

# **WASTE PREVENTION *and* SUSTAINABILITY: Case Studies for Local Governments**

Compiled for StopWaste.Org

by

ICLEI – Local Governments for Sustainability

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*“Sustainable community development is the ability to make development choices which respect the relationship between the three “E’s” – economy, ecology and equity:*

- *Economy – economic activity should serve the common good, be self-renewing, and build local assets and self-reliance.*
- *Ecology – Humans are part of nature, nature has limits, and communities are responsible for protecting and building natural assets.*
- *Equity – The opportunity for full participation in all activities, benefits, and decision-making of a society.”*

Mountain Association for Community Economic Development<sup>1</sup>  
<http://www.maced.org>

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### Notes:

<sup>1</sup> Cover quote is from the MACED, an organization that works to create economic opportunity, strengthen democracy, and support the sustainable use of natural resources in eastern Kentucky and Central Appalachia.

## BACKGROUND

In 2002, StopWaste.Org partnered with ICLEI – Local Governments for Sustainability on a pilot project to develop Sustainability Inventories for interested jurisdictions in Alameda County. Local governments participating in this project included the cities of Albany, Berkeley, Dublin, Oakland, and San Leandro. The Sustainability Inventory provides the jurisdiction with an initial (baseline) “picture” of each community’s environmental, social, and economic conditions and how these are related. The Inventory looks at 15 resource areas, describing each using a set of indicators designed to measure the “state” of the resource, “pressures” on the resource area, and community activities taken in “response” to the trends in the resource areas over time. The resulting report can be used by the local government to help set goals and targets for moving toward a more sustainable future.

The cities involved in the pilot project expressed interest in receiving guidance on concrete steps they could use to pursue their sustainability objectives. The Sustainability Case Studies presented below provide examples of actions some municipalities are taking to advance their overall sustainability efforts while preventing materials from entering the waste stream.

**StopWaste.Org** is the Alameda County Waste Management Authority and the Alameda County Source Reduction and Recycling Board operating as one public agency. The *Alameda County Waste Management Authority* was formed in 1976 and is responsible for preparing the Alameda County Integrated Waste Management Plan and Alameda County Hazardous Waste Management Plan. It manages a long-range program for development of solid waste facilities and offers a wide variety of other programs in the areas of source reduction and recycling, market development, technical assistance and public education. The *Alameda County Source Reduction and Recycling Board* was created in 1990 through a ballot initiative, “Measure D.” The Recycling Board is responsible for programs that promote source reduction, residential and commercial recycling, recycled product procurement and market development.

**ICLEI – Local Governments for Sustainability** is a non-profit association of local governments dedicated to improving global environmental conditions through cumulative local action. Founded in 1990, ICLEI works with city and county governments to raise awareness of environmental issues and their local impacts. Through its campaigns and initiatives, ICLEI helps build capacity within the local governments to address diverse issues such as community sustainability, global climate change, waste minimization, environmental fleet and transportation policies, and urban heat island reduction. ICLEI provides its members with technical and policy assistance, training and tools, and access to an international network of over 600 jurisdictions undertaking similar activities. The *Communities 21 Campaign* and ICLEI’s Sustainability Inventory were designed to help jurisdictions assess their environmental, social, and economic conditions and take proactive steps to improve the sustainability of the community as a whole.

StopWaste.Org and ICLEI would like to thank the staff of the five Alameda County municipalities that participated in this project for the time and energy they spent in producing baseline Sustainability Inventories for their cities. Some of the jurisdictions have already taken next steps in utilizing their Inventories to highlight needed actions or to spur implementation of particular practices or programs. “Next steps” have included:

- Publishing the Inventory report (or sections of it) to area residents and businesses & engaging them in sustainable practices
- Developing a set of policies, goals and timelines based on the findings in the City’s Inventory and formulation of a resolution or similar vehicle to codify these objectives
- Identifying and tracking indicators of sustainability, and evaluating progress on an annual basis

- Creating a Sustainability Coordinator position (e.g., in Salt Lake City)
- Including a sustainability screen for all City Council agenda items. Variations on this concept are now occurring in both the Cities of Berkeley and Oakland as well as in jurisdictions outside of Alameda County such as Fort Collins, Colorado
- Integrating sustainability targets into the budget development process (i.e., with a sustainability screen for Council agenda items).
- Integrating Municipal Sustainability Best Practices into program evaluation and/or performance review criteria

Project participants from local jurisdictions included:

- Ann Chaney, Community Development and Environmental Resources Director – City of Albany
- Wendy Ke, Community Development Department – City of Albany
- Judy Lieberman, Assistant to the City Manager, City of Albany
- Brooke Levin, Environmental Services Manager – City of Oakland
- Carol Misseldine, Sustainable Development Coordinator – City of Oakland
- Kate Squire, Economic Development/Sustainable Development Initiative – City of Berkeley
- Janet Lockhart, Mayor – City of Dublin
- Jeri Ram, Planning Division – City of Dublin
- Kristi Bascom, Planning Division – City of Dublin
- Michael Bakaldin, Environmental Services Manager – City of San Leandro
- Jennifer Nassab, Recycling Program Coordinator – City of San Leandro

## INTRODUCTION

Despite significant progress in promoting recycling and other strategies to manage waste in more economically, socially, and environmentally beneficial ways, Americans are still producing too much waste. On average, each individual in the U.S. discards approximately 4.4 pounds of material each day; 30% of this is recycled or composted, 15% is burned at incineration facilities, and the remaining 56% is disposed of in landfills.<sup>1</sup> Local governments are in a unique position to impact the waste stream from their own internal operations and from the community as a whole. Waste prevention activities undertaken by a jurisdiction also form a fundamental link between governmental operations and programs to increase community sustainability.

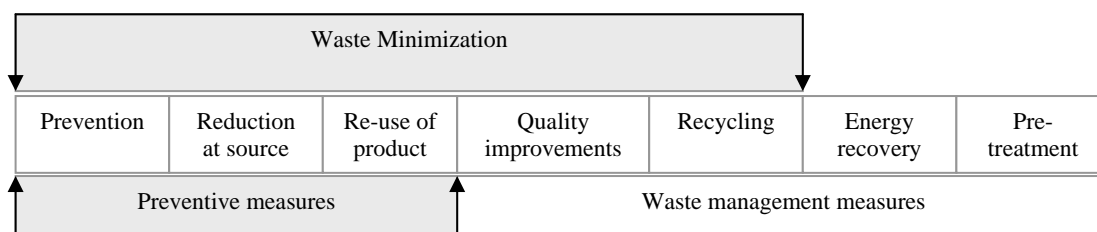
Waste generation and how waste is managed has a dramatic impact on the overall sustainability of a community. Collecting and disposing of solid waste is an expensive proposition for a community, adversely affecting the financial situation of the local government that carries out these duties and the residents and businesses that pay taxes or directly fund their waste disposal costs. Waste generation and disposal also has a dramatic effect on the natural environment. The use of disposable products strains resources and ecosystems used to produce those products (e.g., through mining activities, the use of timber and other natural resources, or chemical releases during the manufacturing process). The disposal of these products also has an environmental impact (e.g., air quality at incinerators, potential for groundwater contamination at landfills). Beyond the environmental and economic impacts, there are also social costs to waste generation, whether it is the impact that the above environmental conditions can have on human health or the conversion of valuable landscapes to landfills and the negative impacts that they can have on surrounding communities. Alternatively, waste management can provide economic opportunities in new recycling industries, decreasing the amounts of materials that need to be purchased, or “closing the loop” – taking a former waste product and using it as the input for another industry, often reducing the costs for both parties. Decisions about how waste is managed will also influence the

environmental issues mentioned above; and alternative disposal techniques can create jobs, reduce health impacts and increase the efficiency of operations.

Bearing the brunt of responsibility for municipal solid waste (MSW) management and for local and statewide waste reduction mandates, local governments play a significant role in developing programs to reduce waste generation and improve waste management. Over the last two decades, local governments across the U.S. have pioneered cutting edge strategies to divert progressively more of the waste stream from the landfill. Local governments are at the forefront of developing strategies that go beyond diversion to enhance the recycling of difficult to target materials, reaching out to less responsive communities, and devising waste prevention strategies that reduce waste before it is generated at all.

Waste prevention – also known as source reduction – means reducing the total amount of materials used and therefore the total amount of waste generated. It is considered the ideal waste solution by the U.S. EPA’s Office of Solid Waste<sup>2</sup> for its potential to reduce the overall environmental, social, and economic costs of waste in all phases of a product’s life cycle. The life cycle approach to waste management entails considering all stages of a product’s “life,” including acquisition of raw materials, manufacture, transport, use, and disposal. By avoiding the production of a new product in the first place, choosing products that have fewer associated wastes (because of their higher durability, recycled content, reusability, etc.), or reusing products, waste prevention avoids the creation of waste at each stage of the product’s life. Waste prevention is the most powerful method communities can use to reduce the impact of the products they buy and use. It prevents emissions of many greenhouse gases, reduces pollutants, saves energy, conserves resources, reduces hazardous materials and associated social risks, and reduces the need for new landfills and combustors.

The following diagram illustrates the overall types of preventive and management measures for waste<sup>3</sup>. A full waste minimization strategy includes both types of measures: prevention and management. However, this report recognizes that prevention is the most preferable method because it helps create less waste in the first place, and thus avoids the costs and associated societal and environmental harms of recycling, municipal composting, landfilling, and incineration.



Many local governments are designing and implementing innovative waste prevention and minimization strategies, going beyond state and federal mandates by complementing their existing waste management practices and going the extra mile in reducing their waste disposal needs. This guide is intended to highlight a number of key waste prevention strategies being pioneered by local governments around the country, with spotlights on local activity, that hold significant potential to reduce waste and its associated costs. These strategies also provide a number of co-benefits beyond those that affect the waste stream, including the environmental benefits associated with reduced greenhouse gas and criteria air emissions, reduced litter, and less ecological damage associated with altered practices regarding the acquisition, manufacture, and transport of material goods. There are health benefits that result from the improved management of hazardous waste and reduced local air pollution. Similarly, there are economic benefits that result from streamlining operations, stimulating the local economy, and supporting jobs in sustainable industries. These strategies take advantage of the unique and powerful levers for change available to

municipalities in shifting their own internal operations as well as influencing the communities they represent. For these reasons, waste prevention can be a powerful tool around which local jurisdictions can design step-by-step programs to become more sustainable communities.

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<sup>1</sup> Municipal Solid Waste 2001 Facts and Figures, EPA Office of Solid Waste.  
<http://www.epa.gov/epaoswer/non-hw/muncpl/msw99.htm>

<sup>2</sup> EPA Office of Solid Waste web page on waste prevention: <http://www.epa.gov/epaoswer/non-hw/reduce/prevent.htm>

<sup>3</sup> “Case studies on waste minimization practices in Europe” report. Report was based on the Organization for Economic Co-operation and Development working definition on waste minimization agreed at the 1996 Berlin Workshop ‘Building the basis for a common understanding on waste minimization’. ([http://www.netresiduos.com/cir/relatorios/EEA%20EU%20waste\\_min%20case%20studies%20EPA%20Feb%202002.pdf](http://www.netresiduos.com/cir/relatorios/EEA%20EU%20waste_min%20case%20studies%20EPA%20Feb%202002.pdf))

## CASE STUDIES

The following case studies have been compiled to provide Alameda County and other local governments with examples of successful initiatives that prevent or minimize solid waste and enhance quality of life in their communities. These examples focus on diverse initiatives to prevent and reduce the generation of solid waste in municipal operations and throughout the community. They have been chosen because they achieve a significant, measurable reduction in disposed waste; address at least two aspects of sustainable development: environment, economy, and/or equity; and help create more self-reliant communities in the long term. Together these cases represent strategies through which local governments can pursue more sustainable waste reduction solutions that enhance the safety and livability of their local and global environments. They are also practices which are evaluated regularly for effectiveness and improved based upon evaluation, are deemed to be innovative and cost-effective, and are potentially replicable within the social, economic, and political reality of Alameda County.

The categories of case studies in this guide include:

- **Paper Reduction Through e-Government**: The implementation of technology-based document management, electronic filing, and other online systems to replace the use of paper;
- **Policy Frameworks for Sustainable Operations**: Innovative municipal policies for resource conservation, holistic decision making, and protecting public and environmental health;
- **Disposable Bag Policies**: Examples of store-level fees on the use of disposable carry bags;
- **Environmentally Preferable Purchasing Policies**: Jurisdictions using their purchasing power to minimize the environmental and social impacts of their operations; and
- **Biodiesel Use in Fleet Vehicles**: The use of recycled vegetable oil to power fleet vehicles.

The case studies range widely in the resources and commitment they require and have different degrees of impact on tonnage reduced and the associated disposal, operating, social, and environmental costs. All, however, are united by the fact that they go the extra mile in reaching those hard-to-reach materials or activities—e.g., plastic bags or high tech waste—and they emphasize waste prevention and reuse over disposal.

Local governments are encouraged to use this guide to gain an idea of what has worked in other jurisdictions. Therefore, the case studies include information on the waste prevention measure that was undertaken, the methodology that was used to implement the measure, and the results to date. Readers can use this guide as a resource to guide their actions, scanning the introductory summary to each section

for an overview of the range of actions that have been put into place and the results obtained, or focus on specific actions for local implementation — reading the individual examples included and following up by investigating the links to additional resources, which contain background and supporting material for each jurisdiction's individual actions. The cases outlined in this guide offer concrete steps towards improving overall community sustainability. Jurisdictions are encouraged to use them to frame a broader discussion about their overall sustainability vision and as anchors around which to build a comprehensive action plan for social, environmental, and economic health.

## ***Paper Reduction Through e-Government***

### **Description and Implementation**

Local governments can significantly improve the efficiency and cost-effectiveness of their operations while reducing their environmental impact by using creative electronic and technology based operational systems. Implementing electronic filing systems and systems to administer public services online or over the phone can expedite and streamline what may have previously been costly and time-consuming bureaucratic procedures. Such systems reduce office paper and vehicle miles traveled, while enhancing transparency, accuracy, and access to government systems.

These savings have a significant impact on global environmental issues as well. A majority of the country's timber harvest is used in the production of pulp for paper. Therefore, reducing paper usage decreases pressure on forest resources. Similarly, the pulp and paper industry has been cited in the release of dioxin and chlorine into the air and water. Decreasing paper use helps to minimize the release of these pollutants. Additionally the reduction in vehicle miles traveled reduces congestion in urban areas, frees citizens' time that would otherwise have been spent traveling to and from government buildings, and also reduces the emission of greenhouse gases and air pollutants.

Furthermore, by adopting e-government solutions to their administrative challenges, local governments set an important example in their communities, leading them towards a more fair, efficient, and environmentally sustainable future. Examples included in this section include Paperless Traffic Courts and other Voice Response and e-Government systems.

### **Common Benefits**

#### **Local**

- Reduced paper use due to electronic files and streamlining of operations
- Reduced vehicle miles traveled (VMT) resulting from replacement of physical trips by telephone and e-mail inquiries and processing
- Cost savings due to minimization of overtime and reduced employee hours
- Expedited and improved delivery of services
- Improved work conditions through reducing monotonous, onerous tasks
- Enhanced transparency, fairness, and access to government systems
- Significantly reduced error rates and minimal lost files
- Heightened file security

#### **National/Global**

- Reduced pressure on timber resources
- Reduced use of chlorine and release of dioxin from paper production
- Reduced greenhouse gas emissions from vehicle travel and the decomposition of paper in landfills

### **Common Challenges**

- Initial cost of system development
- Resistance to change amongst administrators and the public
- Access to technology for the “non-wired” public
- Employee training costs
- Technology development and expertise required to maintain systems

### **Specific Examples and Results**

#### **Miami-Dade County, FL—“Paperless” Traffic Court**

The Miami-Dade Traffic Court is the fourth largest traffic court in the world, processing the traffic citations issued by every law enforcement agency in the county. Duties include updating, organizing, and maintaining public records, collecting fines, and maintaining calendars for County Court Judges and Hearing Officers.

Miami-Dade County became a pioneer in the realm of e-government when it implemented the world’s first “paperless” traffic court. Since 1995, the Traffic Division of the Miami-Dade Clerk of Courts, in cooperation with the Administrative Office of the Courts (AOC) and Miami-Dade County, has been involved in the design and implementation of imaging technology to streamline its operations. This process was conceived and implemented by the County Clerk, who was recognized as the “2002 Public Technologist of the Year” for his role in spearheading the system and bringing together the various agencies that participate. The project was initiated to improve service to the various agencies that process traffic cases, attorneys, and the public; and in reaction to financial pressures to be able to “do more with less.”

SPIRIT (Simultaneous Paperless Image Retrieval Information Technology) is a collection of programs, databases, and computers that digitizes paper-based documents, providing access to judges, attorneys, and court clerks throughout county facilities. SPIRIT courtrooms have imaging workstations instead of stacks of paper files. Before the new system was developed, clerks handled each piece of paper an average of 37 times. SPIRIT currently handles up to 3,600 cases a day, allowing the Traffic Division to process 32% more citations, despite a 167% increase in court cases, while lowering error rate from 15% to less than 1%.

This increase in efficiency has allowed the Division to cut staff by 15% — 40 fulltime employees have transferred from the calendaring unit to other areas of the Clerk’s Office. Additionally, the Traffic Division’s use of overtime has been reduced from a high of \$412,649 in FY 96-97 to a projected low of \$150,000 in FY 01-02. Time spent looking for requested, lost, or misplaced files has been eliminated. Staff report that working conditions have improved as more time is spent working with people, as opposed to managing paper.

The SPIRIT system has also contributed to a better, more decentralized quality of public service. The electronic generation of forms has minimized errors and helped improve activities at Public Service Counters. Government accessibility has been improved, as the public can use district locations for traffic-related business (public service counters, attorney rooms, courtrooms, etc.) without having to go to the downtown location to review and process files. This decreases the Court’s environmental impact by reducing the vehicle miles traveled to and from the courthouse.

Miami-Dade’s “paperless” traffic court demonstrates the diverse benefits of e-government. Money has been saved, case files and documents are more secure, and the Court has reduced storage needs. City staff report that the policy has been very positively accepted within the local government as well as the



wider community. The County has also gained significant public recognition for the project. In 2001, the County was awarded the Technology Solutions Award by Public Technology, Inc. for the SPIRIT project. Environmentally, it has made a significant impact through paper reductions and reducing the GHGs associated with the paper lifecycle and the vehicle miles traveled. Through further developing the system for other administrative functions, the County intends to continue its transition to e-solutions throughout its operations.

Miami-Dade County Clerk of Courts SPIRIT program website  
<http://www.miami-dadeclerk.com/dadecoc/SPIRIT.asp>

**Miami-Dade County, FL—Voice Response System**

As part of its overall e-government operations, Miami-Dade County has also developed and implemented an Interactive Voice Response telephone system known as DIAL (Direct Information Access Lines). Established in 1995 under the direction of the Clerk of Courts, the DIAL system provides general information on traffic violations, court procedures, and court-approved programs. The system is constructed to provide an always-accessible avenue of court system information to Miami-Dade County citizens from the comfort of their homes. Citizens can pay for traffic and parking tickets over the phone or online with a credit card, make court dates (civil and criminal), or make inquiries on child support. The system eliminates the need to write a letter or wait in line to obtain a trial date and generated over 12,000 calls per month in 2003. As a result, staff members report that the system reduces the need for considerable amounts of paperwork, thereby minimizing the waste generated by the government. It also significantly reduces the environmental impacts associated with transportation to and from the Courts, eliminating an estimated 1,481,040 Vehicle Miles Traveled and 4,304 tons of eCO<sub>2</sub> since its implementation.

Miami-Dade County Clerk of Courts DIAL program website  
<http://www.miami-dadeclerk.com/dadecoc/DIAL.asp>

**Fort Collins, CO—e-Services at FCgov.com**

The City of Fort Collins' website, [www.fcgov.com](http://www.fcgov.com), has won awards for its innovation, functionality, efficiency, and economy. The site gives citizens enhanced access to online government services (e-services), allowing them to pay for traffic citations, sign up and pay for recreation classes, report crimes, obtain election information and voter registration status, search and access various official city documents such as inspection reports, subdivision plots, and ordinances; and more. City vendors can also take advantage of the website's technology by reviewing requests for proposals (RFPs) and bids. In 2000, approximately 100 bids and RFPs were posted, reducing annual printing and mailing costs by approximately \$8,000 and preventing the consumption of 194 reams of paper (approximately 919 lbs) and 3.1 tons of eCO<sub>2</sub>. Through doing business smarter, Fort Collins' commitment to e-government has been a powerful tool to continue to provide high levels of service for its customers while maintaining costs and reducing its environmental impact.

City of Fort Collins E-Services Website  
<http://fcgov.com/eservices/>

**Local Examples:**

The City of Oakland has also been a leader in using online resources to provide services to its constituency. Their website, which receives over 20,000 hits/month, provides easy access to city information, including crime statistics, sign-ups for municipal recreation centers, online GIS mapping services, and other municipal information.

The East Bay Regional Park District has also implemented an electronic data management and paper reduction system for internal operations and public interactions. Within the office, documents are circulated electronically, printing of newsletters and letterhead is “on-demand,” and double sided printing is standard. In interactions with the public, maps and other park resources are distributed over the internet, and the park district has implemented an on-line registration system for programs and activities. Through these systems, the EBRPD is reducing paper use and has seen a 250% return on their investment.

## ***Policy Frameworks for Sustainable Operations***

### **Description and Implementation**

Local governments can encourage or mandate waste reduction by adopting various policy frameworks that govern resource utilization at the local government and/or community levels. At the broadest level, overarching principles can be adopted that set priorities for consideration in enacting specific policies and send an important message to the various agencies and to the community about the local government’s commitment to the sustainable use of resources. At a more specific level, policies can target a particular resource (e.g., paper) and set guidelines for its utilization in all areas of government operations or can use a specific regulatory device (e.g., a ban) to require certain forms of behavior within the municipal operations or the community. Policy frameworks can also involve certain forms of analysis, including Full Cost Accounting, to support the financial justification for moving forward on waste reduction policies.

The holistic, inter-departmental nature of these efforts allows them to address multiple aspects of community sustainability. An overarching policy framework integrates diverse initiatives to reach a broader audience and have more far-reaching impacts. For example, management frameworks such as taking a “precautionary” approach to decision making, which disallows any action that has not been proven to have minimal impact on the environment or human health can lead to a reduction in the toxicity of products used by all departments, achieves energy savings from the use of more efficient equipment (thereby reducing power plant emissions), and decreases demand for the extraction of raw materials and production of new products through the use of recycled products — while creating a market for recycled materials.

### **Common Benefits**

#### **Local**

- Policy frameworks can have far-reaching impacts by transforming the decision-making processes throughout government operations and the community as a whole
- Can shift focus to waste prevention over recycling or disposal options
- Reduced paper use
- Reduced toxicity of products used
- Assistance in meeting landfill diversion goals
- Extensive cost savings possible through the selection of longer lasting, more durable products and through energy savings gained
- Promotes coordination between different agencies
- Sends a clear message of priorities to employees and setting a leadership example for community

**National/Global**

- Reduced environmental impacts associated with the acquisition, manufacture, and transport of more damaging products when considered from a life cycle perspective
- Reduced toxicity and health concerns associated with more hazardous products
- Reduced greenhouse gas emissions and other pollution resulting from choosing less energy-intensive products

**Common Challenges**

- Requires education to influence behavioral changes
- Monitoring and enforcement is time consuming
- Garnering support in government and community

**Specific Examples and Results**

**King County, WA—Zero Waste of Resources 2030 Guiding Principle**

The King County Zero Waste of Resources 2030 Guiding Principle was adopted in 2003 as an umbrella vision, target, and policy framework to guide County actions with respect to resource consumption and waste reduction. The concept of Zero Waste, as adopted by King County and other local governments (including the City of Seattle, City of Santa Cruz, and the City of Toronto), represents a holistic and upstream approach that seeks to redesign the manner in which resources and materials flow through society by specifically targeting consumers, advertisers, manufacturers, and product designers. The Principle redefines the term *waste* as something of no value, which must be thrown away, and thus implies a goal of 100% efficiency, in which nothing of value is disposed of by 2030.

In King County, the focus of the principle is on six target areas: paper, metal, food waste, wood waste, yard waste, and electronics/mercury; which represent 60% of the overall residential, non-residential, and self-haul waste stream. King County has already taken a number of significant steps on a Zero Waste of Resources path in these areas. Banning yard waste from curbside trash collection, lobbying for electronics take back, and banning the disposal of electronics and mercury at area landfills, linking up waste generators with manufacturers, promoting compost and natural yard care behaviors such as integrated pest management, and encouraging residents and business to purchase products with recycled content are just a few examples. King County's policy specifically prohibits incineration as a means of disposing marketable recyclables or yard debris. This is an important part of the policy, as there has been growing interest in some locales in achieving zero waste via incineration or other "conversion technologies" designed to convert waste to energy. Many of these technologies have not yet been proven to be free of harmful emissions, and thus cannot currently be considered an appropriate or sustainable method of achieving zero waste. King County's policy has experienced widespread support for its emphasis on turning waste into a valuable resource and for its emphasis on supporting economic activity at the local level.

The Zero Waste of Resources concept emphasizes all three aspects of sustainability: environmental, social, and economic. To that end, it encourages creative policies which help turn waste into raw materials that can stimulate the local economy. It involves actively transferring shared responsibility for targeted waste to producers through cooperative partnerships. It emphasizes education of local residents, ratepayers, businesses, organizations, and institutions; encouraging them to stop thinking of resources as waste for which they have to pay to dispose and to maximize reuse, repair, recycling, and composting. So far, the Principle has been widely supported for its ability to reconcile seemingly different goals into one coherent policy. It is a long-term approach that involves innovation and "thinking outside the box" to shift behavior and responsibility towards a healthy and sustainable society.

King County Waste Code 2003 (see section 10.14.020-10.14.030)  
<http://www.metrokc.gov/mkcc/Code/13-Title%2010.pdf>

**San Francisco, CA—Precautionary Principle**

In June 2003, San Francisco became the first jurisdiction in the nation to adopt the Precautionary Principle as a policy framework to develop laws that protect health and the environment. The Principle requires a different approach to decision-making from the traditional risk assessment-based approach, which waits until proof of an environmental danger has been established before imposing regulations which prohibit a particular activity. It involves the careful assessment of available alternatives using the best available science and requires selection of the alternative that presents the least potential threat to human health and the city's natural systems. Public participation and an open and transparent decision making process are critical to finding and selecting alternatives, stemming from recognition that the public bears the ecological and health consequences of environmental decisions.

In the text of the Precautionary Principle it states that, "*Where threats of serious or irreversible damage to people or nature exist, lack of full scientific certainty about cause and effect shall not be viewed as sufficient reason for the city to postpone cost effective measures to prevent the degradation of the environment or protect the health of its citizens.*" Thus the five key elements of the framework are: 1) Anticipatory Action; 2) Right to Know; 3) Alternatives Assessment; 4) Full-Cost Accounting; and 5) Participatory Decision Process.

The Precautionary Principle has far-reaching implications for waste reduction, stemming from its emphasis on discouraging waste and taking into account all by-products involved in extraction, manufacturing, production, transport, and disposal of materials. To this end, the Principle has allowed the City to pursue resource conservation through green building projects, working toward the maximization of reuse and recycled content of all construction and demolition materials; favoring long-term use through product durability, reparability, and reuse; and maximizing post-consumer recycled content and recyclability. Extensively adopted in Western Europe and other countries, the Precautionary Principle is a powerful framework for advancing waste prevention.

**Local Examples:**

In 2003, the City of Berkeley passed a similar resolution, which stated that the City would adhere to the Precautionary Principle in decision making, and that policies be developed that supported this, starting with an Environmentally Preferable Purchasing Policy, which was adopted in 2004, and is further described in the Environmentally Preferable Purchasing Policies section of this report. These policies were developed by an ad hoc Bay Area Working Group on the Precautionary Principle (BAWG), which includes members of the Energy, Solid Waste, Community Environmental, and Community Health Commissions and input from community groups such as the Women's Cancer Resource Center, Breast Cancer Action, Commonweal, Clean Water Fund, and the Ecology Center. City staff and the BAWG also relied on the resources and technical assistance of StopWaste.Org. Despite initial assumptions, research by the City determined that in most cases there are no additional costs associated with buying environmentally preferable products and in some cases these products actually cost less. When the lifecycle costs are considered, safer "green" cleaning products often last longer, reduce the possibility of allergic reactions, and help to minimize the risk of burns and eye damage often associated with traditional cleaning products.

San Francisco Precautionary Principle Website  
<http://www.sfenvironment.com/aboutus/innovative/pp/>

Berkeley Precautionary Principle Policy

[http://www.takingprecaution.org/docs/101403\\_berkeley\\_resolution.pdf](http://www.takingprecaution.org/docs/101403_berkeley_resolution.pdf)

Bay Area Working Group on the Precautionary Principle fact sheet

[http://www.breastcancerfund.org/atf/cf/{DE68F7B2-5F6A-4B57-9794-AFE5D27A3CFF}/BAWGFactSheet\\_03\\_05\\_03.pdf](http://www.breastcancerfund.org/atf/cf/{DE68F7B2-5F6A-4B57-9794-AFE5D27A3CFF}/BAWGFactSheet_03_05_03.pdf)

***Portland, OR—Sustainable Paper Use Policy***

In an effort to model sustainable business practices and to follow the recommendations made by the City of Portland/Multnomah County Joint Task Force On Paper's extensive use and impact throughout their operations, Portland adopted the Sustainable Paper Use Policy in June 2003. Recognizing that paper use represented one of the greatest areas of consumption of material resources, the Policy called for a number of measures aimed at reducing the amount and impact of paper use in City operations. The goals set out included:

- Reduce overall printing and writing paper consumption by 15% by 2008
- All paper products to meet the EPA recycled content recommendations by 2004<sup>1</sup>
- Give preference to paper products that have been processed chlorine free
- Track consumption of copy, printing, and writing papers and create Bureau-level strategies for reducing paper consumption

As detailed in the 2004 Annual Report, the City has achieved, or is on track to achieve, the Policy goals, with the only notable exception being the chlorine goal, in which significant achievements have been made. With some outside assistance from Portland State University interns, the Policy included a significant educational component and elicited participation from all bureaus. It is a cutting-edge policy that has already significantly altered the City's paper use. In 2004, it was reported that paper use was down 15%, cutting more than 13 million sheets (approximately 26,000 lbs) with an estimated reduction of 34 tons of eCO<sub>2</sub><sup>2</sup>.

City of Portland Sustainable Paper Use Policy

<http://www.portlandonline.com/shared/cfm/image.cfm?id=24521>

The EPA's Comprehensive Procurement Guidelines with recycled content recommendations paper products

<http://www.epa.gov/cpg/pdf/paper.pdf>

***Seattle, WA—Ban on Recyclables in Trash***

Despite the fact that residents pay for garbage but recycling is free, approximately 25% of Seattle's garbage is made up of paper, cardboard, aluminum cans, plastic bottles, and yard debris that could have been recycled or composted. In an effort to target those recyclable materials and thereby reverse a decline in the city's recycling rates, the City of Seattle has adopted a new ordinance that will prohibit the disposal of recyclables in trash as of January 1, 2005. The ordinance aims to save residents and businesses money, enhance revenues derived from recyclables, and keep future garbage costs low.

Seattle Public Utilities (SPU) conducted an educational outreach program in 2004 regarding the new requirements, began placing educational notice tags on garbage cans containing banned waste types to alert their owners in 2005, and will begin enforcement in 2006. With the exception of contaminated and food soiled paper, the following recyclables will be outlawed if found in significant amounts: paper, cardboard, glass and plastic bottles and jars, as well as aluminum and tin cans. Yard debris has been prohibited since 1989. SPU's proposed definition of significant amounts is: "more than 10% by volume of container, dumpster or self-haul vehicles load based on visual inspection by an SPU inspector,

contractor or transfer station worker.” Specifically, SPU staff will conduct random inspections of commercial and multifamily dumpsters, as well as residential cans, in order to identify contamination. The ordinance will be enforced for businesses and apartment owners with up to two warning notices before a civil fine of up to \$50 is sent to the garbage subscriber. For single-family households, the City’s contractors will not pick up garbage cans that have significant amounts of recyclables until the recyclables are removed.

Complementing the ban, the City will implement a number of other service enhancements designed to increase the level of recycling for residents and businesses. Residential recycling improvements will increase yard waste collection to every other week at no additional cost. Subscribers to the residential yard waste program will be provided with free 96-gallon wheeled containers beginning in the spring of 2005 and will soon be able to add certain types of vegetable food waste and compostable paper to their yard waste. To help with commercial recycling efforts, the City will be introducing free, bi-weekly curbside recycling to businesses. Additionally, starting in mid-2005, restaurants, grocers, and other food service businesses will be provided, at a discounted cost, a full range of container sizes and collection frequencies as part of their waste collection service. All collected material will be composted at the Cedar Grove Composting facility; and business districts throughout the city will receive 300 new public recycling containers that will provide sidewalk collection points for cans and bottles.

Given that residential curbside recycling is provided free and that the ban will be accompanied by a number of service improvements, the ban on recyclables makes economic sense for residents and businesses, which pay for their garbage as a result of the City’s Pay as You Throw (PAYT) policy. Following from the success of the long-term ban on yard waste in garbage, the City expects the measure to have a significant impact in encouraging further recycling and to set an important precedent for this regulatory policy mechanism for use by other local governments.

The public response to the extensive publicity accompanying the ban has been overwhelmingly positive. The City has worked with groups that have concerns about the ban to ensure that their feedback is taken into account in providing service enhancements<sup>3</sup>. The City Council showed strong support for the measure, particularly after the economic benefits were demonstrated. Because of the strong local market for recyclable materials, the City predicts that the ban will save as much as \$2 million per year due to revenue from selling the recyclables collected and received by local industry.

***Local Examples:***

Many jurisdictions in Alameda County have recently begun programs to allow residents to dispose of food scraps in their green waste bins for curbside pick-up and composting. As food scraps and food-soiled paper make up approximately 38% of the residential waste thrown away in Alameda County, this practice has the potential to dramatically decrease the amount of materials going to area landfills. Jurisdictions that currently allow this practice (or will soon) include: Alameda, Albany, Castro Valley, Dublin, Emeryville, Fremont, Livermore, Oakland, Pleasanton, San Leandro, and Union City.

City of Seattle Ban on Recyclables in Trash Website

[http://www.ci.seattle.wa.us/util/About\\_SPU/Recycling\\_System/History\\_&\\_Overview/Ban\\_on\\_Recyclables\\_in\\_Garbage/index.asp](http://www.ci.seattle.wa.us/util/About_SPU/Recycling_System/History_&_Overview/Ban_on_Recyclables_in_Garbage/index.asp)

Ban on Recyclables in Trash ordinance (pdf)

[http://www.ci.seattle.wa.us/util/stellent/groups/public/@spu/@rmb/@csd/@swcontracts/documents/spu\\_informative/cos\\_003964.pdf](http://www.ci.seattle.wa.us/util/stellent/groups/public/@spu/@rmb/@csd/@swcontracts/documents/spu_informative/cos_003964.pdf)

“Seattle Restricting Disposal of Recyclables” article in the Recycling News, 1/4/2005

<http://www.recyclingtoday.com/News/news.asp?Id=6977>

**Brookline, MA—Full Cost Accounting Analysis**

In contrast to other common methods of accounting, Full Cost Accounting (FCA) takes into account more than cash outlays, including all of the monetary costs of resources associated with municipal solid waste (MSW) programs. According to the EPA's protocol, FCA goes beyond the limits of cash flow accounting, which is often used by local governments, by considering direct and indirect (overhead) operating costs of MSW services as well as up-front (past) and back-end (future) expenses. It addresses such costs as public education and outreach, land acquisition, permitting, and facility construction and modification, as well as operating costs such as operation and maintenance, capital costs, interest payments, and "hidden" costs. Finally, it includes back-end costs, such as site closure, building and equipment decommissioning, post-closure care, and retirement and health benefits for current employees. In reflecting the "real" costs of different waste management options, FCA can be an invaluable tool to aid decision-makers with program planning and can help identify specific measures for cost-effectively improving operations.

In the Town of Brookline, which has its own fleet of garbage trucks but contracts out for recycling, comparing costs of recycling versus garbage collection based on simple cash outlays contributed to a common misconception that recycling was more expensive. However, a Full Cost Accounting Analysis—conducted at no cost by graduate student interns from a the business program at Brandeis university and based on the EPA's comprehensive Full Cost Accounting Website—demonstrated that recycling was, in fact, cheaper than garbage per ton.

Although the impact of the analysis is not yet quantifiable, members of the Town's Solid Waste Advisory Committee hold that the Analysis has been extremely revealing and important in gaining support for waste reduction strategies. Full Cost Accounting Analysis can thus be a powerful strategy for local governments to gain political support for more aggressive waste reduction measures.

US EPA's Full Cost Accounting Website  
<http://www.epa.gov/epaoswer/non-hw/muncpl/fullcost/>

City of Brookline Full Cost Accounting Analysis  
Available for PDF Download in the electronic version of this report at StopWaste.org

**Local Examples:**

The City of Oakland has taken steps to integrate sustainability principles into all decisions it makes. All staff reports to the City Council for projects, purchases, or services exceeding \$15,000 are required to include a section that addresses how the item under discussion will have economic, social equity, or environmental benefits. The goal is to foster the identification and promotion of sustainability opportunities as early as possible in the design of all projects undertaken.

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**Notes:**

<sup>1</sup> The EPA recycled content recommendations are outlined in the Comprehensive Procurement Guidelines (CPG) and Recovered Materials Advisory Notices (RMANs). These documents address a wide variety of paper products with different recycled content recommendations for each.

<sup>2</sup> Calculation based on a 100% methane recovery rate, using the mixed paper emissions reduction factors, and assuming that all reduced paper consumption would have otherwise been landfilled.



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<sup>3</sup> For instance, in the early stages of the policy's development, hotels raised concerns about the ban and their ability to ensure guest participation. The City worked with them to develop a plan for them to reach their clients in order to ensure their compliance.

## ***Disposable Bag Policy***

### **Description and Implementation**

Disposable bags represent a significant<sup>1</sup> and growing component of the municipal solid waste stream. According to the EPA Office of Solid Waste, over 4 million tons (or 360 bags per year per person) of plastic bags, sacks, and wraps were generated in 1999, comprising over 17% of all plastic waste and almost 2%, by weight, of total municipal solid waste generated in the United States. A majority of these plastic bags are provided free from retailers. They contribute to the waste burden of landfills, comprise a major component of stormwater pollution, disrupt drainage and sewer systems, create a costly nuisance in the form of blowing litter and contamination at recycling and composting facilities, and constitute a health hazard to children<sup>2</sup> and wildlife<sup>3</sup>.

Furthermore, most plastic bags are petroleum-based. Therefore, when considered from a life cycle perspective, they are responsible for significant environmental impacts associated with extraction (ecosystem disruption), processing (air pollution), and transport of oil (air pollution). This is in addition to the toxic chemicals used in the manufacturing process that then become a disposal issue themselves. Disposable paper bags are biodegradable, but still constitute a collection and disposal problem and use timber resources. Timber harvesting is associated with ecosystem loss and erosion, while paper processing produces a significant amount of noxious chemicals, including dioxin, which has been linked to cancer. Although bags are often produced from recycled paper, this is still only a percentage of the total material input and virgin timber is used for the rest.

There are a number of different strategies for reducing the impact of plastic bags on the waste stream. These include recycling and reuse campaigns and improved litter control. Voluntary strategies implemented by supermarkets and advocacy organizations concentrate on reducing demand for the bags through educating the public about the benefits of reusing and recycling bags. Unfortunately, these programs often show limited success as retailers and consumers alike have little incentive to participate or limit their demand for the bags<sup>4</sup>. A number of countries around the world, such as Australia, Bangladesh, Denmark, Taiwan, Ireland, South Africa, and the United States are pioneering innovative strategies to combat the proliferation of the bags from the supply side<sup>5</sup>. To this end, local, state, and federal governments can enact supply-side regulations such as bans, taxes, and levies or voluntary or mandatory take back programs, which place more of the burden of the bags and their disposal on the producers and suppliers. A national levy in Ireland, for example, has reduced the proliferation of plastic bags by 90% and a similar law in South Africa, which prohibits grocery stores from giving out free bags below a certain thickness, is expected to cut consumption of the bags by 50%<sup>6</sup>. Such efforts to reduce the production and consumption of bags have yielded the most dramatic means of curbing the nuisance and result in the most significant environmental and economic benefits.



## Common Benefits

### Local

- Reduced disposal and litter control costs
- Improved ability to reach landfill diversion goals
- Reduced costs attributed to equipment clogging at recycling and composting plants
- Improved sewer system maintenance and reduced stormwater pollution due to less bags clogging the system and escaping into the bay
- Improved environmental stewardship due to reduced greenhouse gas emissions, reduced use of toxic chemicals, reduced terrestrial and marine pollution, reduced landfill burden
- Reduced health hazards due to suffocation
- Aesthetic improvements in local neighborhoods with reduction of “fly-away” bags

### National/Global

- Reduced environmental impacts in acquisition, manufacture, and transport of materials used in production of the bags from a life cycle perspective
- Reduced toxic exposure in processing and manufacturing of plastic bags from life cycle approach
- Advancing the polluter-pays principle and progress towards “closing the loop”

## Common Challenges

- Resistance by plastics industry, suppliers, and consumers
- Providing alternatives in the form of more durable, sturdy, reusable bags requires new purchasing decisions and marketing changes
- Administrative commitment required in devoting local government staff time to implementation, monitoring, and enforcement

## Specific Examples and Results

### Ireland—Federal Environmental Levy on Plastic Bags

In 2002, Ireland became the first federal government to enact a point-of-sale levy on plastic shopping bags. In response to growing concern about the environmental impacts of the 1.2 billion plastic bags given to consumers at no charge each year, the levy requires that shops, supermarkets, and service stations charge their customers 15 Euro cents (approximately 19 U.S. cents) per plastic bag, to be itemized on the bill. Exceptions are made for smaller bags used to package non-packaged goods. Revenues generated from the Plastic Bag Environmental Levy go into an Environmental Fund and are used to support waste management, anti-litter programs, and other environmental initiatives. So far, the levy has produced a dramatic change in Irish shopping habits, with shoppers overwhelmingly switching to reusable shopping bags and thereby reducing the number of plastic bags consumed by 90%. The levy, which is enforced by the local authorities through warnings and fines, has also raised millions of dollars for environmental projects and has already had a significant impact in minimizing the litter problem. To ease the transition, many stores sold canvas bags and some offered “bags for life,” replaced free when they wear out.

Text of the Irish Environmental Plastic Bag Levy  
<http://www.irishstatutebook.ie/ZZSI605Y2001.html>

Description of the Irish Environmental Plastic Bag Levy  
[http://www.oasis.gov.ie/public\\_utilities/waste\\_management/plastic\\_bag\\_environmental\\_levy.htm](http://www.oasis.gov.ie/public_utilities/waste_management/plastic_bag_environmental_levy.htm)  
1

**Galena, Alaska—Ban on Plastic Bags**

Also called “tundra ghosts” and “landfill snowbirds,” plastic bags constitute a major litter problem all over Alaska. In 1998, the City of Galena took control of that problem through a full ban on plastic bags. With a grant from the U.S. Environmental Protection Agency, the city’s ruling body, the Loudon Tribal Council, handed out 2,000 free canvas bags to help phase out plastics in the town’s three stores. To date, nearly 40 other Alaskan local governments have followed suit, working with the state’s Department of Environmental Conservation to formulate the bans. The environmental benefits of the bans have been clearly demonstrated in the villages and news reports demonstrate that public reaction to the bags has been quite positive.

Article on the Alaska plastic bag ban  
<http://66.23.131.98/archive/2003/jul/envbrfs.txt>

**San Francisco, CA—Fee on Disposable Carry Bags**

After a CA state bill (AB 586) proposing a 2-cent-per-bag tax, payable by the stores, died under heavy opposition from retailers and bag makers in 2003, San Francisco began looking into a local solution. City officials are now considering a 17 cent surcharge on all grocery bags, 90% of which are plastic, in an effort to reduce waste and the environmental and economic consequences of the disposable bags.

The Department of the Environment estimates that San Francisco customers bring home about 50 million bags each year, accounting for about 2% of the waste stream, at an annual cleanup cost of about \$7.4 million. Disposable plastic and paper bags are also responsible for more than \$1 million in extra costs due to their role in contaminating recyclables and compost items at the Norcal waste management facilities<sup>7</sup>. According to the Department’s calculations (see link below), the full costs of the bags including contamination costs, collection and disposal costs, street cleaning costs, and future landfill liability costs come to \$0.17 per bag.

The fee, as levied on suppliers and calculated to internalize all associated costs, will pass on the cost to the consumer, providing a disincentive for them to use the bags (see itemized cost break-down, below). One-half of the revenue generated by the surcharge (8.5 cents/bag) will be kept by the grocers to spend on City-approved programs including reusable shopping bags. The other half will be applied to funding related programs through the Department of Environment, including programs to provide discounted reusable checkout bags, in-store collection of bags and other packaging for recycling, free compostable bags in produce and bulk aisles, discounted compostable bags and food service ware on store shelves, and outreach for waste prevention and recycling programs. The ordinance requires supermarkets to provide an annual report to the Department of Environment summarizing bag revenues and program expenditures. It also provides for the City to adjust the amount of the surcharge to other suppliers of disposable bags, including drug stores, dry cleaners, newspapers, and other retailers; in the future.

The main opposition the City has encountered has been from the local stores worried about customer inconvenience and transfer of business to surrounding communities, and lobby groups representing bag manufacturers. If passed, the climate benefits of the policy could be significant. With a reduction following that of Ireland with 90% less bags being consumed, approximately 1,093 tons of eCO<sub>2</sub> would be reduced per year. A more conservative estimate of 50% reduction in bag consumption would result in a reduction of 607 tons of eCO<sub>2</sub> per year. Depending on the actual reduction seen, this is equivalent to taking between 119 and 215 cars off the road for one year.

**Recent Developments:** In early 2005 the San Francisco Environmental Commission passed a resolution in support of adopting the bag policy. In February, the Board of Supervisors passed a resolution asking the Department of the Environment to complete a pair of studies. The first will look more in depth into the costs to the City of the problem of bags. The second will analyze any possible negative impacts on the low and fixed-income community, as well as those with large families, and possible mitigation for those impacts (e.g., providing free reusable bags to food-stamp holders). The results of these studies are due to be presented to the Board of Supervisors in 2005, and will be taken into consideration in the final drafting of the ordinance.

San Francisco Climate Action Plan (September 2004)  
<http://www.sfenvironment.com/aboutus/energy/cap.htm>

Proposed Resolution  
[http://www.ci.sf.ca.us/site/sfenvironment\\_page.asp?id=29571](http://www.ci.sf.ca.us/site/sfenvironment_page.asp?id=29571)

San Francisco Bag Policy Fact Sheet  
Available in Appendix A

Itemization of associated costs  
[http://www.sfgov.org/site/sfenvironment\\_page.asp?id=28374](http://www.sfgov.org/site/sfenvironment_page.asp?id=28374)

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**Notes:**

<sup>1</sup> Disposable bags make up approximately 2% of the City of San Francisco's waste stream. See the San Francisco case study in this section.

<sup>2</sup> Plastic bags are the second leading cause of suffocation among babies. See: "Keep Your Baby Safe," Parents Magazine: <http://www.parents.com/articles/age/5757.jsp>.

<sup>3</sup> Ingestion of, and entanglement in, plastic is a significant concern to the health of marine life. See: "Keep the Sea Plastic Free—Bin It", Australian Government, Department of the Environment and Heritage: <http://www.deh.gov.au/industry/waste/plasticdebris.html> and Leahy, Stephen, "Drowning in an Ocean of Plastic", Wired News, June 5, 2004: <http://www.wired.com/news/technology/0,1282,63699,00.html>

<sup>4</sup> Lowy, Joan. "Plastic Left Holding the Bag as Environmental Plague: Nations around world look at a ban"

<sup>5</sup> See list on international practices in the "San Francisco Bag Policy Fact Sheet", which is included in the additional resources listed at the end of the San Francisco case study.

<sup>6</sup> See case study below for information on Ireland and the following article for information on South Africa: "South Africa bans plastic bags", BBC News, 9 May 2003: <http://news.bbc.co.uk/2/hi/africa/3013419.stm>.

<sup>7</sup> According to SF Environment, plastic bags contaminating the recycling stream result in costly machinery jams. Associated costs include: cost of removing bags from the recycling stream, cost of fixing jammed machinery, and cost of reduced revenue gained from the sale of recyclable materials due to bag contamination. See Itemization of associated costs download.

## ***Environmentally Preferable Purchasing (EPP)***

### **Description and Implementation**

Environmentally preferable purchasing (EPP), or “green” purchasing, involves buying products or services that have a lesser or reduced adverse effect on human health and the environment when compared with competing products or services that serve the same purpose”<sup>1</sup>. EPP can consider many different factors related to the raw materials acquisition, production, manufacture, transport, use, and disposal of a product. The EPA’s Final Guidance on EPP is centered on five guiding principles:

- Including environmental considerations as part of the normal purchasing process
- Emphasizing pollution prevention early in the purchasing process
- Examining multiple environmental attributes throughout a product’s life cycle
- Comparing environmental impacts when selecting products
- Making purchasing decisions based on accurate and meaningful information about environmental performance of products and services

EPP can be a powerful tool for local governments to use in their strategies to reduce waste and become more environmentally and socially sustainable. For instance, using recycled and recyclable material avoids the need to go through the extraction and manufacturing process using virgin materials, thereby saving considerable natural resources and energy. Through simple purchasing decisions, governments can affect change at all levels of production, use, and disposal of products used throughout government operations and can help to create markets for environmentally friendly products, thus making them more affordable to other buyers. Considering the full life cycle of a material can demonstrate how higher short-term costs may well be offset by reduced disposal costs, offering valuable information for the purchasing decision-making process. Mandated by some states, local EPP provisions can be voluntary or mandatory and can apply to as few or as many sectors of the local government as desired. They are increasingly being utilized as important levers to enact behavioral change in municipal operations, sending an important message of leadership and best practice to the community.

### **Common Benefits**

- Improved ability for a jurisdiction to meet existing environmental goals
- Improved worker safety and health with use of less toxic or hazardous products
- Reduced liability, as EPP products tend to reduce the risk of occupational health hazards and resulting problems such as allergies and chemical burns
- Reduced employee health costs associated with occupational health hazards
- Reduced disposal costs, as fewer materials are discarded and more durable, long-term products are given preference
- Stimulation of the market for environmentally friendly products and services

### **Common Challenges**

- Resistance to change within departments
- Enforcement and monitoring
- Time and cost of product evaluation
- Coordination between government agencies
- Increased costs for some products

### **Specific Examples and Results**

***Berkeley, CA—Blended Cement and Environmentally Preferable Purchasing Policy***

Cement produced through conventional methods uses virgin materials and emits greenhouse gases in the burning of fossil fuels to extract and treat the limestone. The cement industry's heavy reliance on coal leads to particularly high emission levels of CO<sub>2</sub>. The cement industry accounts for 5%<sup>2</sup> to 8%<sup>3</sup> of the world's CO<sub>2</sub> emissions, as well as nitrous oxide, sulfur, and pollutants. Each ton of conventional cement produced emits one ton of carbon dioxide. Alternative cement production methods produce "blended cement," which can substantially reduce greenhouse gas emissions and the use of virgin materials. Blended cement uses binding materials—such as fly ash, a byproduct of steel smelting, or rice hulls—that do not require a firing process. Recycling such material to produce cement helps to keep this material out of landfills.

In December 2002, Berkeley became the first U.S. city to adopt a blended cement procurement policy. The City Council resolution requires that, wherever technically appropriate, procurement of cement will specify the use of blended cement used in City buildings and other construction. The resolution also instructs the City Manager to work with local concrete delivery and manufacturing facilities to assure the availability of blended cement. Since the resolution, blended cement has been used in two major construction projects, as well as being used regularly in sidewalk construction. Because of the material's ready availability in Berkeley, the material cost of the blended cement is about the same as conventional cements and has not had an adverse monetary impact. The new material has been found to be of higher quality than traditional cement (it is harder and will potentially last longer), but it does take longer to cure. Taking into account education of cement operators and appropriate adjustments in scheduling, City staff reports that the blended cement project has so far been a major success.

Local governments routinely purchase cement to use as the binding agent in concrete for buildings and other construction. Through cement procurement policies, jurisdictions can promote the goal of reducing emissions of greenhouse gases from buildings and operations. Local governments can also influence full communities' emissions by supporting the market for blended cement.

In the fall of 2004, Berkeley also adopted a comprehensive Environmentally Preferable Purchasing Policy that covers many other materials than just cement (e.g., recycled content paper, less toxic cleaning supplies, sustainably harvested wood products), customized from StopWaste.Org's model EPP policy (see Resources under Local Examples below). This policy helps to support the City's Precautionary Principle Ordinance (described in the Policy Frameworks for Sustainable Operations section in this report) by specifying products that are safer for human health and the environment. City studies have shown that there are minimal additional costs associated with switching to these products. "*We thought the change to less toxic janitorial cleaners would cost more money and take more time, and in fact, found quite the opposite*" reports Rene Cardinaux, Berkeley's Public Works Director. Berkeley's broader EPP requires consideration of environmental factors such as energy efficiency, resource conservation, waste minimization, recycled content, and toxicity when selecting vendors and products for its operations.

City of Berkeley Blended Cement Policy Resolution and Supporting Material  
<http://www.ci.berkeley.ca.us/citycouncil/2002citycouncil/packet/121702/2002-12-17%20Item%2027.pdf>

City of Berkeley Press Release on EPP  
<http://www.ci.berkeley.ca.us/news/2004/11Nov/111704greenpurchasingpolicy.html>

City of Berkeley EPP Policy and Supporting Material  
<http://www.ci.berkeley.ca.us/citycouncil/2004citycouncil/packet/101904/2004-10-19%20Item%2015.pdf>

**King County, WA—Environmental Purchasing Program**

The King County Environmental Purchasing Program has earned national recognition as one of the most effective such programs in the country. The Program provides County personnel with information and technical assistance to help them identify and evaluate economical and effective recycled and environmentally preferable products. This policy, adopted in 1989, directed County agencies to purchase environmentally preferable and recycled materials “whenever practicable,” essentially setting a goal of 100% of what is realistic. In 1995, the goals of Executive Policy were extended to include other environmentally preferable materials and processes. Implementation of this policy relies on the judgment of the people who actually use the products in their daily work. The program enables agencies to use their own professional judgment to evaluate and adopt new opportunities as they are identified.

The Program assembles data on the purchases of County agencies and produces an annual report to the County Council and the community on the status of policy implementation and the accomplishments of agencies. In 2003, recycled paper represented over 98% of County paper purchases, totaling 3.2 million dollars. Recycled paper is used for all major government functions, including more than nine million bus schedules annually, tax statements, court forms, pet license notifications, business cards, reports, stationary, and internal printing.

King County purchases many other recycled and environmentally preferable products. These include remanufactured toner cartridges, re-refined antifreeze and motor-oil (used by all County vehicles, including the fleet of 1,200 Metro buses, one of the largest in the nation), low-VOC asphalt cold patch compound, plastic lumber, compost, shredded wood-waste, tire-retreading services, and hybrid vehicles. Many of these products are more economical than those they replace, and the County saved \$580,000 by purchasing them in 2003.

Agencies continue to evaluate opportunities to use environmentally preferable products, such as less toxic cleaning products, recycled content carpet, energy-efficient equipment, and low-toxicity pest control methods; and to incorporate sustainable building methods into construction.

Program success depends on enabling agencies to appreciate the new opportunities being created in a changing marketplace and information is the central component of the Program. To this end, in addition to conducting educational seminars on specific opportunities, the Program makes extensive use of the Internet. It uses e-mail to distribute an “Environmental Purchasing Bulletin” to agency liaisons and maintains a website to make information available to agencies, suburban cities, and the community at large on the environmental purchasing experience of County agencies. As a result of their effort, the Program has earned a number of national awards and has been extremely successful in terms of participation by different agencies and in keeping the public informed of the County’s efforts.

King County Environmental Purchasing Policy  
<http://www.metrokc.gov/procure/green/policy.htm>

King County Environmental Purchasing Policy informational website  
<http://www.metrokc.gov/procure/green/index.htm>

“How to Make Green Buying Programs Work” by Karen Hamilton, King County. In the Pollution Prevention Northwest Newsletter, Fall, 1999.  
<http://www.pprc.org/pubs/newsletter/news1199.html#story2>

King County EPP Annual Report 2003  
<http://www.metrokc.gov/procure/green/annrep03.pdf>



Environmental Purchasing Bulletin  
<http://www.metrokc.gov/procure/green/bulindex.htm>

**St. Paul, MN—Environmentally Friendly Procurement**

Under Minnesota state law and the Ramsey County Solid Waste Plan, St. Paul is required to have an EPP program. Four City Council Resolutions and one County Board Resolution set forth St. Paul's EPP policy. Overall, the policy is predicated on the goals of reducing energy and resources, purchasing materials with high recycled content, participating in cooperative purchasing opportunities, and considering packaging in choosing products.

As part of the EPP program, in 1996, the City tested non-toxic cleaning products in the City Hall Annex for their effectiveness in comparison to conventional products. Custodial workers reported that six of the ten products worked as well or better than the products they replaced and they reported feeling better and having fewer adverse health reactions to the products. The pilot initiated a significant change in toxics use for the City of St. Paul and contributed to the development of purchasing criteria for the state.

This pilot project served as a catalyst for local businesses to develop a similar project. An Environmentally Preferable Purchasing Workshop was presented to over 40 city and county purchasers in October 2000. One ongoing outcome was Eureka Recycling forming a paper buying cooperative, which gives organizations, individuals, and businesses in the Twin Cities area the chance to obtain high quality, 100% postconsumer recycled office paper at a reduced cost. Several city departments are buying paper through the coop. The co-op combines many smaller paper orders into a single order large enough to get a bulk discount directly from the supplier. Eureka Recycling's service allows organizations to pay less for paper with a higher recycled content.

Saint Paul Area Paper Buying Coop  
[http://www.eurekarecycling.org/bg\\_coop.cfm](http://www.eurekarecycling.org/bg_coop.cfm)

**Local Examples:**

In addition to the City of Berkeley noted above, the City of San Leandro, the Castro Valley Sanitary District, and StopWaste.Org itself have all adopted versions of the model EPP policy developed by StopWaste.Org. This policy was written with input from technical experts in diverse fields (e.g., transportation, energy efficiency, water conservation, paper production, toxics, green building, landscaping) to ensure product standards were up-to-date and accurate. It was also reviewed by national EPP experts and local environmental and purchasing staff to make sure that it is both comprehensive and practical.

EPP guidelines and other StopWaste.Org resources are also being used by the Alameda County General Services Agency (GSA), University of California at Berkeley, and the cities of Livermore, Fremont, and Dublin to integrate EPP into their operations. Alameda County works with their purchasers and suppliers to include environmental standards in their purchasing agreements and through this process have developed a number of standardized "green" purchasing contract boilerplates that can be used as an alternative to the traditional contracts. When entering into new contracts, County staff researches product availability, cost, and existing Federal EPP standards and those developed by colleagues in other jurisdictions' bid documents.

To date the County GSA has integrated EPP criteria into \$6.1 million worth of procurements including office paper, janitorial paper products and trash can liners, printing services, computer software and technical training services, paint/traffic stripes and pavement markings, inmate commissary and vending

machine services, tree trimming and removal, and emergency pickup and disposal of hazardous waste. Their experience is that there is no appreciable price difference between the environmental products and services and those traditionally used. An additional \$5 million in new purchasing contracts that meet the EPP requirements are being planned. This will expand the County's environmentally friendly purchases into office supplies, furniture, milk and dairy products, cleaning supplies, carpet, upholstery, drapery cleaning services, and biodiesel fuel.

The City of Livermore has also required its janitorial cleaning service to use environmentally preferable cleaning products in all City facilities. This decision recognized the benefit that using products with reduced or no harmful ingredients provides to both employees and the environment. The City found dozens of "green" cleaning products that were readily available for commercial use, including bathroom cleaners, glass cleaners, and all-purpose cleaners. These products are either certified by Green Seal to meet Green Seal's standard for Industrial and Institutional Cleaners (GS-37) or are approved by a similar organization. Requiring third-party certification saves the City from having to evaluate every product themselves. Switching to the new products did not incur any additional costs or decline in the quality of cleaning services.

In another successful effort to purchase environmentally preferable products, the City of Fremont has been using "green" printing services. They identified their printing needs, and through the Bay Area Green Business Program were able to identify local resources that meet those needs. The City requires the use of recycled content paper, soy based inks, and copying on both sides of the paper.

StopWaste.Org: Resources for Environmentally Preferable Purchasing and model policy language  
[www.StopWaste.Org/EPP](http://www.StopWaste.Org/EPP)

Bay Friendly Landscape Guidelines  
[www.bayfriendly.org](http://www.bayfriendly.org)

Construction-related products and information  
[www.BuildGreenNow.org](http://www.BuildGreenNow.org)

Bay Area's Green Business Program  
<http://www.greenbiz.ca.gov/AboutUs.html>

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**Notes:**

<sup>1</sup> Federal Executive Order 13101: "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition." See the Federal Environmental Executive Website:  
<http://www.ofee.gov/gp/preferpurchasing.html>

<sup>2</sup> C.A. Hendriks(ECOFYS), E Worrell (Lawrence Berkeley National Laboratory), and D. de Jager(ECOFYS), K. Blok(ECOFYS), and P. Riemer (IEA Greenhouse Gas R&D Programme), Emission Reduction of Greenhouse Gases from the Cement Industry, Greenhouse Gas Control Technologies Conference Paper,  
[http://www.tececo.com/files/Sustainability\\_Documents/EmissionReductionofGreenhouseGasesfromtheCementIndustry.pdf](http://www.tececo.com/files/Sustainability_Documents/EmissionReductionofGreenhouseGasesfromtheCementIndustry.pdf), accessed on June 6 2005

<sup>3</sup> Mehta, P.K. "Role of Pozzolanic & Cementitious By-Products in Sustainable Development of the Concrete Industry", in *Sixth CANMET/ACI/JCI Conference: Fly Ash, Silica Fume, Slag & Natural Pozzolans in Concrete*, 1998.



## ***Biodiesel Use in Fleet Vehicles***

### **Background**

All across the United States, individuals, businesses, and governments are actively choosing a cleaner and more energy independent future through the use of biodiesel, making it the fastest growing alternative fuel in the country. More than 400 U.S. fleets currently use the fuel commercially, including all four branches of the military, dozens of school districts, Yellowstone National Park, and a growing number of city bus systems. Biodiesel is a clean-burning alternative fuel produced from domestic, renewable sources that also contributes to energy independence and sustainable local economic growth.

Biodiesel is produced from recycled or virgin vegetable or animal oils and can be used in unmodified diesel engines. Most biodiesel in the United States is made from virgin soybean oil, but recycled restaurant oil and grease can be used to produce fuel-grade biodiesel as well, thereby turning waste into a valuable resource. Regardless of its virgin or recycled origins, biodiesel can be used in its pure form (B100) or blended with petroleum diesel in any proportion. The most commonly found biodiesel is B20, which contains 20% pure biodiesel blended with 80% petroleum diesel. The performance, storage requirements, and maintenance of biodiesel are similar to, if not better than, that of conventional diesel. It is also far safer to transport, store, and use; because it is not a hazardous material like petroleum-based diesel.

In addition to its waste reduction potential, biodiesel has significant air quality benefits. In 2000, it became the only alternative fuel in the country to have successfully completed the EPA-required Tier I and Tier II health effects testing under the Clean Air Act<sup>1</sup>. It is proven to be safe, biodegradable, and to reduce serious air pollutants such as sulfur emissions (SO<sub>x</sub>)—the main component of acid rain—and criteria air pollutants, including particulates and carbon monoxide<sup>2</sup>. Biodiesel also reduces carbon dioxide (CO<sub>2</sub>)—the major greenhouse gas—by 78% compared to its fossil fuel equivalent and thus holds significant potential to decrease a local government's carbon footprint<sup>3</sup>. Similarly, a switch to biodiesel can reduce the emission of carbon monoxide (CO), volatile organic hydrocarbons (VOCs), and particulate matter under 10 microns<sup>4</sup> (PM<sub>10</sub>) from vehicle fleets. Although studies have shown that the emissions of nitrogen compounds (NO<sub>x</sub>) from biodiesel may be slightly higher than conventional diesel (depending on the engine family and testing procedures), additives are being developed to reduce NO<sub>x</sub> emissions<sup>5</sup>. Overall, the end-of-tailpipe emissions benefits of biodiesel are significant and total emissions reduced are even more dramatic when the full life cycle<sup>6</sup> of the fuel is considered.

The price of biodiesel depends on the location and size of the producer and distributor, but averages between 13 and 22 cents more per gallon than petroleum diesel<sup>7</sup>. However, because it uses existing infrastructure and vehicles without requiring expensive new equipment or retrofit, biodiesel may be a least-cost alternative for complying with state and federal air quality regulations requiring the use of alternatively fueled fleet vehicles (when compared with other alternative fuels and vehicles on the market)<sup>8</sup>.

### **Implementation**

Local governments can promote biodiesel through switching their fleets to the alternative fuel at any scale. Any conventional diesel engine can run on the fuel, from garbage trucks to ferry boats to diesel back-up generators, and biodiesel can be used in any proportion to show improvements over the petroleum-based fuel. The higher the proportion of biodiesel, the greater the air quality benefits, so local governments can choose a biodiesel strategy that fits their own priorities and financial situation. Because the price varies according to the fuel's availability, financing strategies will vary and have been met in

diverse ways. For some local governments, the increased cost will be offset by savings in avoided retrofit and maintenance costs, as biodiesel is a cleaner burning fuel that allows for the postponement of oil changes and other regularly scheduled maintenance.<sup>9</sup> For others, costs may be distributed amongst consumers through next to negligible rate increases. Federal and state incentive programs supporting biodiesel are also available which may help to offset any costs associated with choosing biodiesel<sup>10</sup>.

### **Common Benefits**

#### **Local**

- Improved local air quality — reduced carbon monoxide, unburned hydrocarbons, and particulate matter
- Reduced nuisance of black smoke and noxious odors associated with conventional diesel
- Enhanced compliance with state and federal regulations mandating alternative fuel or vehicle use, as biodiesel often offers a least cost option in comparison to other alternative technologies
- Potential to lower the health costs associated with air pollution; reduced respiratory illnesses
- Lower maintenance cost of vehicles resulting from enhanced lubricity of engines
- Enhanced safety in transport, storage, and handling due to its non-toxic nature when compared with hazardous and toxic diesel fuel
- Stimulation of local economy and sustainable industry with rising biodiesel demand
- Demonstration of environmental and public health commitment

#### **National/ Global**

- Lower emissions of sulfur oxides and sulfates—major components of acid rain
- Enhance domestic energy independence resulting from replacement of imported petroleum fuels with renewable biodiesel from national sources
- Lower emissions of CO<sub>2</sub>—the major greenhouse gas
- Reduce reliance on environmentally damaging fossil fuels and the pollution associated with their extraction, manufacture, and transport when considered from a life cycle perspective

### **Common Challenges**

- Financing higher fuel costs
- Resistance to change amongst fleet operators
- Inconsistent biodiesel supply due to lack of local biodiesel industry or undeveloped distribution network
- Instability of biodiesel prices
- Depending on supplier, new storage tanks may be required
- Slightly higher NO<sub>x</sub> emissions in some engines<sup>11</sup>
- Increased need for initial replacement of filters due to higher lubricity

### **Specific Examples and Results**

#### **Las Vegas, NV – Recycled Oil from Local Casinos to Power Local Fleet**

With Clark County restaurants producing six gallons of grease per resident per year, twice the national average; used restaurant oil in Las Vegas represents a significant disposal challenge. At the same time, the Las Vegas area suffers from a significant air pollution problem, exacerbated by its geography — a hot sunny desert environment surrounded by mountains so that smog generation rates are increased and pollution is trapped in the valley.

The City of Las Vegas, the Las Vegas Valley Water District, the Clark County School District, and the Clark County Automotive Division are helping to turn that waste into a valuable resource while improving their environment through their choice of biodiesel fuel in fleet vehicles. The biodiesel is produced locally from recycled oil from the city’s casinos and supplemented with soybean oil imported to the area. In fact, the refinery, operated in partnership between Haycock Petroleum and Biodiesel Industries, is the only commercial refinery in the nation operating primarily on a feedstock of recycled cooking oil. Additionally, this partnership opened the country’s first public biodiesel fueling station in 2001.

The School District alone operates the largest biodiesel school bus fleet in the country with 1,188 buses running on the fuel. The agencies together consume over approximately 4,000,000 gallons of biodiesel annually. With 2,288 government fleet vehicles operating on B20, the local agencies are significantly reducing their greenhouse gas and air pollution emissions.

	eCO <sub>2</sub>	CO	SO <sub>x</sub>	VOCs	PM10
Annual Emission Reduction	8,798 tons	28 tons	2 tons	7 tons	2 ton

In an effort to reduce NO<sub>x</sub> emissions, the City has begun using the additive Clean Boost in all engines running on biodiesel. The additive, which adds 2 cents to the 16 cents the biodiesel costs over regular diesel, has so far exhibited dramatic results, reducing NO<sub>x</sub> emissions by 36% or an estimated 111 tons over the course of a year when compared with conventional diesel.<sup>12</sup> Overall, the biodiesel project has been extremely successful, with high driver and rider acceptance. Because about half of the biodiesel is produced by a local biodiesel manufacturer from used vegetable oil, the City has eliminated the disposal need for the waste, contributes to the local economy, and has significantly reduced the emissions associated with the burning and transport of petroleum diesel.

The biodiesel project is just one of the ways that the City and County are promoting alternative fuels as part of their participation in the Las Vegas Regional Clean Cities Coalition (LVRCCC). The City’s biodiesel program came into existence due to the support of the state, which was an early pioneer in including biodiesel as an alternative fuel under Nevada state law and promoting its designation by the U.S. EPA. Under a grant from the U.S. Department of Energy’s Western Regional Biomass Energy Program, the Nevada Energy Office was able to work with the Las Vegas partnership to develop a process for large-scale production of biodiesel from the waste cooking oils. Interest in biodiesel at the state level was initially piqued after the Bio Bug, a VW Beetle which ran on biodiesel, was demonstrated in the Nevada State Motor Pool. This provided fleet managers an opportunity to see that emissions reductions could be achieved without retrofitting existing vehicles.

Las Vegas Regional Clean Cities Coalition (LVRCCC)

<http://www.lasvegascleancities.org/>

Clean Cities Newsletter on Clark County School District Biodiesel Project

[http://www.eere.energy.gov/afdc/apps/toolkit/pdfs/las\\_vegas\\_success.pdf](http://www.eere.energy.gov/afdc/apps/toolkit/pdfs/las_vegas_success.pdf)

**Berkeley, CA—Full Fleet Switch to Pure Virgin Biodiesel**

In 2003, the City of Berkeley—a long-time leader in environmental initiatives—announced the conversion of virtually all of its fleet to pure biodiesel (B100) making it the largest vehicle fleet in the United States and the second largest in the world to operate on B100. Over 180 of the City’s vehicles (all

except for the remote Fire Department vehicles), including those from the Departments of Public Works, Parks, Fire, Police, and Health and Human Services,; now run on the clean-burning fuel. The City consumes approximately 240,000 gallons of B100 per year, helping the City meet its greenhouse gas reduction target and reducing the emission of harmful air pollutants. The City currently pays a price premium of \$0.80/gallon over conventional diesel. Although the City's current biodiesel supply comes from virgin sources, the City plans to switch to that made from recycled sources as supply becomes more available and cost-effective<sup>13</sup>.

	eCO <sub>2</sub>	CO	SO <sub>x</sub>	VOCs	PM10	NO <sub>x</sub>
Annual Emission Reduction	2,518 tons	7 tons	1 tons	1 tons	0.5 ton	-1 tons

The Berkeley Ecology Center, a local non-profit community organization working towards improving the local environment, operates the City's recycling program, which was converted to B100 many years earlier. The Ecology Center was able to point to their success in using biodiesel and was an early advocate for the City to convert from its 20% biodiesel to the 100% level and assisted the City in managing the early stages of the fuel switch. The City's conversion to B100 was fully supported by the Berkeley City Council and six citizen advisory commissions as a key component to their emissions reduction and community sustainability programs.

Transportation is thought to be the largest source of greenhouse gas emissions within the City, and therefore the City has been taking steps in recent years to reduce those emissions. Due to the limited number of fuel tanks at City facilities, the City had to make the conversion in most vehicles at one time when they switched to stocking biodiesel in their tanks. Most modern vehicles can operate on biodiesel with no retrofitting, but the City needed to survey its fleet to ensure compatibility<sup>14</sup> and undertake retrofits where necessary. Due to the cost of delivery, the City's fire fleet, which has multiple fueling tanks at remote locations, will be converted once a contract can be developed to minimize the costs of delivery to locations distant from the City's central fueling facility.

Other steps the City has taken to reduce the negative impact of transportation on air quality include actively pursuing other forms of alternative fuel vehicles and transportation modes. The City's fleet includes 10 CNG vehicles, 2 electric pick up trucks, 1 electric sedan, 10 electric parking scooters, 2 electric utility carts, and 9 fleet bicycles. The City provides an electric vehicle recharging station and preferential street parking for electric vehicles. Additionally the city has recently retired 15 of its fleet vehicles and replaced them with four hybrid cars operated by City CarShare<sup>15</sup>. Berkeley's new car-sharing program has been listed as one of the 50 most creative and forward-thinking government programs in the country by the Innovations in American Government Awards.

**Local Examples:**

The City of Oakland has also reduced its air emissions by operating 15% of its fleet on alternative fuels (e.g., compressed natural gas, electricity, etc.). In October 2002, the City was awarded a grant from the Bay Area Air Quality Management District for the purchase of 16 clean-fuel garbage trucks.

City of Berkeley press release on biodiesel project

<http://www.ci.berkeley.ca.us/news/2003/06jun/061903biodieselconversion.html>

City of Berkeley Climate Wise Action Plan

<http://www.ci.berkeley.ca.us/energy/enghg.htm>

The Ecology Center website

<http://www.ecologycenter.org/>

**Missoula, MT—Biodiesel from Recycled Vegetable Oil to Power City Vehicles**

In an effort to improve local environmental health and safety and to contribute to the development of a locally-based biodiesel industry, the City of Missoula began its biodiesel project to power City vehicles in 2003. A local biodiesel refinery, Sustainable Systems, was spawned after the University of Montana ran a biodiesel pilot project in 2001. Sustainable Systems, the City/County Health Department, and other groups were key advocates for the City biodiesel project.

The idea to increase City use of biodiesel was debated several times in a City Council Subcommittee before the idea was sent to the full City Council. At the meetings, the positives of biodiesel (including air pollution benefits, life cycle CO<sub>2</sub> emissions, and its domestic production) were weighed with concerns raised about the extra cost, cold weather gelling, and engine warranties. Overall, the idea of using B20 was well received by the City Council and was seen as a key strategy in reaching the goals laid out in the City's Greenhouse Gas Energy Efficiency plan. The City is currently using B20 in four of its diesel vehicles (snowplows and street-sweepers), through an allocation of \$2,500 by the City Council to pay for storage tanks, coordination, and extra fuel costs. The City purchases its biodiesel from the local industry, Sustainable Systems, which uses recycled restaurant oil in the production of the fuel and now operates two retail biodiesel pumps in Missoula. The City is currently consuming approximately 10,000 gallons of B20 per year, resulting in a reduction of 22 tons of eCO<sub>2</sub>.

The City-County Health Department also recently partnered with the University of Montana and received a grant from the EPA's Clean School Bus U.S.A. program that will be used to fund the additional cost of biodiesel fuel for eight school buses to run on B20. The City bus fleet has also begun using B5 in an effort to curb the health impacts of exposure to diesel exhaust and to reduce the number of complaints received about bus fumes. Although on average the biodiesel costs the City 20–35 cents more per gallon, City staff state that the positive impacts have proven worth the investment. Jack Stucky, City Motor Vehicle Superintendent, stated that the people using the equipment loved the B20 because the increased lubricity decreased wear on the fuel injectors and other components. The City has plans to expand the project in the next fiscal cycle.

Missoula Independent Biodiesel Article

<http://www.everyweek.com/News/News.asp?no=3671>

City of Missoula Greenhouse Gas-Energy Efficiency Plan (May 2004)

<http://www.co.missoula.mt.us/envhealth/AirQ/GHG/Missoula%20GHG-EE%20Plan%20Final.doc>

***Seattle, WA—City Partners with Washington State Ferries in Biodiesel Project***

In May 2004, the City of Seattle announced its partnership with the Washington State Ferry system in a year-long biodiesel pilot project. The City’s public utility, Seattle City Light, in an effort to stimulate local development of a biodiesel industry and as part of its larger greenhouse gas mitigation efforts, will cover the cost of switching to 1.5 million gallons to B20 in the Vashon, Southworth, and Fauntleroy ferries.

	eCO <sub>2</sub>	CO	SO <sub>x</sub>	VOCs	PM10	NO <sub>x</sub>
Annual Emission Reduction	3,299 tons	11 tons	33 tons	5 tons	3 tons	-5 tons

Seattle has long been a local government leader in the area of reducing greenhouse gas emissions, and this partnership is an outgrowth of City staff’s continuing efforts to find tangible emission reductions in their community. Through targeting the ferry system—a significant consumer of petroleum diesel—the City of Seattle is pioneering innovative strategies to reduce its greenhouse gas emissions and move towards its goal of being greenhouse neutral, a policy adopted by Council Resolution 30359 in July 2001 after being pushed by then Mayor Shell and Councilmember Wills.

City of Seattle press release on biodiesel in ferries

<http://www.seattle.gov/news/detail.asp?ID=4343&dept=40>

Seattle City Light streaming video on ferry biodiesel project

<http://www2.seattlechannel.org/media/video.asp?ID=2297>

Seattle’s Emissions Reduction Program and more information on the Climate Neutral Policy

<http://www.ci.seattle.wa.us/light/climatechange>

***Windsor, CA—Recycled Pure Biodiesel to Power All City Garbage Trucks***

Stemming from the enthusiasm of its Mayor, who himself drove a biodiesel vehicle, the City of Windsor began to look into the fuel for its fleet vehicles. After conducting an extremely successful biodiesel pilot project with district school buses, the City of Windsor came to an agreement with its garbage hauler to switch all the City’s garbage trucks to pure biodiesel (B100) in 2004. The cost of switching to the clean-burning fuel (about \$1 more per gallon) is distributed to the consumers through a rate increase of \$1 per trash can per month. The project, which City staff report has been very well received by the community and the garbage haulers, will result in the replacement of 100,000 gallons of conventional diesel by biodiesel per year. In one year, it will reduce eCO<sub>2</sub> by 1,048 tons and CO by 3 tons<sup>16</sup>. The project also plays an important role in contributing to local economic development and waste reduction through supporting a local biodiesel manufacturer that uses vegetable oil and used fryer oil to produce the fuel.

City of Windsor Biodiesel Project Press Release

<http://www.ci.windsor.ca.us/mediareleases/20040929.pdf>

***Recent Developments in Biodiesel Markets:*** In late 2004, there was a problem in the quality of biodiesel being provided by a major refinery. Impurities in the fuel delivered caused problems with fuel gelling and fuel filter clogging. These problems have led Berkeley and Seattle to temporarily suspend their use of biodiesel. Industry representatives report that the problem has been rectified and research is underway at the refinery in question to determine the cause of the problem and ensure that it does not occur again.

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**Notes:**

<sup>1</sup> See EPA Biodiesel Emissions Analysis Program, with link to Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions, October 2002: <http://www.epa.gov/otaq/models/biodsl.htm>

<sup>2</sup> EPA Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions, Draft Technical Report, October 2002: <http://www.epa.gov/otaq/models/analysis/biodsl/p02001.pdf>

See also, Morris, R.E. et al. 2003. Impact of Biodiesel Fuels on Air Quality and Human Health: Summary Report September 16, 1999–January 31, 2003. National Renewable Energy Lab: Golden, Colorado. <http://www.nrel.gov/docs/fy03osti/33793.pdf>

<sup>3</sup> Sheehan J. et. al. 1998. Lifecycle Inventory of Biodiesel and Petroleum Diesel for Use in an Urban Bus; National Renewable Energy Laboratory for the US Department of Energy Office of Fuels Development and the U.S. Department of Agriculture Office of Energy: Golden, CO.

<sup>4</sup> PM<sub>10</sub> is a pollutant of concern as particulates of this size are able to pass the respiratory systems defenses and enter the lungs. Although the EPA has recently set standards for PM<sub>2.5</sub> (particles small enough to enter the deep lungs), this is a much more difficult pollutant for which to track an individual vehicle's impact—as it is not just a tailpipe emission, but also forms as a secondary pollutant in the atmosphere from other compounds that are emitted from the vehicles. Therefore only tailpipe emissions of PM<sub>10</sub> are included in this report.

<sup>5</sup> See the National Biodiesel Board Emissions Fact sheet:  
<http://www.biodiesel.org/resources/fuelfactsheets/default.shtm>

<sup>6</sup> A full life cycle approach involves a comprehensive “cradle to grave” inventory of materials used, energy resources consumed, and air, water and solid waste emissions generated in all aspects of the production and use of the fuel. See Sheehan J. et. al. 1998.

<sup>7</sup> From the May 2001 Clean Cities Fact Sheet on biodiesel for local governments.

<sup>8</sup> The Energy Conservation Reauthorization Act of 1998 allows federal, state, and alternative fuel provider fleets, which must comply with the Energy Policy Act (EPAAct) and Executive Order 13149, to meet up to 50 percent of their light duty alternative fueled vehicle purchase requirements with biodiesel. For more information, see the National Biodiesel Board's fact sheet on EPAAct:  
[http://www.biodiesel.org/pdf\\_files/fuelfactsheets/EPACTSummary.PDF](http://www.biodiesel.org/pdf_files/fuelfactsheets/EPACTSummary.PDF)

<sup>9</sup>It is important to note that as biodiesel enhances lubricity, it can actually dislodge buildup in the engine, which reduces maintenance costs in the long run but can require more frequent filter changes in the short term. See the National Biodiesel Board's Fact Sheet on Biodiesel Performance:  
[http://www.biodiesel.org/pdf\\_files/fuelfactsheets/Performance.PDF](http://www.biodiesel.org/pdf_files/fuelfactsheets/Performance.PDF)

<sup>10</sup> For further information and links to specific funding and other incentives see: the Department of Energy Efficiency and Renewable Energy Alternative Fuels Data Center database of state and federal incentives and laws: [http://www.eere.energy.gov/afdc/laws/incen\\_laws.html](http://www.eere.energy.gov/afdc/laws/incen_laws.html); the Department of Energy's Clean Cities Website: <http://www.eere.energy.gov/cleancities/>; the EPA Clean School Bus USA program: <http://www.epa.gov/cleanschoolbus/>; the National Biodiesel Board: <http://www.biodiesel.org/>.

<sup>11</sup> Additives are being tested which show significant reductions to NO<sub>x</sub> emissions over diesel. See Las Vegas, NV example.

<sup>12</sup> Without the addition of this additive it is estimated that this switch to biodiesel would increase NO<sub>x</sub> emissions by 5 tons annually.

<sup>13</sup> Because of extra processing steps involved in producing biodiesel from recycled oils, some distributors charge more for the fuel made from recycled inputs over that made from virgin inputs. The City of

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Berkeley currently purchases virgin biodiesel because of these cost concerns, but will reconsider if prices or availability of the recycled biodiesel change.

<sup>14</sup> Biodiesel tends to be more corrosive on rubber lines, gaskets, and seals than traditional diesel; but vehicles can be fairly easily retrofitted to eliminate these problems.

<sup>15</sup> City Car Share provides vehicles to its members at various locations throughout the city. Members can reserve a vehicle online and pay only for the time and distance they use the vehicle. This allows residents to avoid the fixed costs of owning a personal (or additional) vehicle. The City of Berkeley's new Car Share vehicles are reserved for City employees during the day and available to the public on evenings and weekends.

<sup>16</sup> The impact on other emission reductions was less than 1 ton.

## CONCLUSIONS

The previous case studies illustrate some strategies that local governments are implementing that take them beyond recycling. They are based on the simple fact that the less waste that is produced, the less waste there is to manage. They are developed from a perspective that considers the whole life cycle of a product and takes into account the efficiency and waste of all aspects of the product's production, usage, and disposal. In this way, they represent the greatest gains that can be made in improving the efficiency and sustainability of the operation of the local government and the wider community.

These strategies present several creative solutions to reducing the consumption of new products, preventing the waste entailed in the production and use of a product, and reusing products instead of disposing of them. They represent strategies that have a significant potential to reduce the amount of waste managed by local governments, burdens on local landfills, and the costs of managing municipal solid waste. They also provide a number of co-benefits, including the environmental benefits associated with reduced greenhouse gas and criteria air emissions, reduced litter, and decreased ecological damage associated with acquisition, manufacture, and transport of material goods. They include health benefits that result from the improved management of hazardous waste and reduced local air pollution. Additionally, there are the economic benefits that result from streamlining operations, stimulating the local economy, and supporting jobs in sustainable industries.

Most importantly, these strategies highlight the multitude of innovative actions local governments can take to influence and improve their operations and those of the larger community. They offer ideas for overcoming barriers to reaching diversion goals, while reducing upstream waste. Through government operational strategies, these local governments provide an example of leadership, social and environmental responsibility, and efficiency to the world. In their community initiatives, they play a key role in leading their cities and counties towards a more efficient, healthy, and sustainable future.

## GLOSSARY

### **Closed-loop systems**

Systems where locally-generated recyclables are collected, processed in local or regional plants, sold to local remanufacturers, and the end-products are purchased by local private or municipal consumers.



### **Composting**

Composting is the controlled decomposition of organic matter under aerobic conditions. It transforms plant debris, food waste, and other organic material into compost, which includes a vast array of living organisms as well as the more stable form of organic matter called humus. Compost can be used as a soil amendment, topdressing, compost tea, or as a component of a potting mix. Its use brings life to the soil, which improves soil structure, water holding capacity, nutrient cycling, and disease suppression. Compost is also being used to degrade pollutants and control erosion.

From the Land Regeneration Network:

<http://www.grc.cf.ac.uk/lrn/resources/waste/management/recovery/composting.php>

### **Extended life of products**

This involves making sure that repair stations offer quality service so that products are more durable and need to be replaced less often.

### **Extended Producer Responsibility (EPR)**

EPR, or Producer Take Back, places the burden of disposal of e-waste on the producer, which can help to limit the amount of waste produced because it gives companies an incentive to redesign products, thereby using safer materials and making products easier to recycle and reuse.

### **Full Cost Accounting (FCA)**

FCA is a method of accounting that takes into account more than cash outlays to include all of the monetary costs of resources associated with municipal solid waste (MSW) programs. According to the EPA's protocol, FCA goes beyond the limits of cash flow accounting, which is often used by local governments, by considering direct and indirect (overhead) operating costs of MSW services as well as up-front (past) and back-end (future) expenses.

### **Life Cycle**

The life cycle approach to waste management entails considering all stages of a product's "life", including acquisition of raw materials, manufacture, transport, use, and disposal. By avoiding the production of a new product in the first place, choosing products that have less associated waste (because of their durability, recycled content, reusability, etc.), or reusing products, waste prevention thus avoids waste created at each of these stages.

### **Product Stewardship**

Though recognizing the role manufacturers play in the waste that is generated from the goods they sell, Product Stewardship spreads the responsibility for reducing the environmental impact of a product among manufacturers, retailers, consumers, and the existing waste management infrastructure. This is the equivalent practice for the European manufacturer-centered EPR.

### **Recycling**

Recycling involves taking apart an old product and using the material it contains to make a new product. What makes recycling different from reuse is that the product must be reprocessed. This extra step may have additional effects on the environment. Although recycling helps conserve resources, creates jobs, and reduces waste; it is important to remember that there are still economic and environmental costs associated with the collection and recycling of materials. The costs of collecting and processing materials vary widely. The extent to which revenues from the sale of recyclable materials offset costs depends on a number of factors, including the market value of the materials collected, the costs of collection and processing, and the distance that materials must be transported to markets. In the case of high-value

materials such as computer paper and aluminum, revenues may offset costs. In other cases, the costs may greatly exceed revenues.

**Reduction at source (or Waste Prevention):**

Reduction at source involves reducing the amount of waste generated in the first place. For the consumer it means buying only what you need and choosing products with less packaging. For manufacturers, it involves using less material to produce and package goods.

**Resource recovery:**

Resource recovery involves the extraction of valuable energy or materials from the waste stream. Modern energy-from-waste plants, for example, have the ability to recover much of the energy and heat value that goes into the manufacture of goods, while reducing the amount of solid waste requiring disposal. This is primarily an industrial practice.

**Reuse:**

Reuse refers to the repeated use of an item in its original form (although not necessarily for its original purpose). For consumers, this may be as simple as reusing grocery bags. An example in industry would be the use of durable, reusable crates rather than disposable boxes to ship goods.

## APPENDIX A: SAN FRANCISCO BAG POLICY FACT SHEET



### BACKGROUND

In 2003, the San Francisco Board of Supervisors adopted goals of 75 percent landfill diversion by 2010, and zero waste by 2020. To achieve these goals, the Zero Waste section of San Francisco's Environment Department (SF Environment) promotes waste prevention, recycling and composting programs and policies. The proposed bag policy would put a fee on supermarket<sup>1</sup> checkout bags—both paper and plastic—to reduce the proliferation of unnecessary bags and their negative effects on the environment and San Francisco's recycling, composting and litter abatement programs.

### THE PROBLEM

Bags are a problem because they:

- Use both dwindling natural resources and energy, and create pollution during their production and distribution;
- Create significant litter, and disrupt drainage and sewer systems;
- Are perceived as disposable products; and
- Impede San Francisco's landfill diversion goals.

Additionally, conventional plastic grocery bags:

- Harm marine and other life;
- Are difficult to recycle or compost, and are major contaminants in San Francisco's recycling and composting programs; and
- Contain little recycled content.

### STATISTICS

- Each year the United States consumes 30 billion plastic and 10 billion paper grocery bags, requiring 14 million trees<sup>2</sup> and 12 million barrels of oil.<sup>3</sup>
- The pulp and paper industry is the 2nd largest industrial user of energy in the U.S.<sup>4</sup>
- More than 46,000 pieces of plastic contaminate each square mile of our oceans.<sup>5</sup>
- Over 100,000 marine animals die every year from plastic entanglement.<sup>6</sup>

<sup>1</sup> The proposed ordinance would apply to supermarkets that create a recycling convenience zone under California's bottle bill. As defined by the California Department of Conservation, a convenience zone originates around a supermarket that is identified in the Progressive Grocer Marketing Guidebook, has gross annual sales of \$2 million or more, and sells a "full line" of dry groceries, canned goods, or non-food items and perishable goods. [[www.consrv.ca.gov/DOR/dmr/retailers/cz.htm](http://www.consrv.ca.gov/DOR/dmr/retailers/cz.htm)]

<sup>2</sup> [Paper or Plastic?](#), Healthwell

<sup>3</sup> [Reusable Bags Tackle Plastic Bag Mess](#), Organic Trade Association

<sup>4</sup> "Paper Cuts: Recovering the Paper Landscape", Abromovitz & Mattoon, Worldwatch Institute, Washington DC, 1999

<sup>5</sup> [Keep the Sea Plastic Free—Bin It](#), Australian Government, Department of the Environment and Heritage

<sup>6</sup> [Sea Turtles Don't Shop](#), Earth Resource Foundation

## SOLUTIONS AROUND THE WORLD

### Alaska:

- 30 communities have instituted bans on the distribution of non-biodegradable plastic bags.

### Australia:

- The government and Australian Retailers Association agreed to reduce plastic bag use by 25 percent by 2004 and 50 percent by 2005;
- Created a kit for retailers to assist them in reducing plastic bag use and ad campaigns educating shoppers about alternatives;
- Stores have launched programs such as providing a reusable bag to shoppers who turn in 20 plastic bags; and
- Is considering a tax on single-use HDPE bags (#2 high density polyethylene, the plastic used for most checkout bags).

### Dhaka, Bangladesh:

- Banned polyethylene bags after they clogged drains and worsened floods; and
- Is planning to extend the ban nationwide.

### Bhutan:

- Vendors caught handing out plastic bags face losing their business license.

### Denmark:

- Plastic bag tax is twice that for paper bags, with both paid by retailers upon purchase; and
- Consumption of paper and plastic bags has declined by 66 percent.

### Ireland:

- 15 cent fee per bag on retail customers;
- Raised 23 million euros for green fund to support waste reduction;
- 90 percent reduction in bag use since introduction of levy; and
- Plastic bags as part of the litter stream reduced from 5 percent to .3 percent.

### Mumbai (formerly Bombay), India:

- Fines on factories and stores for making and using plastic bags;
- Outdoor markets are not allowed to use plastic bags and instead provide recycled paper bags; and
- Prohibits bags thinner than 20 microns (as does Delhi, Maharashtra and Kerala) to discourage use.

### South Africa:

- Government threat of a ban led to a plastic bag fee paid by manufacturers and appearing on shopper's receipts.

### Switzerland:

- Requires supermarkets to charge 15-20 cents per paper bag; and
- The majority of shoppers bring their own reusable bags.

### Taiwan:

- Bans free distribution of plastic bags and food service ware by government agencies, schools, restaurants, supermarkets and other stores; and
- Ban has resulted in a 69 percent drop in the use of plastic products.

## RECOMMENDATIONS

Require by local ordinance that:

- Supermarkets (as defined by the CA bottle bill) charge 17¢ for each checkout bag (plastic or paper, offered to customers to carry their merchandise upon purchase);
- Stores can keep half of the revenue to use for in-store collection of packaging for recycling, discounted reusable bags, compostable bags in produce and bulk aisles, selling compostable bags and food service ware at a discount, and outreach on waste prevention and recycling programs;
- Supermarkets provide an annual report to SF Environment summarizing bag revenues and program expenditures with excess profits going to the City; and
- Provisions would eventually apply to smaller markets, drug stores, department stores, hardware stores, dry cleaners, newspapers and other bag distributors, and additional bag types.

## OTHER INTERNET RESOURCES

- [www.myownbag.com/activism.html](http://www.myownbag.com/activism.html)
- [www.reusablebags.com/](http://www.reusablebags.com/)
- [www.cwac.net/paper\\_industry/links.html](http://www.cwac.net/paper_industry/links.html)
- [www.forestethics.org/paper/](http://www.forestethics.org/paper/)
- [news.bbc.co.uk/1/hi/uk/1969997.stm](http://news.bbc.co.uk/1/hi/uk/1969997.stm)
- [www.deh.gov.au/industry/waste/plastic-bags/pubs/analysis-final.pdf](http://www.deh.gov.au/industry/waste/plastic-bags/pubs/analysis-final.pdf)
- [www.earthresource.org/seaturtlesdontshop.htm](http://www.earthresource.org/seaturtlesdontshop.htm)
- [www.algalita.org/initiatives.html](http://www.algalita.org/initiatives.html)
- [www.mindfully.org/Plastic/plastic.htm](http://www.mindfully.org/Plastic/plastic.htm)
- [www.ran.org/ran\\_campaigns/old\\_growth/](http://www.ran.org/ran_campaigns/old_growth/)
- [www.planetark.com/campaignspage.cfm/newsid/7/story.htm](http://www.planetark.com/campaignspage.cfm/newsid/7/story.htm)

## **APPENDIX B: RESOURCES AVAILABLE IN THE ON-LINE VERSION**

This report will be available electronically at <http://www.stopwaste.org>. In the electronic version you will be able to follow live links to the “additional resources” listed in this document. There are also two additional sections of cases studies included in the electronic version. The first of these is a section on “Electronic Waste Management” highlighting the efforts of Snohomish County, Washington’s electronic waste program and various e-waste collection events and activities around the country. Also included will be a section on “Reusing Waste and Closing the Loop.” This section will discuss Portland, Oregon’s Fix it Fairs, Saint Paul, Minnesota’s Wood Wins program for job training the creative reuse of scrap materials, and various online materials exchange programs.