will include a reuse yard for building materials and provide repair and refurbishment for reusable bulk items delivered by the Department or the public. No new space will be needed for this infrastructure project.

Materials Recovery/Transfer Station (MRF/TS)

The MRF/TS is located at 3810 Todd Lane on a 7 acre parcel. The MRF/TS was originally used as a materials recovery facility (MRF) to process recyclables from a dual-stream collection system, before the Department moved to a commingled single-stream collection system. After the move to a single-stream collection system, the MRF/TS was used to collect and handle the single stream recyclables from the

route vehicles and transferred these materials to a recycling processing facility in San Antonio. Since October 2010, the Department hauls collected recyclables to a recycling processor in Creedmoor directly from its routes, eliminating the expense of transfer operations at the Transfer Station. Currently, the MRF/TS is not in use to transfer or process materials, but has approximately 9,000 square feet of unused usable tipping floor.

The Department's MRF/TS will be repurposed into a Resource Recovery Center. The enriched loads from the new On-Call Bulk Items Collection initiative will be brought without compaction to the facility for floor sorting and will also accommodate the public drop-off of bulk materials currently collected at the FM812 Landfill. Only minor upgrades to the facility are considered necessary. Initially, a skip-loader/forklift and some additional bins would be needed to operate the facility. Staff and equipment growth will coincide with population and materials growth.

A floor sorting operation is a simple method to divert potential recyclables, reusables and repairable materials from other discarded materials. Vehicles delivering materials to the facility are directed to separate areas to unload their materials, depending on the material type or generator type. Staff will sort these materials on the floor to pull recoverable materials from the other discarded materials, and separate them into bins or debris boxes for shipment to market. The Master Plan calls for it to be in service by FY2013.

New Resources: Resource Recovery Center

Two additional staff members within the Diversion Facilities Division will be needed for additional labor within the Department's Resource Recovery Center. The facility will require minor upgrades and routes will need reconfiguration. The repurposed use of the facility will not require any additional space. The physical upgrades will be made to enhance the facility for better use in receipt, unloading, sorting and consolidation of materials for markets within the existing space.

Private-sector Resource Recovery Centers

The Department will encourage the development of Resource Recovery Centers at local landfill sites so users have the option of taking their source separate materials to a designated area located within the landfill gates. The landfill can charge a fee for taking these materials to their site, but this fee could be less than the landfill fee to incentivize users to reuse or recycle materials. This way the user can save money while the landfill operator can still collect a charge to cover their services. The landfill operator will benefit by maintaining its capacity and minimizing their costs. These private Resource Recovery Centers would be developed and operated by the private landfill entity without financial support from the Department. The Department will encourage private landfill operators in the region to include Resource Recovery Centers in their operations.

Materials collected and managed through Resource Recovery Centers can include hard to recycle items, including mattresses, textiles, appliances, office equipment, and furniture. Larger facilities can include a reuse yard for building materials, and provide repair and refurbishment for reusable bulk items and other reusable materials delivered by the public. They can also handle BOPA materials, brush, and other recoverable materials. The materials typically are brought in self-hauled loads by residents or businesses

to a disposal site. Thus Resource Recovery Centers are usually developed at landfills or disposal facilities. Local disposal sites can redesign their sites to provide for a separate drop-off and staging area where the public can drop off their recoverable materials before proceeding to the designated landfill area. At some facilities, the diversion activity takes place after the fee gate and the public is required to separate materials for recycling and reuse. If users decide to proceed directly to the landfill area, they are required to pay an extra fee. Lessened tipping fees at Resource Recovery Centers can provide a significant incentive to users. Some facilities provide drop-off or buyback options for revenue-generating recyclables, and charge lower rates for certain items (e.g., yard trimmings, clean fill).

Diversion levels and costs at Resource Recovery Centers can vary widely depending on the extent and type of the diversion activities. These activities can include public area drop-off for traditional recyclables (cans, bottles, and paper), salvaging materials from the tipping area at a transfer station or landfill (large pieces of metal, cardboard or wood), diverting reusable items (furniture, building materials, and household goods), and providing retail sales on site. For Zero Waste communities, Resource Recovery Centers provide ways to reuse, recycle or compost all twelve market categories of Recyclable Materials.¹ In some locations, Resource Recovery Centers could be combined in clusters of reusables, recyclables, compostables, and special discards, including regulated materials and C&D. Each of the clusters would utilize different approaches to collecting and processing, requiring different trucks, equipment and handling. The cluster approach requires that the combined categories of materials be sorted at other locations. Some activities may be co-located at a landfill, but others may be off-site.

Projected Need for Resource Recovery Centers

After the recommended initiatives and ordinances are implemented, Resource Recovery Center capacity needs could be between approximately 78,000 to 172,000 tpy over the planning period, or about 250 to 600 tpd. This could be addressed by one to three facilities in the 200 tpd range but more likely in varying sizes up to 200 tpd to fit the needs of the City and the availability of sites.

New Resources: Private-Sector Resource Recovery Centers

All of the proposed Resource Recovery Centers would be developed and operated by the private sector operators who currently operate landfills or disposal facilities.

Implementation Tasks for Resource Recovery Center Development

Task	Lead Responsibility	Participants	Schedule
1. City to re-purpose the Transfer Facility into a Resource Recovery Center.	Diversion Facilities Division	Diversion Facilities Division	2013

¹ Reusable goods, Paper, Metals, Glass, Polymers, Textiles, Chemicals, Putrescibles (including food scraps), Wood, Ceramics (including rock, tile, bricks, concrete and asphalt), Soils, and Plant Debris.

9.13 Eco-Industrial Park

The Department's closed FM 812 Landfill, located at 10108 FM 812 in the City of Austin, is approximately 360 acres in size, and under 30-year post-closure care within the USEPA Subtitle D requirements for landfill site care and maintenance. The Department is considering the redevelopment of the set-aside buildable land as an Eco-Industrial Park.

An eco-industrial park is an industrial system of production facilities which conserves natural and economic resources; reduces energy and water usage and provides opportunities for reuse or recycling of wasted materials. An Eco-Industrial Park is planned, designed, and built in such a way that it makes it easier for businesses to co-operate, and that results in a more financially sound, environmentally friendly project for each business entity.

Based on the concepts such as by-product synergy ("waste-to-feed" exchanges), each business can support other businesses through material resource sharing and common on-site energy and water systems. The planned solar-array at the closed landfill site will assist in green electric power needs of the Eco-Industrial Park. The Department will offer the buildable land area at the FM812 closed landfill for economic redevelopment, in collaboration with the City of Austin Economic Redevelopment and Growth Office.

New Resources: Eco-Industrial Park

Additional resources are needed to design and implement the Eco-Industrial Park. These additional resources include a 1.00 FTE Department staff person positioned at the ERGSO office, estimated to be approximately \$100,000.

Implementation Tasks for Development of Eco-Industrial Park

Task	Lead Responsibility	Participants	Schedule
1. Hire staff to design and implement Eco-Industrial Park	Strategic Initiatives Division	Economic Development and Growth Office	2013
2. Solicit industries to locate at Eco-Industrial Park.	Economic Development and Growth Office	Private sector companies	2013 – 2020

Section 15 Recycling Economic Development

A key driver in the development of the Solid Waste Services Master Plan (Master Plan) is the opportunity to create new green jobs and site new green businesses in Austin through Recycling Economic Development. The City has the ability to attract new businesses to Austin, including reuse and recycling non-profit organizations and private sector entrepreneurs, re-processors, secondary manufacturers and other businesses that have the ability to use recovered materials in their manufacturing processes.

15.1 Economic Growth and Redevelopment Services Office (EGRSO)

Providing green jobs and local economic development is a key opportunity identified in the Master Plan. The Solid Waste Services Department (Department) will provide funding for a new staff member in the EGRSO who will be responsible for retaining and attracting reuse and recycling industries to Austin. Through this new position, EGRSO will create the Recycling Economic Development program, which will be responsible for undertaking the following initiatives:

- **Locating Resource Recovery Small Businesses**- assisting small businesses capable of using discarded materials in their manufacturing process to locate in Austin.
- **Supporting By-Product Synergies** – assisting industrial businesses and manufacturers in making waste-pairings where the discarded by-products from one company can be the feedstock for another company.
- **Implementing a Business Waste Reduction Assistance Program** - to encourage the local business community in waste reduction efforts in support of the Austin Zero Waste goals.
- **Support the Development of a Green Business Leaders Advisory Council** – to seek advice from the business community on practical implementation of waste reduction and diversion programs in the business community. The Office of Sustainability will take the lead with this advisory body, in partnership with the Department and the EGRSO.
- **Supporting Incentives to Attract Recycling Re-processors** - assist in attracting new secondary materials processors to Austin to provide markets for recovered materials generated in the Central Texas region.
- **Eco-Business Park & Eco-Industrial Park** – assist in the development of Eco-Business Parks and Eco-Industrial Parks capable of processing recovered materials generated in Austin. Encourage the development of eco-industrial parks in Austin that would co-locate major re-manufacturing activities next to processors of recycled materials. The City may support these efforts through an inventory of materials generated throughout the region, and the recruitment of businesses and industries to use these locally generated resources.
- **Brownfield Redevelopment Program** – assist in the redevelopment of land that has been environmentally remediated through the Brownfield Redevelopment Program.

Resources for Recycling Economic Development Support

One additional staff member from the Department will be placed within the Economic Growth and Redevelopment Services Office. This new staff person will be responsible for retaining and attracting reuse and recycling industries to Austin, including the following activities.

Implementation Tasks for Recycling Economic Development

Task	Lead Responsibility	Participants	Schedule
1. Hire a staff person to support the Recycling Economic Development Program	Solid Waste Services Department	Recycling Economic Development Program	Late 2012
2. Identify sources of materials that could be made available to secondary materials processors willing to locate in Austin	Recycling Economic Development Program	Solid Waste Services Department	2013 and on-going
3. Identify the companies, locally and nationally, that use the materials produced by Austin generators. Recruit these businesses to locate in the region.	Recycling Economic Development Program	Economic Growth and Redevelopment Services Office	2013 and on-going
4. Provide an information clearing house for Austin businesses to support “waste pairings”	By-Product Synergy	Recycling Economic Development Program	2013 and on-going

Implementation Tasks for Recycling Economic Development

Task	Lead Responsibility	Participants	Schedule
5. Development of a Business Waste Reduction Assistance Program and participation in a Green Business Leaders Advisory Council.	Solid Waste Services Department Recycling Economic Development Program	Recycling Economic Development Program Office of Sustainability	2013 and on-going
6. Support the development of a “Re-Made in Austin” alliance of manufacturers that use recycled feed-stocks to share resources and promote the recycling and recycled content product manufacturing industries	Recycling Economic Development Program	Economic Growth and Redevelopment Services Office	2014 and on-going
7. Co-host regional workshops for economic developers and financiers, manufacturers, purchasing agents, researchers, government officials, consultants, and other interested parties	Recycling Economic Development Program	CAPCOG and Economic Growth and Redevelopment Services Office	2014 and on-going
8. Facilitate the development of Eco-Business Parks and Eco-Industrial Parks by networking potential developers to reuse and recycling-based processors and manufacturers	Recycling Economic Development Program	By-Product Synergy	2015 and on-going

15.2 Brownfield Real-Estate Redevelopment Program

Brownfield real-estate is defined as vertical and horizontal real property (Structures and Land), where the expansion, redevelopment or reuse may be complicated by the presence or potential presence of a hazardous substance, pollutants, contaminants, controlled substances, petroleum products, or is mine-scarred land. Examples of Brownfield real-estate redevelopment projects in Austin, before and after:

<u>Historical Use</u>	<u>Redevelopment</u>
<ul style="list-style-type: none">• Illegal dumping on vacant property• Tax Foreclosure property• Vehicle & Equipment Storage & Repair Shop• Service Station• Warehouse• Industrial/Commercial Facilities	<ul style="list-style-type: none">Homewood Heights Community GardenGuadalupe-Saldana Affordable HousingAfrican American Cultural and Heritage FacilityTop Hat - HamburgersCommercial Multi-businessesExpanded commercial business
Tax value \$7,000,000	\$57,000,000

The economic benefits of reusing Brownfield real-estate include: reducing urban sprawl, creating new jobs, increasing the local tax base, improving the value of adjacent property, and mitigating public health and safety concerns.

The environmental benefits of reusing Brownfield real-estate include: preservation of open space and farmland, cleanup and sustainable solutions through state voluntary cleanup program, climate protection through convenient and diverse transportation models, addressing environmental justice through community participation, and redevelopment using green building and renewable technologies. Brownfield redevelopment can save money through reuse of existing infrastructure, utilities, roads, and services.

The Brownfield Redevelopment Program, through collaborative initiatives such as securing federal grant dollars from the U.S. Environmental Protection Agency, zero to low interest remediation loans, and assistance with revitalization planning, provides incentives and information to Brownfield property owners and other stakeholders so they can clean up and reuse their Brownfield properties. With the combined resources from various agencies, the Brownfield Program can help expedite the cleanup and revitalization of Brownfield properties.

Resources for Brownfield Redevelopment Program Support

Two staff members transferred from Watershed Department to the Solid Waste Services Department will be responsible for implementing the mission and objectives of the Brownfield Redevelopment Program, including the following activities.

Implementation Tasks for Brownfields Redevelopment Program

Task	Lead Responsibility	Participants	Schedule
1. Transfer Program and staff to Solid Waste Services	Solid Waste Services Department	Brownfield Redevelopment Program	2011

Implementation Tasks for Brownfields Redevelopment Program

Task	Lead Responsibility	Participants	Schedule
2. Research potential Brownfield sites within Austin.	Brownfield Redevelopment Program	Solid Waste Services Department	2011 and on-going
3. Provide environmental site assessments to eligible property owners.	Brownfield Redevelopment Program	Solid Waste Services Department	2011 and on-going
4. Seek additional program support from State and Federal funding sources.	Brownfield Redevelopment Program	Solid Waste Services Department	2011 and on-going
5. Manage the Brownfield Cleanup Revolving Loan Fund.	Brownfield Redevelopment Program	Solid Waste Services Department	2012 and on-going
6. Provide Brownfield forums to educate developers and Brownfield property owners about potential land reuse opportunities.	Brownfield Redevelopment Program	Economic Growth and Redevelopment Services Office	2012 and on-going

Implementation Tasks for Brownfields Redevelopment Program

Task	Lead Responsibility	Participants	Schedule
7. Facilitate land reuse and redevelopment discussions with economic developers, financiers, manufacturers, government officials, consultants, and other interested parties	Brownfield Redevelopment Program	Economic Growth and Redevelopment Services Office	2012 and on-going
8. Form Brownfield Coalition (3+ entities), develop MOA and apply for US EPA Cleanup loan totaling \$1,000,000.	Brownfield Redevelopment Program	Solid Waste Services Department	2013 and on-going
9. Form Regional Brownfield Forum representatives to: educate, strategize solutions, resources, & partnerships.	Brownfield Redevelopment Program	Solid Waste Services Department	2014 and on-going
10. Establish Texas Chapter of National Brownfield Association	Brownfield Redevelopment Program	Solid Waste Services Department	2014 and on-going

15.3 Research and Development Program

Zero Waste research and development is essential to developing the City's future Zero Waste system. Currently, many products and packaging are designed for the dump and cannot be recycled or composted. Designing products and packaging with their end of life in mind will help the City work toward Zero Waste. Serious Zero Waste practitioners around the world¹ are focusing on these materials that cannot be recycled and composted, also known as legacy discards. They are striving to develop new designs in products and packaging that can be reduced, recycled or composted.

Areas for Zero Waste Research and Development include:

¹ AmbienteFuturo, Lucca, Italy <http://ambientefuturo.org/> (accessed January 16, 2011)

- Product Redesign
- Toxicity Reduction in Consumer Products
- Waste Reduction in Packaging

The goal of this initiative is to achieve advancements in the science of Zero Waste by ensuring that Austin is a center for Zero Waste research. As detailed in the policy descriptions in **XXXXXX**, the Strategic Initiatives Division will support the work of the City’s academic partners in conducting Zero Waste Research, and will support the work of its non-profit, city and regional partners, by facilitating cooperation and assisting with grant applications.

The policies and programs identified in this Master Plan will allow the City to achieve high levels of diversion. However, research will be necessary to achieve Zero Waste. Ten to fifteen percent of the materials currently disposed in landfills are materials that cannot be recycled or composted and have been designed for the dump. These materials include legacy discards that are materials and products that were placed into use before Zero Waste systems were devised, and will trickle out of homes and businesses for years to come. Research is needed to understand the composition of these materials, identify the products and packaging that require redesign, and the processes for returning potentially recyclable and compostable materials into useful products.

The City is fortunate to have access to research institutions located in Austin, including the University of Texas at Austin, Center for Maximum Potential Building Systems, and University of Arlington’s Zero Waste Network at the Center for Environmental Excellence. As a result, the Department can support academic partnerships in new research and can also assist in applying for state and federal grants. The City’s role will be to support its academic partners in pursuing research initiatives, facilitate meetings, and assist in identifying research projects and funding sources, including:

- “Zero Waste Incubator” for focused Zero Waste Research at an academic institution;
- Research in designing products and packaging for recyclability;
- Research in understanding the composition of materials that cannot be recycled or composted;
- Pursuing state and federal grants on behalf of academic partner; and
- Development of an internship program for job training and community development.

Resources for Zero Waste Research & Development Support

One additional staff member the Department will be responsible for the development of Zero Waste Research and Development, as well as supporting Product Stewardship initiatives, including the following activities.

Implementation Task for Zero Waste Research Support

Task	Lead Responsibility	Participants	Schedule
1. Identify potential Zero Waste research projects and funding sources	SWS Strategic Initiatives Division	Zero Waste Network	2011 and on-going

Implementation Task for Zero Waste Research Support

Task	Lead Responsibility	Participants	Schedule
2. Support University of Texas at Austin in their Zero Waste efforts; identify potential faculty and students interested in Zero Waste research	SWS Strategic Initiatives Division	University of Texas at Austin	2011 and on-going
3. Participate in national and international dialogues on Zero Waste	SWS Strategic Initiatives Division	All academic partners	2012 and on-going
4. Network academic partners to national and international colleagues and research studies	SWS Strategic Initiatives Division	All academic partners	2012 and on-going
5. Assess and refine Zero Waste research opportunities	Strategic Initiatives Division	All academic partners	Annually

15.4 Market Development and City Purchasing Policies

The goal of this initiative is to create markets for recycled and reclaimed materials through City purchases and through the promotion of local remanufactured products.

Market development is needed for reusable, recyclable and compostable materials and products that do not have readily available markets. Intermediate and end markets return recyclable and composting materials to manufacturing and production of new products. Traditional commodity recyclables, including paper, plastic and metals are worldwide commodity resources that are traded internationally and therefore do not need market development assistance.

Because of their special handling requirements, materials such as organics, reusables, and construction and demolition debris are typically marketed locally or regionally. The City has also experienced low market demand for glass cullet. Recyclable glass is currently transported outside of the region which makes it expensive to recycle.

Local market development can provide economic development and green jobs. Implementing an aggressive Zero Waste market development action plan has the potential to create 1,000 to 5,000 new

green jobs in recycling and organics collection and processing, materials reuse and repair, and local remanufacturing.²

The City utilizes general purchasing standards that provide some guidance to buyers for each department when developing specifications for commonly purchased goods and services. But, the City is lacking a comprehensive environmental purchasing program. Therefore, departments throughout the City do not have consistent standards specifically related to purchasing environmentally preferable products and services. .

To enhance local market development the City will:

- Develop construction specifications for citywide building permits and Public Works contracts that support Zero Waste principles (e.g., for organics used in landscaping for new construction, glass, plastic and tires as recycled content construction materials);
- Develop a compost grading system to highlight different attributes and values of organic products;
- Specify Zero Waste vendor practices for City purchases for products and services, including green caterers and suppliers;
- Support the Sustainability Office and the Purchasing Office to develop environmentally preferable purchasing standards for use by all departments, including setting minimum recycled content standards and limitations on purchase of single-use products; and
- Conduct an annual “Re-Made in Austin” campaign through the Recycling Economic Development Program.

Resources for Market Development and City Purchasing Policies Support

Staffing costs included in Partnership with other City Departments initiative.

Implementation Tasks for Market Development and City Purchasing Support

Task	Lead Responsibility	Participants	Schedule
1. Review Transportation road construction specifications for reclaimed and recycled materials, including recycled glass asphalt, recycled rubberized asphalt and recycled tires; modify	Public Works Department	Strategic Initiatives Division and the Sustainability Office	2012

² Calculated based on the methodology developed from research conducted by the Institute for Local Self-Reliance published in *Recycling Economic Development through Scrap-Based Manufacturing* (Michael Lewis, 1994).

Implementation Tasks for Market Development and City Purchasing Support

Task	Lead Responsibility	Participants	Schedule
City specifications to maximize reuse and recycling			
2. Inform residents and businesses about the quality of compost products, including certified organic compost and Dillo Dirt; provide a composting grading system to encourage “highest and best” use of compost products	SWS Strategic Initiatives Division	Austin Water Utility and the Sustainability Office	2013 and on-going
3. Prepare list of local Zero Waste businesses and amend the purchasing policy to provide preference for Zero Waste businesses, including green caterers and suppliers	SWS Strategic Initiatives Division	Purchasing Department and the Sustainability Office	2013 and annually
4. Prepare list of local reuse operations, manufacturers and composters using reclaimed and recycled materials; conduct media outreach and develop publications to encourage residents and businesses in Austin to embrace the “Re-Made in Austin” brand	Recycling Economic Development Program	Strategic Initiatives Division and the Sustainability Office	2013 and annually
5. Assess and refine opportunities for local market development	Recycling Economic Development Program	Strategic Initiatives Division	2014 and on-going

Section 21 Policies

Zero Waste policies, including ordinances, incentives, bans, take-backs, purchasing specifications, and advocacy, allow the City to increase diversion and decrease waste. Zero Waste policies are extremely important because they influence all the materials that are generated in the City, including waste and material streams not directly handled by the Solid Waste Services Department (Department). By setting an example through consistent policy setting, the City can achieve Zero Waste citywide and lead the region and the state in diversion activity. This section describes the policies that will be implemented to achieve the City's goals, based on input received through the public outreach process.

21.1 Universal Ordinances

Universal ordinances that apply to all waste generators including residents, visitors, institutions and businesses can be effective strategies for achieving Zero Waste. By establishing a Zero Waste framework and policy direction, private sector investment in collection systems and Zero Waste infrastructure can be made with relatively little direct cost to the City. Entrepreneurs and innovators can compete to provide services to generators based on performance and cost. The Department can support these efforts through technical assistance, outreach and education, and reinforcement of desired behaviors. The following initiatives were evaluated in the Needs Assessment Technical Memorandum included in Appendix C and selected for implementation by the stakeholders.

- Universal Recycling and Composting Ordinance
- Single-use Products and Packaging Ordinance
- Take-Back Ordinance
- Extended Producer Responsibility Initiatives
- Hauler Registration Ordinance
- Refundable Deposit (Bottle Bill)

The Department's Strategic Initiatives Division will have primary responsibility for developing the new ordinances and facilitating their implementation.

Policy Cost and Diversion Estimates

Initiative ¹	Date of Initiation (FY) ²	Initial Year of Full Implementation (FY) ²	Initial First Year Implementation Costs	Annual Costs ³	Annual Diversion Tons ³
Universal recycling and composting ordinance – 3 phases	FY11-FY12	FY16			
Single-use products and packaging ordinance ⁴	FY12-FY14	FY13-FY14			
Hauler Registration Ordinance	FY12	FY13			
Take-back ordinance ⁵	FY14	FY15			
Refundable Deposit (Bottle Bill)	FY15	FY16			

Initiative ¹	Date of Initiation (FY) ²	Initial Year of Full Implementation (FY) ²	Initial First Year Implementation Costs	Annual Costs ³	Annual Diversion Tons ³
Extended producer responsibility initiatives	FY17	FY18			

¹Listed based on priorities identified in the *Needs Assessment Technical Memorandum* and discussed by the stakeholders at the November 2010 workshops.

²Calendar dates refer to the City's Fiscal Year (FY) October 1 through September 30 of each year.

²Based on first year of full implementation; figures rounded and thus calculations for Costs per Ton may not calculate exactly.

³Staffing costs included in Universal Recycling and Composting Ordinance.

⁴Diversion estimate and staffing costs included in Extended Producer Responsibility initiatives.

The Strategic Initiatives Division is responsible for:

- Zero Waste policy development;
- Zero Waste program development;
- Marketing, including media outreach, community-based social marketing, producing print publications; and
- Business outreach and economic development, including commercial technical assistance, ordinance implementation, and oversight.

The Strategic Initiatives Division will play a key role in assisting the operations divisions in planning and implementing the new Zero Waste programs and will provide marketing support and community-based social marketing for new Zero Waste programs. In addition, the Strategic Initiatives Division will manage incentive-based programs, such as the compost incentive program.

21.2 Universal Recycling and Composting Ordinance

The goal of this initiative is to phase in universal recycling and composting requirements to all waste generators, both residential and commercial, within the City of Austin by FY2016.

The City Council adopted Phase 1 of the Universal Recycling Ordinance (URO) on November 4, 2010, which requires all multifamily buildings, office buildings, and institutional properties in the City to recycle. Phase 1 of the ordinance will be phased in over four years, beginning in October 2012. The Department is currently (FY2011) engaging stakeholders to develop the rules that will guide program implementation. The Department is also conducting stakeholder meetings throughout 2011 to discuss implementation of URO Phase 2 which will apply to food and beverage service establishments, retail, hospitality, manufacturing and industrial generators.

In URO Phase 2, the City will add a citywide policy for diverting compostable organics from landfills. Food scraps and compostable paper account for about 30 percent of citywide disposal. Organics disposed in landfills create methane which is a powerful greenhouse gas, 21 to 75 times more powerful

than carbon dioxide. URO Phase 2 will evolve into the Universal Recycling and Composting Ordinance (URCO) and will be fully implemented by FY2016.

Phase 3 of the URCO will include single family residents in the requirement to recycle and compost and will be fully implemented by FY2016.

To ensure broad support of the URCO, the Department will release community-based social marketing campaign, which could include:

- Co-hosting regional workshops with the Capital Area Council of Governments (CAPCOG);
- Piloting food scrap collection at restaurants and other commercial businesses;
- Leading by example and establishing comprehensive recycling and composting at all City facilities;
- Providing technical assistance to businesses to reduce waste, streamline processes that create unnecessary waste products, such as shipping containers, and increase diversion; and
- Educating businesses about the waste management industry and service options, including publishing the rates that service providers charge for service based on volume and frequency.

The Department provides commercial technical assistance through its Waste Reduction Assistance Program (WRAP), a free service that assists local businesses with their recycling and waste reduction efforts by motivating businesses to get involved, providing assistance and resources and recognizing businesses that are making a difference. The Department will greatly expand its outreach to commercial and institutional generators through the Commercial Technical Assistance Program coinciding with the implementation of the URCO.

A component of this initiative is the Commercial Technical Assistance Program. The City will conduct outreach to every business in Austin over a five year period. The program will initially focus on businesses with more than 100,000 square feet, as the first phase of implementing the new URCO. Then the program will be phased in to include all businesses within four years. The Department will explain the elements of the URCO and help businesses right-size their garbage service, reduce waste and expand reuse, recycling and composting services with the goal of reducing their overall garbage and recycling bills. The program will include:

- Technical assistance to commercial businesses in support of the Universal Recycling and Composting ordinance;
- Reward and recognition;
- Incentives, grants and pilot projects;
- Information on recycling and reuse outlets;
- Information about rates and services available through private sector service providers and non-profits; and
- Profiles and promotion of businesses transitioning to Zero Waste.

To monitor the effectiveness of the URCO, the Department will collaborate with non-profit and private sector service providers. The Department will register non-profit and private sector services providers. Registered haulers will report diversion and disposal tonnages and service levels by customer. The Department will ensure that the business needs of the non-profit and private sector service providers are balanced with the needs of the generators and the City.

Cost and Diversion Estimates for Universal Recycling and Composting Ordinance Implementation

Initiative¹	Date of Initiation (FY)²	Initial Year of Full Implementation (FY)²	Initial First Year Implementation Costs	Annual Costs³	Annual Diversion Tons³
Universal recycling and composting ordinance – First Phase	FY11	FY16			
Universal recycling and composting ordinance – Second Phase	FY12	FY16			
Universal recycling and composting ordinance – Third Phase	FY13	FY16			

Resources for Universal Recycling and Composting Ordinance Implementation

New staff members or contractor resources are needed for:

- Ordinance and Rules development (1)
- Commercial recycling technical assistance (4)
- Media outreach and social marketing (1)
- Contract development and contract management (1)

New staff resources identified for this initiative will also support:

- Rate Structure incentives
- Zero Waste research
- Regional cooperation

Implementation Tasks for Universal Recycling and Composting Ordinance

Task	Lead Responsibility	Participants	Schedule (FY)
1. Conduct public workshops on New Rules for Phase 1 of the ordinance	Strategic Initiatives Division	Commercial generators, property managers, non-	FY11

Implementation Tasks for Universal Recycling and Composting Ordinance

Task	Lead Responsibility	Participants	Schedule (FY)
		profit and private sector service providers	
2. Undertake pilot program for food scrap collection at restaurants	Strategic Initiatives Division	Targeted restaurants, non-profit and private sector service providers	FY11
3. Conduct stakeholder meetings on Phase 2 of the ordinance	Strategic Initiatives Division	Commercial generators, property managers, non-profit and private sector service providers	FY11 – FY12
4. Conduct outreach to property managers to inform them of the ordinance requirements and timing; provide training	Strategic Initiatives Division	Building owners and managers	FY12 - ongoing
5. Co-host regional workshop on best practices in food scrap diversion; invite local and national experts	Strategic Initiatives Division	CAPCOG, non-profit and private sectors service providers	FY12, annually
6. Present Phase 2 of ordinance to City Council	Strategic Initiatives Division		FY12
7. Hire and train Austin Recycling Ambassadors to provide on-going technical assistance to commercial businesses; increasing staff over five-year rollout	Strategic Initiatives Division		FY13

Implementation Tasks for Universal Recycling and Composting Ordinance

Task	Lead Responsibility	Participants	Schedule (FY)
8. Provide community-based social marketing to residential and commercial generators; provide support to operations divisions	Strategic Initiatives Division	Disposal Facilities Division, Litter Abatement Division, Collection Services Division	FY13
9. Conduct public workshops on New Rules for Phase 2 of the ordinance	Strategic Initiatives Division	Commercial generators, property managers, non-profit and private sector service providers	FY13
10. Provide commercial technical assistance and marketing to commercial generators	Strategic Initiatives Division	Commercial generators	FY12-ongoing
11. Conduct stakeholder meetings on Phase 3 of the ordinance	Strategic Initiatives Division	Residential generators, non-profit and private sector service providers	FY13
12. Present Phase 3 of ordinance to City Council	Strategic Initiatives Division		FY14
13. Conduct public workshops on New Rules for Phase 3 of the ordinance	Strategic Initiatives Division	Residential generators, non-profit and private sector service providers	FY15
14. Provide technical assistance and education to	Strategic Initiatives Division	Residential generators	FY15-ongoing

Implementation Tasks for Universal Recycling and Composting Ordinance

Task	Lead Responsibility	Participants	Schedule (FY)
residential generators			
15. Assess and refine Universal Recycling and Composting Ordinance	Strategic Initiatives Division	All stakeholders	FY20 and every 5 years ongoing

21.3 Single-use Products and Packaging Ordinances

The goal of this initiative is to reduce single-use and non-recyclable products and packaging. To reduce discards that currently have limited recycling markets or uses, the City will consider product and material bans or other requirements or incentives.

Plastic bags and expanded polystyrene are two materials that are increasingly targets of product bans around the country. These materials are not biodegradable and have life spans of hundreds of years. These materials negatively impact the collection system and, when littered, negatively impact the environment. The City will consider developing ordinances with the goal of reducing or eliminating consumption and generation of the following products:

- Single-use bags;
- Non-recyclable, non-compostable take-out containers; and
- Single-use beverage containers.

Resources for Product and Packaging Policy Implementation

Diversion and cost estimates for this initiative are included in the Extended Producer Responsibility (EPR) initiative.

Implementation Tasks for Product and Packaging Policy Implementation

Task	Lead Responsibility	Participants	Schedule (FY)
1. Present plastic bag research to City Council	Strategic Initiatives Division		FY11
2. Conduct stakeholder workshops on the Plastic Bag Ordinance	Strategic Initiatives Division	Retail establishments and customers	FY12
3. Present Plastic Bag	Strategic		FY12

Implementation Tasks for Product and Packaging Policy Implementation

Task	Lead Responsibility	Participants	Schedule (FY)
Ordinance to City Council	Initiatives Division		
4. Provide technical assistance and community-based social marketing to retail establishments and customers	Strategic Initiatives Division	Retail establishments and customers	FY12-ongoing
5. Present take-out container research to City Council	Strategic Initiatives Division		FY13
6. Conduct stakeholder workshops on the Take-Out Container Ordinance	Strategic Initiatives Division	Restaurant stakeholders and customers	FY13
7. Present Take-Out Container Ordinance to City Council	Strategic Initiatives Division		FY13
8. Provide technical assistance and community-based social marketing to retail establishments and customers	Strategic Initiatives Division	Restaurant stakeholders and customers	FY13-ongoing
9. Present single-use beverage container research to City Council	Strategic Initiatives Division		FY14
10. Conduct stakeholder workshops on the Single-Use Beverage Container Ordinance	Strategic Initiatives Division	Building community	FY14
11. Present Single-Use Beverage Container Ordinance to City Council	Strategic Initiatives Division		FY14

Implementation Tasks for Product and Packaging Policy Implementation

Task	Lead Responsibility	Participants	Schedule (FY)
12. Provide technical assistance and community-based social marketing to building community	Strategic Initiatives Division	Building community	FY14-ongoing
13. Assess and refine Single-Use Product Ordinances	Strategic Initiatives Division	All stakeholders	FY20 and every 5 years ongoing

21.4 Take-Back Ordinance

The goal of this initiative is to require brand owners to take back non-recyclable, non-compostable products by considering a take-back ordinance FY2015.

Producer responsibility is a key strategy for achieving Zero Waste. Take-back requirements shift the costs of garbage from taxpayers to brand owners and producers. They also create a powerful economic incentive to redesign products and substantially reduce the use of toxic materials. Local take-back ordinances have focused on hard-to-handle materials such as pharmaceuticals and household hazardous waste. The City will pursue local initiatives if the state is unable to enact EPR framework legislation or product-specific legislation. The City will also collaborate with its regional partners to target non-recyclable, non-compostable materials or hard-to-handle materials across the region. The City will consider the following problem materials for producer take-back:

- Materials that cannot be reused, recycled or composted and single-use items; and
- Other materials (e.g., pharmaceuticals, sharps, batteries, fluorescent bulbs).

Resources for Take-Back Ordinance Implementation

Diversion and cost estimates for this initiative are included in the EPR initiative.

Implementation Tasks for Take-Back Ordinance Implementation

Task	Lead Responsibility	Participants	Schedule (FY)
1. Present producer take-back research to City Council	Strategic Initiatives Division		FY13
2. Conduct stakeholder workshops on the Take-Back Ordinance	Strategic Initiatives Division	Brand owners, retailers, and customers	FY13-FY14

Task	Lead Responsibility	Participants	Schedule (FY)
3. Present Take-Back Ordinance to City Council	Strategic Initiatives Division		FY14
4. Provide technical assistance and community-based social marketing to brand owners, retailers, and customers	Strategic Initiatives Division	Brand owners, retailers, and customers	FY15-ongoing
5. Assess and refine Take-Back Ordinance	Strategic Initiatives Division	All stakeholders	every 5 years

21.5 Hauler Registration Ordinance

To monitor the effectiveness of the URCO, the City will establish an annual registration of non-profit and private sector service providers that collect and haul trash, recyclables and compostables within the city limits. Registered haulers will report diversion and disposal tonnages and service levels by customer. The City will ensure that the proprietary business needs of the service providers are balanced with the Department's need to track diversion activity and progress toward the Zero Waste goals established by the City Council.

The current Hauler Ordinance requires all haulers that collect waste within the City to acquire an annual hauler license. The haulers are required to submit information on the number of trucks utilized and the number of containers deployed within the City. The hauler is assessed an annual per truck fee and an annual per container fee for doing business within the City.

The Department should evaluate an ordinance amendment that will eliminate the container fee and maintain the registration of hauling vehicles utilized within the City. In return for the reduced fees, the City should adopt reporting requirements in support of URCO. Annually, beginning in FY2013, each hauler could then be required to register their fleet of vehicles, pay a per vehicle fee, and submit diversion and disposal tonnages and service levels by customer. The fees collected could be utilized to support the personnel cost to process the annual license and analyze the data received. The Department should continue to ensure that the business needs of the non-profit and private sector service providers are balanced with the needs of the generators and the City.

Implementation Tasks for Hauler Registration Ordinance

Task	Lead Responsibility	Participants	Schedule (FY)
1. Conduct stakeholder	Solid Waste	Haulers and	FY10-FY11

Task	Lead Responsibility	Participants	Schedule (FY)
meetings on the Hauler Registration Ordinance	Advisory Commission	other Service Providers	
2. Develop reporting requirements and information safeguards	Strategic Initiatives Division	Haulers and other Service Providers	FY10-FY11
3. Present Hauler Registration Ordinance to City Council	Solid Waste Services Department	City Law Office	Early FY12
4. Provide registration forms and technical assistance to haulers	Strategic Initiatives Division	Haulers and other Service Providers	FY12-FY13
5. Initiate Hauler Registration Process and Requirements	Finance Division	Haulers and other Service Providers	FY13
6. Assess and refine Hauler Registration Ordinance	Strategic Initiatives Division	All stakeholders	every 5 years

21.6 Statewide Refundable Container Deposit Legislation (Texas Bottle Bill)

The goal of this initiative is to provide support to statewide refundable deposit legislation by 2015 with full statewide implementation by 2016.

The purpose of a statewide Refundable Container Deposit Bill should be to establish a deposit/refund program to decrease the volume of aluminum, glass and plastic beverage containers in our waterways, along our roadways and public lands. A deposit/refund system supported by the Department and City of Austin should combine financial incentives and convenient redemption centers. Along with curbside collection, a bottle bill should ensure the maximum number of beverage containers for recycling. A Texas Bottle Bill should also establish a funding base to create jobs locally and throughout the state in the recycling industry and bring processors and manufactures into our state. A bottle bill supported by the Department and the City should also reduce Texans' carbon footprint by increasing the supply of high quality materials for recycling to help replace the practice of using virgin material to produce new products.

There are 11 bottle bill states in the U.S., the first originating in 1971, another 10 states currently have deposit/refund legislation pending. The Department will support a national bottle bill when one is proposed. To promote the City's support of container deposit legislation, the Department will become an ongoing supporting member of the Container Recycling Institute (CRI). The CRI is a non-profit

organization that studies and promotes policies and programs that increase recovery and recycling of beverage containers. Founded in 1991, CRI has become recognized as the expert source for information on container recycling and container deposit systems, and plays a vital role in educating policymakers, government officials, and the general public regarding the social and environmental impacts of the production and disposal of one-way beverage containers. CRI also works to debunk myths about container recycling promoted by the beverage, retail, and container manufacturing industries. CRI focuses on programs that shift the social and environmental costs associated with manufacturing, recycling, and disposal of container and packaging waste from government and taxpayers to producers and consumers.

Implementation Tasks for State-wide Refundable Deposit Ordinance

Task	Lead Responsibility	Participants	Schedule (FY)
1. Conduct stakeholder meetings on Statewide Refundable Deposit Legislation	Solid Waste Advisory Commission	Department staff	FY12-FY13
2. Support Container Recycling Institute and the Texas Bottle Bill organization	Solid Waste Services Department	Department staff	FY12 ongoing
3. Support Statewide Refundable Deposit Committee	Strategic Initiatives Division	Statewide Committee	FY13 (when established)
4. Present Resolution of Support to City Council	Solid Waste Services Department	City Law Office	FY13-FY15 (when needed)
5. Support state legislation	City of Austin	Governmental Affairs Office	FY13-FY15 (When proposed)
6. Assist in establishment of bottle collection convenience centers	Strategic Initiatives Division	Service Providers	FY14-FY16 (after bill passage)

21.7 Extended Producer Responsibility Initiatives

The goal of this initiative is to provide support to statewide Extended Producer Responsibility initiatives and to consider local initiatives, including a local EPR policy in 2015 and a local producer responsibility ordinance in 2017.

Extended producer responsibility (EPR) initiatives call for the City to take an active role in advocating for legislation requiring product manufacturers, retail establishments, wholesale distributors and other appropriate entities to take back certain products or packaging that currently are difficult to recycle or harmful to dispose. The City is actively engaged with the Texas Product Stewardship Council and will provide more staff resources to that agency to increase its effectiveness. EPR initiatives are most effective at the state level, but the City could also initiate local legislation, if statewide efforts do not succeed. The role of the City will be to:

- Adopt an EPR Policy;
- Provide support to the Texas Product Stewardship Council to obtain 501c3 (education) and/or 501c4 (lobbying) status;
- Support the development of EPR framework legislation - one law to be established as policy by the state legislature that gives the authority to state agencies to address multiple products over time;
- Consider local producer responsibility ordinance; and
- Participate in national and international dialogues.

Cost and Diversion Estimates for Extended Producer Responsibility Initiatives

Initiative	Initial Year at Full Implementation (FY)	Annual Costs	Annual Diversion Tons ¹	Costs per Ton
Extended producer responsibility initiatives	FY21	\$153,000	32,000	\$5

Resources for Extended Producer Responsibility Initiatives

Additional staff or contractor resources (1.5 full-time-equivalents) will be needed for:

- Policy and ordinance development
- Support to the Texas Product Stewardship Council
- Staff support to the Product Bans initiative and Take-Back Ordinance initiative

Implementation Tasks for Extended Producer Responsibility Initiatives

Task	Lead Responsibility	Participants	Schedule (FY)
1. Provide staff support to Texas Product Stewardship Council	Strategic Initiatives Division	Texas Product Stewardship Council	FY12 and on-going
2. Participate in national and international EPR policy development	Strategic Initiatives Division		FY12 and on-going
3. Present EPR policy to City Council	Strategic Initiatives Division		FY15
4. Present local producer responsibility research to City Council	Strategic Initiatives Division		FY16
5. Conduct stakeholder workshops on the Local Producer Responsibility Ordinance	Strategic Initiatives Division	Retail establishments, manufacturers, distributors, and customers	FY16
6. Present Local Producer Responsibility Ordinance to City Council	Strategic Initiatives Division		FY17
7. Provide technical assistance and community-based social marketing to retail establishments, manufacturers, distributors, and customers	Strategic Initiatives Division	Retail establishments, manufacturers, distributors, and customers	FY18-ongoing
8. Assess and refine EPR initiatives	Strategic Initiatives Division	All stakeholders	every 5 years