EPA/231/R-98/004

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Office of Policy, Planning and Evaluation

EPA 231-R-98-004
April 1998

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$mart Investments for City and County Managers:

Energy, Environment, and Community Development

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This Guide was compiled using information from a wide range of sources, including published and unpublished documents, Internet sites, and personal communications with numerous federal, state and local government representatives. In documenting these sources, a conscious effort was made to strike a balance between the standards of documentation normally applied to more technical reports and the desire to maintain the flow and readability of the text in a resource guide intended for a more general audience. In general, specific notations are provided here for written sources that may prove most useful for readers wishing to obtain more detail on individual programs or case studies; where the information in the Guide was based largely on personal communications, appropriate contacts for additional information have been listed at the end of each chapter.

$MART INVESTMENTS FOR CITY AND COUNTY MANAGERS:

ENERGY, ENVIRONMENT, AND COMMUNITY DEVELOPMENT

Urban and Economic Development Division
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Washington, DC 20460

$MART INVESTMENTS CONTENTS

Executive Summary

The Management Challenge of Smart Growth

As a local government manager, you work hard to make your community a better place. Every day your organization faces new public demands and budgetary constraints, and you are under the constant pressure of media scrutiny. Through it all, you are expected to attract, and find ways to accommodate, new growth and development for your community. Where others may see only the short-term economic opportunities and social benefits of growth, your job demands that you also consider the costs and long-term impacts. For unstructured or poorly planned development, those costs and impacts may include unanticipated capital expenditures for public infrastructure, increased operation and maintenance costs for existing public facilities, and long term environmental impacts.

One way to accommodate the budgetary demands of new growth and development is to find new ways to manage existing government operations so that they cost less, work more efficiently and make better use of limited financial resources. You may feel that every dollar you spend is already stretched to its limits, but even the most skilled and experienced managers can benefit from fresh approaches and new ideas. Challenge and encourage everyone, from department heads to clerks and maintenance workers, to take stock of their operations. Do they really use resources as efficiently as possible? Can anything more be done to streamline procedures? You may be surprised at the opportunities for savings you can identify.

Another way to accommodate the fiscal demands of new growth and development is to promote "smart growth." Smart growth utilizes existing infrastructure more efficiently, reducing the need to expand that infrastructure. Working with developers and local businesses to shift new growth away from undeveloped areas, for example, minimizes the need — and the capital costs — for new roads, water lines, and sewer systems. Encouraging the use of public transit reduces traffic flow, lowering costs for road construction and maintenance. And providing incentives to conserve water and reduce waste not only lowers your operating costs for public services, but also reduces the environmental impacts of growth and development.

This $mart Investments Guide is designed to provide you with concrete examples of tools and practices that will enable you to use resources more efficiently in existing operations, and to promote smart growth for the future. Its goal is to ensure that your community can continue to grow and prosper without having to choose between increased taxes or decreased public services and a reduced quality of life. To assist you in making $mart Investments, the guide provides numerous examples of communities that have pioneered these ideas and seen them work. By drawing on these success stories, you will be able to design a $mart Investments plan to promote smart growth and fiscal stability in your community.

$MART INVESTMENTS: THE TOOLS FOR $MART GROWTH

$mart Energy Efficiency Investments. One of the easiest ways to help your budget and show people the advantages of $mart growth is to improve the energy efficiency of public facilities. Some local governments have achieved energy cost savings by starting with simple no-cost or low-cost measures. Directing public employees to turn off unneeded lights and turn down thermostats during off hours produces savings that can be used to finance additional conservation measures. A variety of other flexible financing mechanisms allow local governments to reap savings by replacing standard lighting, heating and air conditioning equipment with energy efficient models, often with no capital outlay. Installing computerized control systems to minimize energy consumption in water distribution and wastewater treatment, while requiring larger initial investments, can yield substantial savings that often repay those investments within a few years.

$mart Water Conservation Investments. As cities grow and expand, local water supplies may dwindle or become polluted. As a result, local governments will often face increased costs to develop or purchase new water supplies, or provide additional treatment for existing supplies. New development may also increase wastewater flows to sewage treatment plants, increasing local costs for plant operation or necessitating capital expenditures for plant expansion. By reducing both water demand and wastewater flows, water conservation measures can help local governments hold down costs at both ends of the pipe. Municipalities profiled in this guide have realized substantial savings through a variety of water conservation ordinances, pricing policies, leak detection programs, plumbing fixture retrofits, or rebates and other financial incentives.

$mart Waste Reduction and Recycling Investments. Waste management and disposal practices affect local government budgets in several ways. First and foremost, because local governments typically provide or contract for disposal of municipal solid waste at landfills, their costs have skyrocketed as landfill tipping fees and waste volumes have increased in recent years. To reduce the amount of waste sent to landfills, and hence the cost of disposal, more than 2,000 communities have implemented unit pricing, curbside recycling, and/or composting programs. These programs

often have the added benefit of generating revenue from the sale of recyclable materials. The stimulation of local recycling markets can also result in lower prices for recycled products that local governments may be purchasing for use in their own operations.

Local governments also incur substantial costs for disposal of construction and demolition waste from public projects. Practices such as salvaging and reusing materials, requiring deconstruction rather than demolition of buildings, and providing waste management education and technical assistance to contractors have saved millions of dollars in costs for new materials and waste disposal.

$mart Transportation Investments. Local governments spend large portions of their budgets on roads, highways and public transit. Many communities are finding that they can reduce road construction and maintenance costs, improve air quality, and increase the utilization of their transit investments through a variety of measures to promote alternatives to automobile commuting. Municipal electric shuttle bus systems, subsidies and economic incentives for carpooling and transit use, flexible work schedules, and telecommuting and videoconferencing have all proven successful in reducing the number of vehicle miles traveled by both public and private sector employees. Light rail systems, while requiring larger and longer term public investments, can also stimulate substantial economic growth by improving businesses' access to customers and employees.

Local governments also spend billions of dollars annually to operate and maintain their vehicle fleets. In many cases, these costs can be reduced through such measures as eliminating nonessential vehicles or buying more fuel-efficient models. Converting or purchasing vehicles to run on alternative fuels such as propane or compressed natural gas is not only saving many communities money, but is also improving air quality.

$mart Development Investments. New commercial and residential development often increases the demand for a variety of public services, but in the absence of tax increases may not generate the revenue needed to offset the associated costs. Some local governments have succeeded in minimizing the impact on their budgets through changes to building codes and zoning ordinances that influence the nature and configuration of new development. As in public facilities, building codes that require water conservation, energy efficiency, and waste reduction in commercial and residential construction can reduce operating costs for local government services. Zoning ordinances can be crafted to promote high-density development near existing infrastructure, encourage mixed use, or charge developers the full cost of infrastructure expansion. All of these measures can help to lower capital and operating costs for public services, conserve open space, and create pedestrian-oriented communities with an enhanced quality of life.

$mart Investments for the Environment. In addition to their financial benefits, all of the $mart Investments described above yield important environmental benefits. Every dollar spent to reduce energy consumption and solid waste generation, or to increase recycling and public transit use, also decreases the consumption of fossil fuels and the depletion of raw materials. Less pollution is produced, air and water quality improves, and public exposure to contaminants decreases. Similarly, water conservation and open space protection not only ensure adequate supplies of clean water and recreational areas for future generations, but also help preserve the integrity of local watersheds, forests, wildlife habitat, and ecosystems.

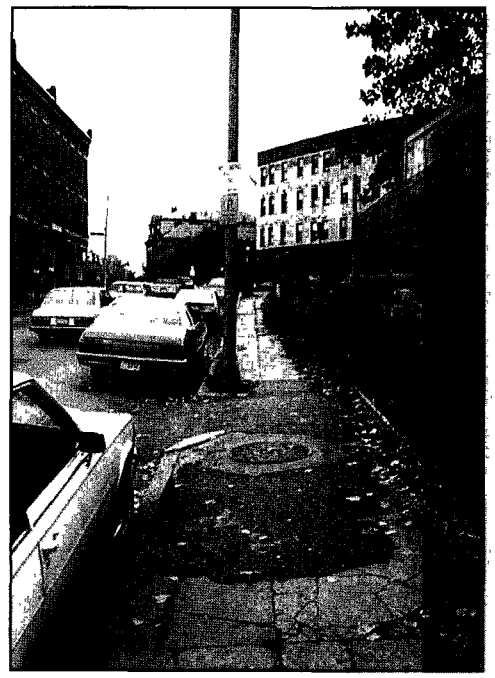
ENSURING PUBLIC SUPPORT

This guide describes the $mart Investments tools you can use to design a more sustainable approach to growth and development, but $mart Investments will do more than just save money and protect the environment. They will help you to continue providing public services that are responsive to your community's changing needs without increasing residents' financial burdens. They will also help preserve your community's fundamental character and quality of life while creating a favorable climate for economic growth and development. All of these goals can be achieved with the broad support and involvement of local government, businesses, and residents. To help you gain that support, the final chapter of the guide profiles public outreach and education programs other communities are already using to ensure community support and involvement for their $mart Investments strategies. By following their examples, you can engage your own community in developing and implementing effective $mart Investments strategies, making it an even better place to live and work in the years to come.

$MART INVESTMENTS INTRODUCTION

FISCAL CRISIS: GROWTH AND DEVELOPMENT FACTORS

Many of America's local governments are in the grip of a growing fiscal crisis. Newspaper headlines tell the story: one state abolishes a financially strapped county; voters in another state's largest city consider a referendum to dissolve the debt-plagued city government and turn its functions over to the county; towns large and small struggle to pay for basic services and infrastructure maintenance. Although the details of the stories differ, they are linked by one recurring theme: much of the fiscal crisis stems from growth and development that could no longer be sustained.



Consider a typical, heavily urbanized city. After the rapid economic growth and population influx of the 1950s and 60s, it has now fallen victim to many of America's urban ills: the flight of investment dollars away from the central city, the migration of businesses and residents to the sprawling suburbs, the proliferation of idle "brownfields" properties and a shrinking city tax base. Many suburbs, meanwhile, suffer from growth-related fiscal pressures of a different sort. Having experienced rapid development in the '60s, '70s and '80s, they now face the end of the building boom. The growth in their local tax bases is leveling off just as large numbers of young families are sending their children to already overcrowded schools. The financial burden on local governments is increasing.

Even rural communities have begun to feel the pinch. Demand for land and open space is escalating in proportion to the spread of nearby suburbs. It frequently triggers conversion of rural land to residential subdivisions. Such change is often unsupported by sufficient growth in the tax base to pay for the increased infrastructure and service

needs. As a result, these communities must now cover higher costs while trying to maintain the very characteristics that have attracted new residents.

Such fiscal pressures require short-term measures to hold down local government costs and avert immediate fiscal crisis, and, even more important, long-term efforts to change patterns of growth and development. Community leaders need to recognize that unstructured development, or "sprawl," is a major cause of rising infrastructure and service costs. This guide contains ideas to help identify and implement a mix of short-term and long-term fiscal solutions that should alleviate the pressure on limited budgets, while enhancing the ability to provide public services and encourage better development.

$MART INVESTMENTS: THE TOOLS FOR $MART GROWTH

The guide serves three purposes:

- to help local governments control rising costs and avert fiscal crises,
- to promote growth that benefits the economy and the environment and
- to highlight outreach activities that will build public support for these efforts.

$mart Investments are innovative money-saving practices that help city managers stretch their limited resources to provide more and better services with less damage to the environment. Many $mart Investments in energy efficiency, waste management, and water conservation are already paying off for local governments across the country. By also promoting greater use of public transit and existing infrastructure in new developments, communities can create local and regional growth patterns that will enhance rather than compromise their future economic and environmental health.

$mart Investments
Programs and practices with returns that exceed initial costs and that promote smart growth.

To assist communities in recognizing and overcoming the effects of unchecked sprawl development, EPA recently formed the $mart Growth Network, a coalition of public, private, and non-governmental organizations devoted to the goal of improving development practices. Through the creation and dissemination of reports, manuals, and guides on "smart growth" practices, the $mart Growth Network provides communities with the tools and guidance they need to revitalize existing communities and better manage development on the ex-urban fringe. This $mart Investments Guide,

one of EPA's $mart Growth Network tools, is intended to serve as an information and policy planning resource for city and county managers. By helping managers avert fiscal crisis while improving the quality of public services, this guide can help ensure both continued economic opportunity and a high quality of life for local residents.

WHY $MART "INVESTMENTS?"

This guide to $mart "Investments" for City and County Managers highlights programs and innovative practices that, like investments, yield financial returns. And in most cases, like other good investments, they yield returns that far exceed their initial cost. In fact, many can be implemented at little or no cost to local governments, and will leverage benefits to the community over and above the cost savings for public services alone. Those programs that do require initial outlays will often pay for themselves within one or two years. Although some steps, such as extensive water conservation for large municipalities, may involve longer term investments with paybacks of six to ten years, those investments can frequently be financed through low-interest loans, grant programs, utility rebate programs, or leasing agreements that substantially reduce up-front costs.

Not all of the investments listed in this guide are equally useful for every local government, but many cities, counties and even small towns have pioneered these ideas and realized substantial gains. The key to their success is thorough evaluation of local assets, needs and options; evaluation that led those communities to sound investments in their future. From the range of short-term and long-term investment opportunities and financing mechanisms illustrated here, local government managers can select those that best fit their needs and promise optimal returns.

WHY SHOULD $MART INVESTMENTS MATTER TO YOU?

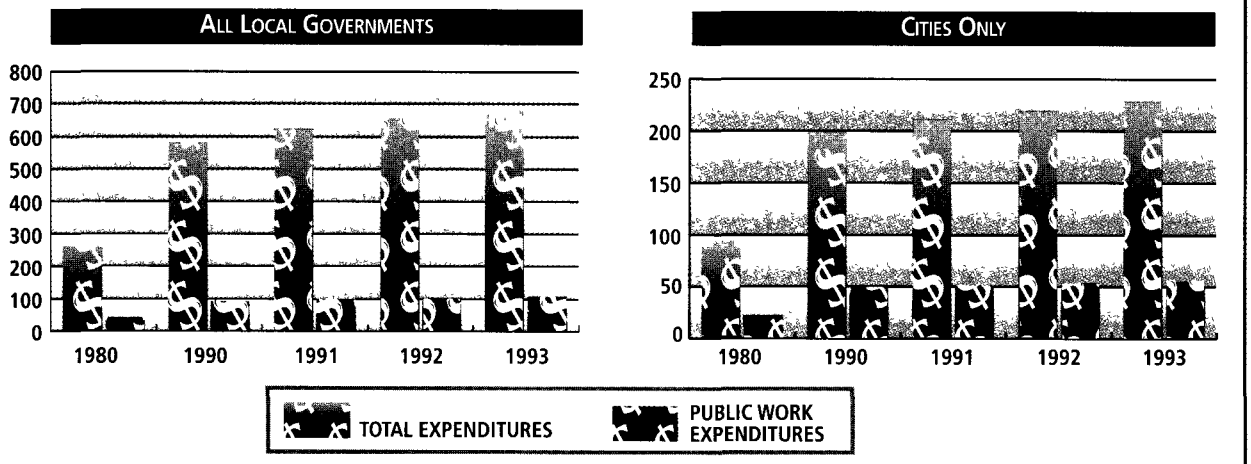
$mart Investments will save you money. As a city or county manager, you work hard to make your community a better place for everybody. Every day, you are faced with the challenge of delivering more and more essential public services, while at the same time minimizing the costs to taxpayers (see page 1-4). That's why $mart Investments should matter to you. They will save you money!

And as much as smart investing should matter to you, your choices matter to all of us as citizens. Collectively, local governments in the United States operate a dizzying array of public facilities — from schools, libraries, convention centers, and office buildings, to hospitals, fire stations, airports, and prisons. We all want them to work well. Investments that reduce the amounts of water and energy these facilities use, as well as the amounts of wastewater and solid waste they generate, simply make good financial sense because they lower operating costs. By lowering local government costs, these investments can eliminate the need to raise the taxes and fees that residents must pay. Local governments can further

THE LOCAL PUBLIC WORKS BUDGET PICTURE

Local governments' costs for the operation and maintenance of public infrastructure and services are considerable. Public works expenditures account for approximately 16 percent of local budgets and represent about 25 percent of city budgets. In 1993, sewerage and sanitation, electricity generation, public water systems, and highways were among the six largest budget categories for city governments.

TRENDS IN LOCAL GOVERNMENT PUBLIC WORKS EXPENDITURES



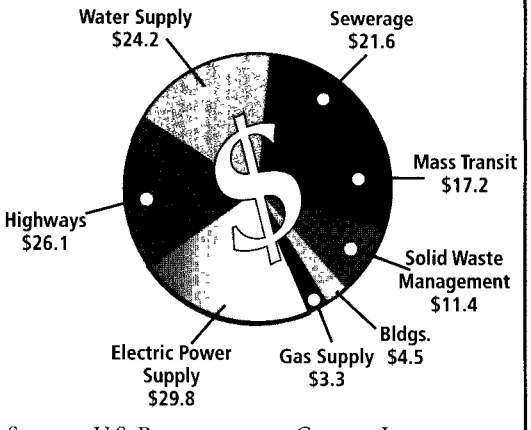
PUBLIC WORKS EXPENDITURES INCLUDES HIGHWAYS, SEWERAGE, WATER SUPPLY, SOLID WASTE MANAGEMENT, MASS TRANSIT, AIRPORT TRANSPORTATION, AND WATER TRANSPORT AND TERMINALS.

SOURCE: U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS. STATISTICAL ABSTRACT OF THE UNITED STATES, 1995; AND U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS. STATISTICAL ABSTRACT OF THE UNITED STATES, 1996.

From 1980 to 1993, excluding electric power supply costs, annual city and county spending for public works nearly tripled, rising from $44.2 billion to $110.5 billion, led by a $15 billion increase in water supply costs. Between 1990 and 1993 alone, local public works expenditures increased by more than 16 percent.[1] Slowing this growth in spending is increasingly important in the face of dwindling federal and state assistance for a variety of local programs.

A breakdown of local government public works costs for the fiscal year ending in 1993 reveals that the top six categories — electric power supply, highways, water supply, sewerage, mass transit and solid waste management — together totaled more than $130 billion, accounting for 19 percent of local budgets. Operation and maintenance costs (O&M) account for nearly 75 percent of electric power supply, water supply and mass transit expenditures, and nearly 90 percent of solid waste management costs. The potential fiscal benefits to local governments from reductions in these O&M costs are significant. Although municipal electric utilities are usually operated as quasi-private entities using separate funds, and do not directly impact local budgets, keeping their costs low can still benefit the local government and the community by lowering electric rates and creating a more attractive business and investment climate.

AGGREGATE LOCAL GOVERNMENT PUBLIC WORKS EXPENDITURE BY CATEGORY (Fiscal Year Ending in 1993)



SOURCE: U.S. BUREAU OF THE CENSUS, INTERNET SITE,HTTP://WWW.CENSUS.GOV/FTP/PUB/GOVS/WWW/INDEX.HTML (ACCESSED 5/6/97)

1. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Technical Information Program. "Energy Efficiency Strengthens Local Economies," Cities and Counties Project Fact Sheet #3.

reduce costs by facilitating private development near existing infrastructure and encouraging greater use of public transit, eliminating the need to expand infrastructure and transportation corridors into undeveloped property.

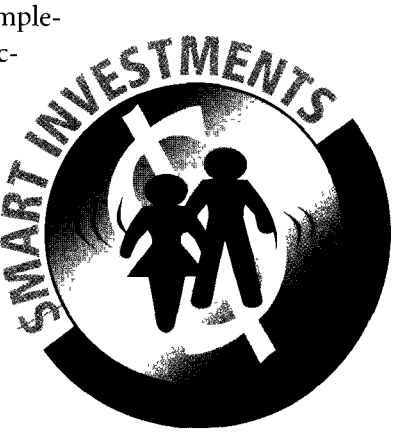
$mart Investments protect the environment. In addition to their fiscal benefits, many of the investments identified in this guide will yield significant environmental benefits. Cutting energy consumption reduces air pollution from power plants and slows the use of natural resources such as coal and oil. Increased recycling and decreased production of solid wastes can prolong the life of existing landfills or eliminate the need for new ones. Better conservation of water results in healthier ecosystems. Improved public transit and expanded alternatives to commuting relieve traffic congestion and improve air quality. In short, $mart Investments should matter to ***everyone.***

How to use this guide to help your bottom line

This guide highlights $mart Investments in five major categories: energy efficiency, water conservation, waste management, transportation and development. Each category is addressed in its own chapter, with a focus on policies, programs and practices that reduce local governments' costs and promote the goal of smart growth. Each chapter presents information on federal programs, case studies of innovative local initiatives, and specific examples of savings.

Local governments can use the program information and case studies to generate ideas and options for $mart Investment plans for their communities. At the end of each chapter, a section entitled "Getting Started" presents considerations and tips for designing and implementing local programs, along with a list of contact people and sources of additional information. By drawing on the ideas and experiences of others who have made $mart Investments work for them, you will be well on your way to improving your local government's bottom line and your community's economic and environmental health.

The final chapter of the guide, entitled "Community Outreach: Gaining Public Support for $mart Investments," emphasizes the importance of involving local residents, businesses and community leaders in the planning and implementation of your $mart Investments strategy. Case studies of successful outreach efforts provide guidance in developing an outreach plan for your community. This chapter also demonstrates ways to implement that plan through examples of specific education and outreach tools that have proven effective in building community support for $mart Investments.



$MART ENERGY EFFICIENCY INVESTMENTS

BENEFITTING FROM $MART ENERGY EFFICIENCY INVESTMENTS

American cities and counties spend billions of dollars annually on energy to operate public buildings, wastewater treatment plants, office machines, water pumps, street lights and the like. According to the California Energy Commission, energy costs for the state's local governments amount to more than $1 billion annually, while its schools spend more per student on energy than on books and other instructional materials. The Philadelphia school district, the fifth largest in the country, spends $33 million on energy each year. And in Chicago, the Center for Neighborhood Technology's Community Energy Program estimates that the area's local governments, including the city, Cook County, and local schools and special districts, spent $235 million on energy in 1995.

Another issue for local governments is that a large portion of their energy expenditures flows out of the local economy. According to the Department of Energy (DOE), each dollar spent on natural gas and electricity results in only $1.48 and $1.75 of local economic activity, respectively. Similar economic multipliers for ordinary consumer goods and energy conservation are $2.06 and $2.32 for each dollar. Economists with the State of Nebraska estimate that the state economy loses as much as 80 percent of every dollar spent on energy.[1]

$mart Energy Investments yield substantial financial returns. The potential financial returns on investments in energy efficiency are enormous. The National Science Foundation has estimated that cities can often reduce their total energy costs by as much as 15 percent through improvements in energy efficiency, without affecting the quality of services they provide. Some measures, such as the installation of energy efficient lighting, can save 60 percent or more in that category alone.

RETURNS ON ENERGY EFFICIENCY INVESTMENTS

- **Cost Savings up to 60%**
- **Pollution Prevention**
- **Resource Conservation**

$mart Energy Investments yield public health and environmental benefits. Energy efficiency investments also benefit public health and the environment. The burning of fossil fuels to generate energy contributes to smog and acid rain, as well as to the greenhouse gas emissions that cause global warming. As the international community seeks to reduce pollution worldwide, and as fossil fuel sources are depleted, local efforts to improve energy efficiency become increasingly important.

ENERGY INVESTMENTS WITH POTENTIALLY HIGH RETURNS

SHORT-TERM	LONG-TERM
Make low-cost lighting upgrades in public buildings (compact fluorescents)	Install water supply SCADA systems
Install LED traffic lights	Upgrade building HVAC systems
Promote energy awareness among public employees	Generate electricity from wastewater byproducts
	Construct AIP wastewater treatment systems

$MART ENERGY INVESTMENTS FOR PUBLIC BUILDINGS

Local governments have a large financial stake in reducing energy use in public office buildings, city halls, county courthouses, schools, and other public facilities. According to the Department of Energy (DOE), buildings consume 36 percent of all energy used in America, at an annual cost of $200 billion. The Washington State Energy Office's Public Sector Program estimates that operation and maintenance costs account for 91 percent of the total cost of owning a building. Energy costs for lighting, heating, and cooling constitute a large portion of those expenses.[2] The potential for significant savings from $mart Energy Investments in building operations is clearly demonstrated by the programs and case studies below.

EPA/DOE JOINT INITIATIVES

THE GREEN LIGHTS PARTNERSHIP PROGRAM

The Green Lights Program is an innovative voluntary partnership of building owners and EPA that promotes the installation of energy efficient lighting. EPA provides technical assistance through energy efficiency manuals, free software for energy cost savings calculations, and information on lighting technologies. In return, program partners conduct lighting audits of their facilities and upgrade lighting to make it more energy efficient and cost-effective. With its focus on cost savings, Green Lights has grown from 39 partners in 1991 to more than 2,500 in 1997, including 250 local, state and federal government entities. Green Lights partners operate on more than six billion square feet of space, and have reduced their electricity use for lighting by an average of 48 percent.

EPA Green Lights
an ENERGY STAR program

RETURNS ON GREEN LIGHTS IN PUBLIC BUILDINGS

- **Lighting electricity savings: 31% to 58%.**
- **Energy cost savings: $10,000 to $383,000 annually.**
- **Investment yields: IRR from 22% to 66%.**

Many local governments have achieved great cost savings on energy through their Green Lights upgrades.

- **San Diego County, California** saves nearly $100,000 in annual energy costs from the lighting upgrades in its County Operations Center Annex.

- **The City of Provo, Utah** reduced lighting energy use in its City Hall by 59 percent by upgrading to a mix of T-8 lamps and electronic ballasts, compact fluorescent and high-pressure sodium lamps.
- **Baltimore County, Maryland** cut its annual lighting energy use by nearly six million kilowatt hours and its energy costs by about $400,000 after upgrades in over two million square feet of floor space.
- **Denver, Colorado,** after reducing its energy costs by $52,000 per year and achieving a 50 percent internal rate of return on lighting upgrades at its City and County Building, retrofitted several other facilities for combined savings of nearly $1 million annually. Denver received EPA's Local Government Green Lights Partner of the Year award in 1996.

Such investments at local government facilities have yielded internal rates of return of 22 to 66 percent, as shown below.

EXAMPLES OF LOCAL GOVERNMENT SAVINGS FROM REPRESENTATIVE GREEN LIGHTS PROJECTS

LOCATION/ JURISDICTION	UPGRADE AREA (SQ. FT.)	ELECTRICITY SAVED(KWH/YR)	ELECTRICITY SAVED (%)	ANNUAL ENERGY COST SAVINGS	INTERNAL RATE RATE OF RETURN (%)
Baltimore County, MD	2,026,652	5,877,989	39	$ 383,428	46
Provo, UT	199,996	709,077	59	$ 36,678	22
Gilbert, AZ	66,102	95,119	37	$ 10,213	66
San Diego County, CA	350,870	1,062,898	40	$ 99,009	NA
Leon County, FL	276,910	679,792	58	$ 91,782	NA
Denver City & County, CO	450,000	900,125	35	$ 52,353	50
Memphis, TN	410,600	294,613	31	$ 20,000	25
Sarasota, FL	71,063	246,240	58	$ 17,236	50

SOURCE: U.S. EPA, GREEN LIGHTS/ENERGY STAR PROGRAM OFFICE

ENERGY STAR® PROGRAMS

Lighting represents only one component of overall energy use in buildings. To continue and expand the adoption of cost-effective energy technologies, EPA and DOE established the Energy Star® Program, targeting five different areas of energy consumption.

- **The ENERGY STAR® Buildings Program** promotes comprehensive energy management and efficiency upgrades of lighting, HVAC, and energy control systems through partnerships with building owners.
- **The ENERGY STAR® Homes Program** improves energy efficiency in new residential construction through partnerships with builders.

- **The ENERGY STAR® Product Labeling Program** identifies the most energy efficient products in a wide range of product categories, including personal computers, office equipment, residential heating and cooling equipment, appliances, TVs and VCRs, and exit signs.
- **The ENERGY STAR® Transformer Program** encourages the manufacture and use of high-efficiency electrical transformers by electric utilities.
- **The ENERGY STAR® Purchasing Initiative** promotes energy efficiency as an important criterion in state and local government procurement, and provides the information and other tools state and local governments need to make specifying energy efficient products and equipment standard practice. This program complements many existing federal, state, and local energy conservation programs and gives state and local governments another avenue for reaping the multiple benefits of energy efficiency.

To popularize the ENERGY STAR® programs, EPA conducts workshops and training courses, offers free analytical software for calculating energy and financial savings, and operates a hotline for technical assistance, information on energy saving technologies, and mailing of efficiency upgrade manuals.

More than 75 ENERGY STAR® Buildings partners have so far upgraded 400 million square feet of floor space. EPA launched the program in 1994 with a series of ENERGY STAR® Showcase projects to demonstrate the economic potential of whole-building energy efficiency upgrades. One noteworthy local government showcase project is the Hungerford Office Building in Montgomery County, Maryland. In 1994, the county retrofitted the 84,000 square foot social services facility with energy efficient equipment. The improvements save the county $90,000 annually on energy bills and have increased the facility's asset value by $8.82 per square foot, at a total cost of only $1.82 per square foot. With a project cost of approximately $153,000, the payback period was less than two years.[3]

RETURN ON ENERGY EFFICIENCY INVESTMENT

Hungerford Office Building, Montgomery County, MD

- **Comprehensive upgrade of 84,000 square feet.**
- **$90,000 in annual savings on energy bills.**
- **Payback of $153,000 cost within two years.**
- **$8.82 per square foot increase in facility's asset value**

INNOVATIVE LOCAL INITIATIVES

● THE PHILADELPHIA SCHOOL DISTRICT'S SAVE ENERGY CAMPAIGN

HIGHLIGHTS

- **No initial funding required.**
- **Incentive program returns 40% of savings to individual schools.**
- **First-year savings of $3 million.**
- **$85 million in savings over 13 years.**

In 1983, while looking for ways to trim its budget and provide better educational services, the Philadelphia School District discovered that it was spending more than twice as much on energy for heating and lighting as it was on books and supplies. With energy costs rising and no money available for capital investments

to improve the energy efficiency of its 258 schools, the District created the Save Energy Campaign, a voluntary incentive-based energy conservation program that has become a model for communities across the country.

The cornerstone of the campaign is the provision of financial incentives for schools to reduce their energy consumption. Schools that save over their three previous years' average energy bills keep 40 percent of the savings. The School District's general fund also gets 40 percent, with the remaining 20 percent going into a special revolving fund earmarked for capital improvements that result in additional energy conservation. With no start-up funds at the beginning of the campaign, the district encouraged schools to focus initially on the simplest and least expensive conservation measures, such as turning off unused lights, turning down boilers earlier in the day, and maintaining better overall temperature control. In the campaign's first year, these measures yielded savings of $3 million. Over 13 years, the program has brought cumulative savings of $85 million, much of which has been used to purchase computers, textbooks, sound systems, film projectors, and other equipment and supplies.[4]

● The City of Phoenix's Energy Management Program

Highlights

- **$150,000 in first-year savings from low cost lighting upgrades.**
- **Savings Reinvestment Plan uses 50% of energy savings for further upgrades.**
- **Annual energy cost savings exceeded $1 million by 1986.**
- **Net savings of $18.4 million returned to city's general fund over 16 years.**

In the late 1970s, city officials in Phoenix, Arizona realized that if energy use in city-run facilities were treated as a single expense, it would be the largest budget item after payroll. To bring down these costs, the city instituted its Energy Management Program to audit energy use and begin upgrades of its 300 buildings. Starting with simple, low cost projects, such as replacing incandescent light bulbs with compact fluorescent lighting, the program saved $150,000 in its first year. The city has since reaped tens of thousands of dollars in additional savings simply by assigning a "utilities monitor" to check all electric bills for errors and overcharges.

In 1983, the City Council used $50,000 in state oil overcharge funds as seed money to create the Savings Reinvestment Plan (SRP), a revolving fund that uses energy cost savings to finance additional capital improvements and efficiency upgrades. Each year the SRP reinvests half of all energy savings back into the fund, up to a cap of $500,000. By 1986, energy savings had already exceeded $1 million annually, surpassing the reinvestment cap. The City Council recently voted to raise the cap by $50,000 annually over five years, to a new limit of $750,000.

Phoenix has achieved phenomenal returns on its investment in energy efficiency. By 1994, the Energy Management Program had yielded $22.8 million in cumulative energy savings. The city put $18.4 million of this savings into its general fund, and reinvested about $4.4 million in the SRP. By annually investing $500,000 of its energy savings in energy efficiency (the equivalent of 1.25 percent of its $40 million energy bill), the city now saves $4 million, or 10 percent of its energy costs, each year.[5]

● CITY OF PORTLAND: CITY ENERGY CHALLENGE

HIGHLIGHTS

- **Funded through a fee of 1% of each city department's annual energy bill.**
- **Provides energy audits, annual energy use reports, and technical assistance.**
- **Energy cost savings returned to individual departments for discretionary use.**
- **Annual energy savings approaching $1.2 million after five years.**
- **$3 million in cumulative savings over five years.**
- **5.7% average IRR on investments of $2.6 million; payback within four years.**

The City of Portland, Oregon is a leader in promoting sustainability and environmental awareness. Portland adopted a formal energy policy in 1990, setting a goal of 10 percent reduction in energy consumption for both the public and private sectors. To demonstrate its own commitment to energy efficiency and to serve as an example to local business leaders, the city initiated its City Energy Challenge (CEC) in 1991, with a goal of reducing its own annual energy bill by $1 million (more than 11 percent) within five years.

To fund salaries for CEC staff, the City Council charges each of the city's eight bureaus a fee equal to one percent of its annual energy bill, up to a limit of $15,000 per bureau. In return, the CEC staff provides each bureau with an annual report on its energy use, energy audits of its facilities, and energy conservation training. The CEC staff also assists the bureaus in preparing bid solicitations and selecting contractors for capital improvements. In addition, the CEC publishes a newsletter with information on energy conservation technologies and project successes. As an incentive for the bureaus to implement CEC recommendations, all energy cost savings are returned to them for their own use.

CEC staffers have also worked with the city's Office of Fiscal Administration (OFA) to help bureaus obtain financing for capital improvements. By "piggybacking" funding for energy efficiency on larger municipal debt sales, OFA has created a low-interest loan fund; bureaus repay the loans out of their energy savings. By the end of 1996, the city's annual energy savings under the CEC topped its five-year goal of $1 million, with a total of $3 million in cumulative savings. The city has invested $2.6 million in capital improvements, but has achieved an

average internal rate of return of 25.7 percent, yielding payback in less than four years.[6]

$MART ENERGY INVESTMENTS IN PUBLIC SERVICES

Local governments incur substantial energy-related expenses in the operation of public utilities and infrastructure. The Department of Energy has estimated that energy consumption accounts for 50 to 75 percent of municipal water system operating costs, with pumps consuming as much as 80 percent of the electricity used in drinking water treatment and distribution.[7] Similarly, electricity to power pumps and aerators accounts for a large portion of wastewater treatment system operating costs. A single streetlight or traffic light consumes only a small amount of energy, but collectively they can cost some communities more than a million dollars a year. The examples of energy efficiency investments presented below include cost-saving success stories for each of these energy applications.

WATER SUPPLY SYSTEMS

By installing a Supervisory Control and Data Acquisition (SCADA) computer network on its water distribution system, the City of Fresno, California is saving $725,000, or 13 percent of its water supply electricity costs each year. Energy savings paid for the $3.2 million cost of the network within five years.[8]

The California Water Service Company is saving an average of $47,000 annually in energy costs, following installation of a SCADA network at a cost of $100,000. During the first four years of its operation, the cost per pumped gallon of water averaged 29 percent lower than in the prior four years.[9]

LOCAL GOVERNMENT SUCCESS STORIES: ENERGY SAVINGS IN PUBLIC SERVICES

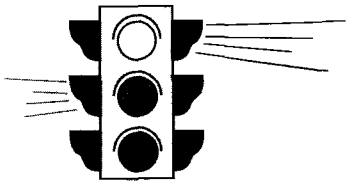
- **Fresno, California; Water supply SCADA**
  - .... Annual savings = $725,000 (13%)
  - .... Project cost = $3.2 million
  - .... Payback period = 5 years
- **California Water Service Co.; SCADA**
  - .... Annual savings = $47,000 (29%)
  - .... Project cost = $100,000
  - .... Payback period = 2+ years
- **Philadelphia Wastewater Treatment Plants; Standby electrical generation using methane**
  - ....Expected savings = $44.7 million over 20 years
- **San Jose, California; Energy efficient streetlights**
  - .... Annual savings = $1.5 million
- **City and County of Denver; LED traffic lights**
  - .... Annual savings = $300,000
- **Santa Monica, California; LED traffic lights**
  - .... Annual savings = $200,000 (estimated)
  - .... Project cost = $500,000 to $600,000
  - .... Payback period = 2 to 3 years

WASTEWATER TREATMENT

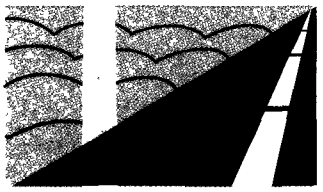
In 1993, the Philadelphia Water Department instituted an innovation to generate additional electricity at two of its three wastewater treatment plants. Methane from sludge digesters is used to power a standby electrical generator. This standby generating capacity allows the department to purchase power at low interruptible rates, which are expected to save $44.7 million over 20 years.[10]

Advanced Integrated Pond (AIP) wastewater treatment systems use microalgae in place of conventional electro-mechanical systems to aerate wastewater. According to DOE, because aeration often accounts for over 60 percent of the energy used in conventional treatment plants, AIP systems may use as little as 20 to 25 percent of the total energy consumed by conventional plants. As a result, AIP systems have substantially lower costs. The total operating costs, excluding payroll, for the AIP wastewater treatment plant in St. Helena, California, for example, are less than $100,000 per year to treat flows of 500,000 gallons per day.[11]

STREET LIGHTING AND TRAFFIC CONTROL



- Between 1981 and 1984, the City of San Jose, California, replaced 48,000 incandescent and mercury vapor streetlights with more efficient low- and high-pressure sodium lights, achieving annual savings of $1.5 million.
- The City of Hanford, California is saving $11,700 per year after replacing incandescent lights in its traffic signals with energy efficient light-emitting diodes (LED). The $80,000 project was funded with a loan from the California Energy Commission and a rebate from the local electric utility.



- The City and County of Denver have replaced their entire stock of 17,000 traffic signals with new LED lights, saving over $300,000 per year in energy and maintenance costs.
- Santa Monica, California planned to retrofit all of its red traffic signals with LED lights in 1997. The city estimated that the project would cost $500,000 to $600,000 and have a payback period of three years or less.
- In 1989 the City of Albuquerque, New Mexico installed 21 lights powered by photovoltaic cells over its Tramway Boulevard Bike and Walking Path. The $2,500 cost of each solar light was $500 less than the cost of connecting conventional lights to the closest underground line, yielding up-front savings of $10,500. In addition, the solar cells eliminate the cost of electricity to power the lights.
- The City of Carrollton, Texas has installed 80 solar-powered school zone flashers at 40 schools, saving more than $3,500 apiece compared to the cost of flashers connected to the electrical grid.
- As part of California's Service Authority for Freeway Emergencies (SAFE) project, 26 of the state's 58 counties installed photovoltaic emergency call boxes along freeways. The solar call boxes cost from $2,200 to $2,300 to purchase and install, and about $350 per year to maintain. They reportedly have a 10-year life-cycle and cost about 75 percent less than conventional grid-connected call boxes.

FINANCING $MART ENERGY INVESTMENTS

Local governments can use a variety of innovative tools to finance energy efficiency improvements and upgrades, and thus reap significant savings on energy costs at minimal expense. Leasing and performance contracts, revolving funds and state loans are three popular financing options that can be paid for with energy savings, requiring little or no up-front cash outlay.

LEASING AND PERFORMANCE CONTRACTS

Among the most widely used and successful financing tools are leasing arrangements through which contractors — known as energy service companies — fund and provide the capital equipment for the upgrade, and may also contract to operate and maintain the equipment, in exchange for lease payments from the local government. Leases may take any of several forms, but they generally allow local governments to make lease payments out of the energy cost savings accrued from the project. At the end of the lease term, the lessee (in this case the local government) typically takes ownership of the capital equipment, which normally has a useful life substantially longer than the lease term.

There are three basic lease options. The best one for any given situation will depend on several questions such as the cost of the project, the desired lease term and whether the local government wishes to take over the capital equipment at the end of the lease. Under a **financing lease**, the lessee pays for the equipment in equal monthly installments, and usually purchases the equipment at the end of the term for a nominal fee. **Operating leases** are often used for shorter terms, with the lessor (the contractor) retaining ownership of the equipment and the lessee (the local government) having the option to purchase the equipment at market value, upgrade to other equipment or renegotiate the lease when it expires. Under a **guaranteed savings lease**, also known as a performance contract, the contractor guarantees that the annual lease payments for the improvements will not exceed the energy savings, and there is often a clause stating that if the savings exceed the lease payment, the local government keeps the difference. As with a financing lease, the local government takes ownership of the capital equipment at the end of the lease.[12] The guaranteed savings lease is often the most attractive financing option for cash-strapped local governments, since it has no up-front cost and is risk-free.

FINANCING $MART ENERGY INVESTMENTS

- **Leasing and performance contracts**
  - **Capital improvement costs paid out of energy cost savings.**
- **Revolving funds**
  - **Energy cost savings from no-cost or low-cost efficiency upgrades used to finance later capital investments.**
- **State loan programs**
  - **Loans repaid out of energy cost savings.**

The Iowa Energy Bank provides one example of a leasing contract. The bank finances projects through leasing agreements, with lease payments structured to be less than or equal to the energy savings. Originally created to finance energy projects in public schools and community colleges, the Energy Bank now operates separate lease-finance programs for hospitals, local government facilities and private colleges.[13]

REVOLVING FUNDS

Revolving funds, such as those employed in the Philadelphia School District's Save Energy Campaign and the City of Phoenix's Energy Management Program,

are other popular and effective financing mechanisms that often require little or no initial funding. The essence of a revolving fund is that the initial savings generated from implementation of simple, low-cost energy efficiency improvements, or no-cost behavioral and operational changes, are used to fund subsequent, more capital-intensive improvements. Thus, early savings leverage even greater energy efficiency gains over time.

A Canadian program similar to Philadelphia's Save Energy Campaign, Destination Conservation, was started in Alberta in 1987 by the Environmental Resource Center. This program promotes the use of simple, no-cost or low-cost "lifestyle" changes in schools, such as turning off unneeded lights, to generate savings that are subsequently used for low cost retrofits such as the installation of occupancy sensors for classroom lights. Savings from these low cost retrofits are in turn used to finance more capital intensive retrofits, such as lighting upgrades. Two hundred and twenty schools from 24 districts in Alberta have participated in the program, with the 87 schools in TransAlta Utilities' service territory saving an average of 25 percent on their baseline utility bills.[14]

STATE LOAN PROGRAMS

Local governments may be able to finance capital-intensive energy efficiency investments in public facilities through loan programs administered by state energy offices. For example, the Texas State Energy Conservation Office administers the Statewide Retrofit Demonstration and Revolving Loan Program, better known as the Loan to Save Taxes and Resources (LoanSTAR) program. LoanSTAR uses a portion of the state's oil overcharge payments as a revolving loan fund to finance energy efficiency upgrades of public facilities such as hospitals, schools and libraries. The low-interest loans are repaid out of energy cost savings. Under a separate initiative, the Texas Education Agency is using $23 million in oil overcharge funds to provide School Energy Management grants to public schools for energy efficiency projects.[15]

Other states have similar programs. The Oregon Department of Energy offers the Small Scale Energy Loan Program, providing loans at 5.9 percent interest for up to 15 years. The California Energy Commission has three separate initiatives to provide energy efficiency funding and technical assistance to local governments. The Energy Partnership Program provides loans to cities and counties to retrofit existing facilities, as well as energy efficiency design assistance for new facilities. The Schools and Hospitals Program provides grants and loans for energy projects at public schools and hospitals. The Water Energy Efficiency Program provides technical assistance to cities, counties, and water districts to improve the energy efficiency of municipal water and wastewater facilities. Using an Energy Partnership loan, the City of Riverside completed energy efficiency retrofits of its seven story City Hall building in 1993, gaining annual savings of $85,649 that paid for the project in 2.5 years and saved three jobs in the city's building services department.[16]

GETTING STARTED

TIPS FOR MAKING $MART ENERGY EFFICIENCY INVESTMENTS

From the case studies presented in this chapter, local governments can extract some general guidelines:

- Start with simple, low-cost measures. Using a revolving fund is a cost-effective way to leverage early savings from low-cost retrofits to finance more capital intensive projects as the program proceeds.
- Take advantage of state loan programs and innovative financing mechanisms, such as leasing arrangements that allow energy efficiency upgrades of public facilities at no cost to local governments.
- Educate government units (e.g., schools or departments) about energy and ways to reduce its use. Perform audits and allow departments to track their progress in improving energy efficiency to promote awareness of energy consumption.
- Provide financial incentives to government units by returning to them a portion of their energy cost savings, thus increasing their commitment to energy conservation.
- Adopt alternatives to the extension of power lines, such as the use of solar cells, for small scale electricity uses in remote locations. Many communities find that the cost savings can be immediate and substantial.
- Publicize successes through public forums, newsletters or information campaigns. Use the example of the local government to spur energy efficiency improvements across the whole community.

SOURCES OF ADDITIONAL INFORMATION

U.S. EPA GREEN LIGHTS AND ENERGY STAR ® PROGRAMS

EPA Green Lights/ENERGY STAR® Buildings Atmospheric Pollution Prevention Division Office of Air and Radiation Contact: Doug Gatlin, Manager, State & Local Government sector Phone: (202) 564-9619	EPA ENERGY STAR® Purchasing Initiative Atmospheric Pollution Prevention Division Office of Air and Radiation Contact: Jennifer Dolin, Program Manager Phone: (202) 564-9073

U.S. DEPARTMENT OF ENERGY PROGRAMS

U.S. Department of Energy Programs Office of State and Community Programs Office of Building Technology U.S. Department of Energy 1000 Independence Avenue, SW Washington, DC 20585 Phone: (202) 586-4074 Internet Site: http://www.eren.doe.gov/buildings	The Office of State and Community Programs provides funding to state governments for energy programs and low income housing weatherization assistance. Individual states may distribute these funds to local governments. OSCP's Internet site currently provides a directory of more than 90 computer software tools for evaluating energy efficiency in buildings. The site also provides information about advanced building technologies, case studies, technical and financial assistance opportunities, and partnership opportunities that promote energy efficiency and pollution prevention.
Energy Efficiency and Renewable Energy Clearinghouse PO Box 3048 Merrifield, VA 22116 Phone: (800) 363-3732 Internet Site: http://www.eren.doe.gov/consumerinfo/	DOE's Office of Energy Efficiency and Renewable Energy administers the Energy Efficiency and Renewable Energy Clearinghouse to make available a wide range of documents on energy efficiency. The clearinghouse's Internet site contains 26 subject directories with over 500 files (text files and software) that can be downloaded. Many of these documents are also available in hard copy.
Center of Excellence for Sustainable Development Office of Energy Efficiency and Renewable Energy U.S. Department of Energy Denver Regional Support Office 1617 Cole Boulevard Golden, CO 80401 Phone: (800) 363-3732 Fax: (303) 275-4830 Internet Site: http://www.sustainable.doe.gov	DOE's Center of Excellence for Sustainable Development provides information on technical assistance and sources of funding. Its Internet site serves as a clearinghouse for articles concerning sustainable communities, energy efficiency, land use planning and management, transportation, green building and related topics.
Energy Efficiency and Renewable Energy Network (EREN) Internet Site: http://www.eren.doe.gov	EREN is an extensive network of Internet sites that provides information related to DOE's Office of Energy Efficiency and Renewable Energy's initiatives.

U.S. DEPARTMENT OF ENERGY PROGRAMS *continued*

National Renewable Energy Laboratory 1617 Cole Boulevard Golden, CO 80401 Phone: (303) 275-3000 Internet Site: http://www.nrel.gov	DOE's National Renewable Energy Laboratory (NREL), managed by the Midwest Research Institute, conducts research to develop renewable energy technologies and improve energy efficiency. NREL's Office of State and Local Partnerships was created in 1994 to provide information and technical assistance to state and local governments. As part of its Cities and Counties Project, NREL developed a series of 30 fact sheets describing innovative energy efficiency initiatives developed by city and county governments. These fact sheets are available in hard copies or online from the Energy Efficiency and Renewable Energy Clearinghouse.

LOCAL ENERGY MANAGEMENT PROGRAMS

Urban Consortium Energy Task Force (UCETF) Public Technology, Inc. 1301 Pennsylvania Avenue, NW Washington, DC 20004-1793 Phone: (202) 626-2400 Internet Site: http://www.pti.nw.dc.us/etf.htm	The Urban Consortium is a membership organization of 23 large municipal governments from around the country. Its Energy Task Force develops strategies to address local energy and environmental concerns. UCETF also offers publications on energy-related topics, including a workbook entitled, Sustainable Energy — A Local Government Planning Guide for a Sustainable Future.
International City/County Management Association (ICMA) 777 North Capitol Street, NE, Suite 500 Washington, DC 20002-4201 Phone: (202) 289-4262 Fax: (202) 962-3500 Internet Site: http://www.icma.org	ICMA is a professional and educational association for more than 8,000 local government administrators worldwide. ICMA provides training programs, technical assistance, data services and publications to improve the quality of local government management and administration.
City of Portland Energy Office 1211 SW Fifth Avenue, Suite 1170 Portland, OR 97212-3711 Phone: (503) 823-7222 Fax: (503) 823-5370 E-mail: pdxenergy@ci.portland.or.us Internet Site: http://www.ci.portland.or.us/energy/web	Portland, Oregon's energy office manages a variety of programs to reduce energy use in the public and private sectors.
National Association of Energy Service Companies (NAESCO) 1615 M Street, NW, Suite 800 Washington, DC 20036 Phone: (202) 822-0950 Fax: (202) 822-0955	NAESCO represents energy efficiency industries and energy products and service companies. It provides information about energy service companies and demand side management programs, and publishes the Energy Efficiency Journal.

LOCAL ENERGY MANAGEMENT PROGRAMS *continued*

City of Minneapolis Center for Energy and Environment Butler Square, Suite 412A 100 6 St. N Minneapolis, MN 55403-1520	The Center for Energy and Environment offers an assortment of energy efficiency programs to Minneapolis residents and businesses, including energy education and low cost weatherization assistance to low income households, and low interest financing of up to $7,000 to residential property owners for efficiency improvements. The Fluorescent Lighting Installation Program helps businesses finance and install energy efficient lighting, and Operation Installation provides one stop service for residential energy conservation retrofits to cut the use of natural gas for heating.[17,18]

ENDNOTES—CHAPTER 2

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2. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Technical Information Program. "Procurement Works Hand in Hand With Energy Efficiency," Cities and Counties Project Fact Sheet #15.
3. The Results Center, Division of IRT Environment, Inc. Montgomery County, Maryland. Resource Conservation Program. The Results Center Profile #125. 1996.
4. U.S. Department of Energy. The Rebuild America Financing Handbook. 1996. See also The Results Center, Division of IRT Environment, Inc. School District of Philadelphia. Save Energy Campaign. The Results Center Profile #114.
5. The Results Center, Division of IRT Environment, Inc. The City of Phoenix. Energy Management Program. The Results Center Profile #118.
6. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Center of Excellence for Sustainable Development. "Cities and Counties: Portland, Oregon," accessed 5/16/97 at http://www.sustainable.doe.gov/ss/pti/PORTLAND/index.html.
7. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Technical Information Program. "Cities Cut Water System Energy Costs," Cities and Counties Project Fact Sheet #13.
8. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Technical Information Program. "Cities Cut Water System Energy Costs," Cities and Counties Project Fact Sheet #13.
9. Ibid.
10. The Results Center, Division of IRT Environment, Inc. Philadelphia Water Department. Conservation Assistance Program. The Results Center Profile #109.
11. George Milanes, Chief Operator of the AIP wastewater treatment plant in St. Helena, California. Personal Communication, July 16, 1997.
12. U.S. Department of Energy. The Rebuild America Financing Handbook. 1996
13. The Results Center, Division of IRT Environment, Inc. Iowa Department of Natural Resources. Energy Bank. The Results Center Profile #73.
14. The Results Center, Division of IRT Environment, Inc. Environmental Resource Center. Destination Conservation. The Results Center Profile #82.
15. The Results Center, Division of IRT Environment, Inc. The State of Texas. LoanSTAR Revolving Fund. The Results Center Profile #101.
16. The Results Center, Division of IRT Environment, Inc. California Energy Commission. Energy Partnership Program. The Results Center Profile #64.
17. City of Minneapolis, Center for Energy and Environment, "City of Minneapolis: Energy & Environment," Internet Site, http://www.ci.mpls.mn.us/departments/city-coordinator/neighborhood/cee.html (accessed 5/29/97).
18. International Council for Local Environmental Initiatives, "Minneapolis, USA: Residential Energy Conservation," Project Summary #47, Internet Site, http://www.iclei.org/leicomm/lei-047.htm (accessed 5/13/97).

$MART INVESTMENTS FOR WATER RESOURCES CONSERVATION

BENEFITTING FROM $MART WATER RESOURCE INVESTMENTS

Economic growth and community development often have the unwanted result of depleting or degrading natural resources, most notably water supplies. As populations expand and existing water supplies dwindle or are threatened, local governments must face additional costs trying to find, purchase or develop new water sources and treat existing supplies. In 1993, local governments spent a total of $24.2 billion, nearly 22 percent of their public works budgets, on water supply system construction, operation, and maintenance. After use, water is typically discharged to municipal sewage treatment systems, imposing additional costs. Local government sewerage expenses totaled $21.6 billion in 1993, almost 20 percent of their public works budgets. $mart Investments in water resources have the potential to yield substantial returns at both ends of the pipe.

Local governments spend $46 billion a year on water supply and waste water treatment systems—40% of public works expenditures.

Water resources management and conservation also yields environmental benefits. $mart Investment in water conservation can help preserve watersheds for healthy ecosystems and wildlife habitats. Conservation measures help to maintain adequate water levels in rivers and streams for aquatic ecosystems, and reduce the quantities of wastewater discharged to surface waters. Local governments can make $mart Investments to conserve water resources; many have found that such investments can bring high returns.

$MART WATER CONSERVATION INVESTMENTS AND PRACTICES WITH HIGH RETURNS

SHORT-TERM	LONG-TERM
Adopt landscaping codes • Institute irrigation restrictions • Implement increasing block pricing	Conduct leak detection programs Subsidize plumbing fixture retrofits

$MART WATER CONSERVATION INVESTMENTS

EPA'S WATER ALLIANCE FOR VOLUNTARY EFFICIENCY PROGRAM

Program Overview

EPA's Water Alliance for Voluntary Efficiency (WAVE) Program promotes water conservation through voluntary partnerships with hotel chains to upgrade and improve plumbing fixtures, laundry facilities and other equipment. Signing a Memorandum of Understanding with EPA, partners promise to conduct water use audits, evaluate water conservation options, upgrade existing water systems and fixtures, and update EPA annually on the progress of implementation. They also agree to install water conserving fixtures and systems in all new facilities, and to provide information to customers and employees on the benefits of water conservation. Program partners receive EPA technical assistance, including a free "WAVE-Saver" software package for tracking water consumption, calculating marginal water costs and conservation budgets, and projecting the cost and performance of various water conservation options. EPA also provides education and outreach through training workshops for facility managers and engineers, and information on water conservation products and equipment suppliers.

Local Government Participation

The WAVE partnership program will soon be expanded to schools, hospitals, and other public facilities. EPA has been adapting the WAVE-Saver software for schools, with testing scheduled for late 1997. The agency also encourages municipalities, local and regional water resource boards, water districts and water utilities to join the WAVE program as supporters. In addition to upgrading their own water fixtures and systems, program supporters assist EPA in promoting water conservation, educating industry and the public about water conservation technology, and encouraging the development of new technologies. By mid-1997, WAVE supporters included ten city and county level water districts, water conservation departments, and water supply boards from around the country.

Benefits to Local Governments

EPA estimates that a hotel or motel can cut its water consumption by as much as 30 percent by installing water conserving fixtures and equipment, and that the payback period for installation costs is often three years or less. Some WAVE charter partners have reported reductions in annual water use ranging from 2.7 to 11 million gallons. That translates into annual water savings of 14 to 52 percent and corresponding cost reductions of $32,000 to $60,000 for water and sewer services.[1] Schools and hospitals, which use water in the same ways as

hotels, may be able to achieve similar cost savings once they are enrolled in the program. Until then, local governments can benefit from participation as WAVE supporters promoting water conservation. Because the marginal costs of developing additional water supplies are normally borne by municipally owned water utilities, local governments' promotion of water conservation can reduce their operating costs and help defer capital expenditures associated with the expansion and maintenance of water supply systems.

WAVE CHARTER PARTNERS SAVINGS FROM WATER CONSERVATION

- **Water use reductions:**
  - **2.7 to 11 millions gallons/year**
  - **14 to 52 percent of total use**
- **Water and sewer services savings:**
  - **$32,000 to $60,000**

$MART WATER CONSERVATION PRACTICES

There are a variety of proven water conservation investments and practices that can reduce water demand and save money. They range from water conservation ordinances and pricing policies to leak detection and voluntary conservation. For example, "increasing block price" programs charge more for each gallon of water if consumption increases beyond a specified threshold, creating an economic incentive for conservation.

- Nationwide, lawn watering accounts for about 32 percent of residential outdoor water use. Landscaping codes can promote significant water savings by restricting the time and amount of lawn and landscape irrigation. They can also require xeriscape landscaping, low-flow irrigation technologies and reuse of gray water.
- Use of *increasing block prices or time-of-day pricing* can also significantly reduce water demand. In Tucson, Arizona, increasing water prices produced a 33 percent drop in demand from 1974 to 1980.
- A combination of increasing block rates, irrigation restrictions, and plumbing code changes, in Tampa, Florida, reduced the community's water demand by more than 15 percent within the first nine months of the program.
- Many cities have found that a retrofit of plumbing fixtures yields substantial savings: in San Pablo, California, replacing conventional 4.5 gallon-per-flush toilets with low-flow 1.6 gallon-per-flush models in a 30 year-old apartment building cut average water use by 34 percent per household. At a replacement cost of $250 per fixture, the average annual savings of $46 resulted in a five and a half-year payback.
- Leak detection programs, both for water mains and for residential plumbing fixtures, can reduce costly water losses. The City of New York estimates that leakage accounts for as much as 10 percent of its total water demand. By surveying its water mains with computerized electronic leak detection equipment and completing repairs, the city contained the leaks and saved 89 million gallons per day. A separate program of residential leak detection by city inspectors reduced leakage by an additional four million gallons daily.

The local initiatives profiled on the following pages illustrate many of these practices.

INNOVATIVE LOCAL INITIATIVES

● SANTA MONICA, CALIFORNIA

HIGHLIGHTS

- **Direct installation or rebates for ultra-low flow toilets in commercial and residential buildings.**
- **Restrictions on lawn and landscape watering, fountains and swimming pools.**
- **Implementation of increasing water rate structure.**
- **New development water supply costs paid in full by developers.**
- **Water use and wastewater flows reduced by14% and 21%, respectively, over five years.**
- **Five-year, $12.5 million reduction in city water supply and wastewater treatment costs.**

Santa Monica, California meets only about two-thirds of its water needs from local ground water supplies, purchasing the rest from the Metropolitan Water District of Southern California. The city also purchases wastewater treatment services from the City of Los Angeles at significant cost. In an effort to reduce both expenses, and avoid constructing its own wastewater treatment plant, Santa Monica initiated a comprehensive water conservation and management program in 1988, revising its plumbing code to require ultra low-flow (ULF) toilets in new buildings. The city also enacted a water conservation ordinance to regulate residential water use, including restrictions on lawn and landscape watering, fountains and swimming pools.

Santa Monica has also established economic incentives to encourage water conservation, including an inclining rate structure which charges higher unit costs as consumption grows, and a water-demand mitigation fee imposed on developers to cover the full water supply costs of new development. The city's Bay Saver Toilet Retrofit Program offers two options to encourage property owners to install ULF toilets: a $75 rebate for purchase and installation of a city-approved toilet, or a $35 payment to have the city provide and install one. The rebate and direct install options are financed with general water and wastewater revenues, credits given to the city by the Metropolitan Water District for conservation initiatives, and surcharges on water bills for property without upgraded fixtures. Having surpassed its original goal of retrofitting 25 percent of residential toilets in less than three years, the program was extended in 1992 to target an additional 25 percent of residential buildings and at least 25 percent of toilets in commercial buildings.

By late 1997 the Bay Saver Program had retrofitted 53 percent of toilets in residential buildings, but only 9.5 percent in commercial buildings. Commercial participation has been low since water costs constitute a smaller percentage of commercial budgets. Nonetheless, the program has reduced water demand and wastewater flows by 1.9 million gallons per day. Combined with other conservation measures, the city realized a 14 percent decrease in water use and a

21 percent drop in wastewater flows from 1990 to 1995, producing net savings of $12.5 million on water purchases and wastewater treatment services.[2]

● Philadelphia Water Department

Highlights

- **Water conservation program to reduce non-payment of water bills.**
- **Average household water savings of 25%.**
- **48% return on investment to city's water department.**

The Philadelphia Water Department (PWD) serves a population of 1.74 million people, supplying the area with 349 million gallons of water per day. In 1986 PWD instituted the Conservation Assistance Program (CAP) to help low-income and "payment-troubled" residential customers manage their water use. The CAP educates consumers about water use and provides direct installation of low-flow toilets, shower heads and faucet aerators, in addition to minor leak repairs. Such assistance lowers customers' water use to levels they can afford. Because PWD has an abundant supply of water, the program was intended to serve only as a means to reduce non-payment of bills. However, it has also resulted in average household water savings of 25 percent. Through reduced bill arrearage and reduced water supply operating costs, PWD expects net savings of $97 per household over ten years, or $1.48 for every dollar invested in the program.[3]

● Los Angeles

Highlights

- **Rebates for purchase and installation of low-flow toilets.**
- **Annual savings of $15 million in water supply and treatment costs.**
- **Two-thirds reduction in sewer hookup fees.**

Since 1988, the City of Los Angeles has required the use of low-flow water fixtures in all new construction. In 1990, to increase water conservation, the Los Angeles Department of Water and Power (DWP) began replacing toilets in existing buildings with low-flow models. Offering rebates of $75 to $100 for anyone purchasing a low-flow toilet, and distributing free toilets through local community organizations, the city replaced 620,000 toilets by 1996. The DWP has invested a total of $65 million in the rebate program, but now saves $15 million in water supply and treatment costs annually, for a payback period of less than five years. Residents also save on sewer charges, which are based on the amount of water piped into their homes. Reduced wastewater flows have enabled the city to cut costs for wastewater treatment, resulting in a two-thirds reduction in sewer hookup fees for new construction, the largest fee cut in the city's history.[4]

ATLANTA'S PUBLIC-PRIVATE PARTNERSHIP FOR WATER CONSERVATION

HIGHLIGHTS

- **Retrofit 20,000 households in Empowerment Zone with low flow fixtures.**
- **Funding provided by corporate and non-profit partners.**
- **Projected savings of $2.7 million on water bills.**

EPA Region 4 has recently been involved in a public-private partnership with the City of Atlanta, Georgia Power Corp. and the Turner Foundation to distribute low-flow toilets, shower heads, and faucet adapters to low-income residents of the Atlanta Empowerment Zone, with funding provided by corporate and non-profit partners. The initial phase of the project, started with distribution of low-flow fixtures to 960 households, is expected to reduce annual water consumption by 25 million gallons, yielding savings of $87,000 on residents' water bills. The long-term project goal is to retrofit all 20,000 households in the Empowerment Zone with low-flow fixtures, with projected savings of $2.7 million on water bills.[5]

GETTING STARTED

TIPS FOR MAKING $MART INVESTMENTS FOR WATER RESOURCES CONSERVATION

- Design a water conservation program to address the specific needs of the community. This may require analyses of water metering or billing records to identify the largest water consumers.
- Target reductions in commercial and residential use through changes in water rate structures, or modifications to plumbing codes.
- Address non-payment of bills through in-home water audits, leak repairs, and subsidized retrofits with water conserving fixtures for low-income residents.

SOURCES OF ADDITIONAL INFORMATION

EPA WAVE PROGRAM

EPA Office of Water
Contact: John Flowers,
WAVE Program Director
Phone: (202) 260-7288
EPA's WAVE Technical Support Hotline
Phone: (800) 993-WAVE

The WAVE Program promotes voluntary water conservation. EPA provides program partners with technical assistance tools for plumbing upgrades, including free "WAVE-saver" software for tracking water use.

WATER CONSERVATION

City of Santa Monica
Environmental Programs Division
200 Santa Monica Pier
Santa Monica, CA 90401
Contact: Dean Kubani
Phone: (310) 458-2227
Fax: (310) 393-1279

Santa Monica's Environmental Programs Division tracks progress on a number of the environmental initiatives the city is undertaking as part of its Sustainable City Program.

City of San Jose
Environmental Services Department
777 N. First St., Suite 450
San Jose, CA 95112
Phone: (408) 277-5533
Fax: (408) 277-3606

The city is reducing wastewater flows by installing ultra low-flow toilets in new construction and providing incentives to local businesses to install water conserving fixtures. San Jose also plans to develop a Nonpotable Reclamation and Reuse Facility to provide water for irrigation, fire fighting, fountains, street sweeping and vehicle washing.[6]

GENERAL RESOURCES

International City/County Management Association (ICMA)
777 North Capitol Street, NE, Suite 500
Washington, DC 20002-4201
Phone: (202) 289-4262
Fax: (202) 962-3500
Internet Site: http://www.icma.org

ICMA is a professional and educational association for more than 8,000 local government administrators worldwide. ICMA provides training programs, technical assistance, data services and publications to improve the quality of local government management and administration.

ENDNOTES—CHAPTER 3

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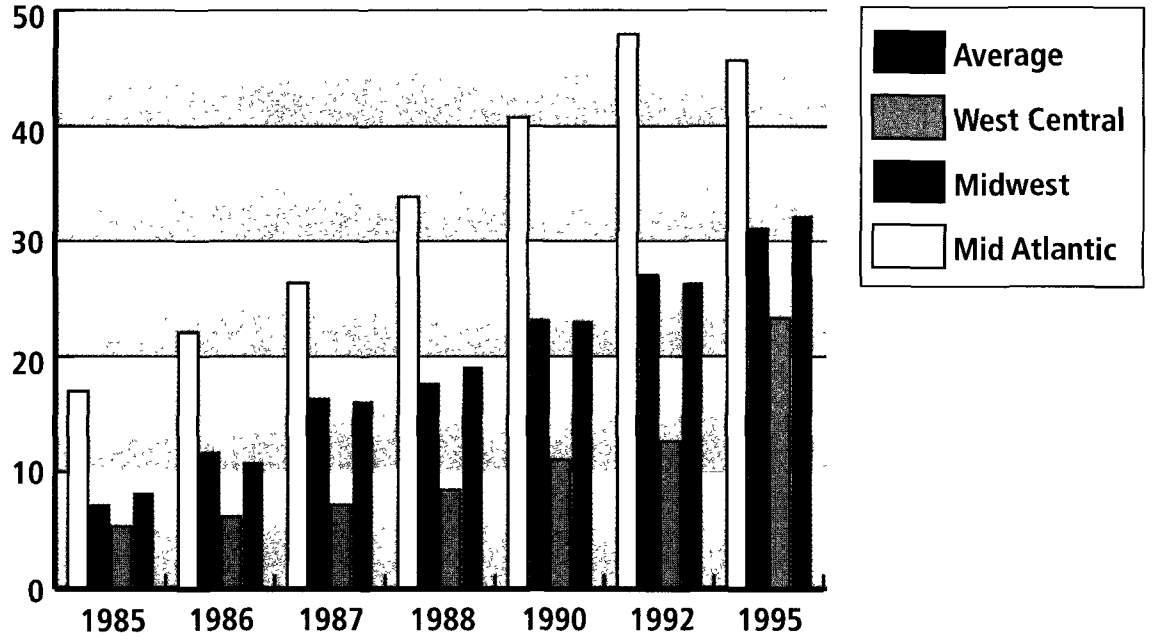
$MART WASTE REDUCTION AND RECYCLING INVESTMENTS

BENEFITTING FROM $MART WASTE REDUCTION AND RECYCLING INVESTMENTS

Local governments usually pay for collecting and disposing of municipal solid waste (MSW). Over the last three decades, the volume of MSW has grown from 88 million tons in 1960 to 208 million tons in 1995, and local governments' waste disposal costs have risen steadily as well. From 1980 to 1992, local government expenditures for solid waste management more than tripled, raising from $3.3 billion to $10.7 billion. The increase has been driven in part by the escalation in nationwide average landfill tipping fees, which went up nearly fourfold in a decade. In some cases, the rise in tipping fees has been even more sudden and dramatic: when Portland, Oregon's landfill closed in 1988 and the city was forced to contract with a private regional landfill 150 miles away, its tipping fees grew from $17.50 to $75 per ton.[1]

LANDFILL TIPPING FEES



SOURCE: NATIONAL SOLID WASTE MANAGEMENT ASSOCIATION. WASTE AGE, JANUARY 1996.

WASTE REDUCTION AND RECYCLING INVESTMENTS WITH POTENTIALLY HIGH RETURNS

SHORT-TERM	LONG-TERM
Use crushed concrete for road base	Use recycled paper
Recycle toner cartridges	Implement unit pricing for solid waste
Buy retread tires for fleet vehicles	
Buy recycled plastic "lumber"	
Salvage and reuse building materials	

$mart Waste Management Investments yield cost savings. Given these costs, cutting the amount of waste generated in the community and sent to landfills can yield immediate savings. By also implementing waste reduction practices in public facilities, local governments can reap additional savings. Recycling, one of the most widely used ways to divert materials from the waste stream, may provide further financial benefits through the sale of recyclable materials, as well as economic benefits through job creation. A study by the Massachusetts Department of Economic Development found that recycling industries have created 10,000 jobs and added $588 million to the state's economy.[2] Newark, New Jersey's recycling program saved residents and local businesses $15.4 million in disposal fees and generated almost $167,000 from the sale of recycled materials over six years.[3] Many cities and counties that buy recycled products to support local recycling markets have also realized savings through the lower prices of some recycled products. Finally, holding down waste disposal costs for local businesses can stimulate private investment in more productive economic activities.

$mart Waste Management Investments yield environmental benefits. Waste reduction and recycling yields environmental benefits to the community, as well. By prolonging the life of existing landfills, reductions in waste volumes can postpone or eliminate the need for new or expanded landfills. The environmental impact of existing landfills is alleviated, since less waste means less leachate that might contaminate ground water and less loose trash that can blow into surrounding neighborhoods. With fewer trucks needed to collect and transport waste, and with less trash burned in municipal incinerators, local air quality may also improve.

$MART INVESTMENTS IN MUNICIPAL SOLID WASTE REDUCTION

THE EPA WASTEWI$E PROGRAM

The goal of WasteWi$e, a program launched by EPA's Office of Solid Waste and Emergency Response (OSWER) in 1994, is to cut the generation of municipal solid waste through voluntary waste reduction and recycling agreements. Under the current program, which targets the commercial sector, companies volunteer

to develop their own waste reduction and recycling plans, and provide EPA with annual progress reports, along with updated goals for the coming year. Goals must include three components: (1) implementation of three significant waste reduction or prevention steps, (2) establishment or improvement of a recycling program, and (3) increased manufacture or purchase of recycled products. Annual progress reports must include data on the amount of waste reduction, the quantity of recyclable items diverted from the company's waste stream, and examples of recycled material purchases.

EPA provides information and technical assistance to participating companies through the WasteWi$e Update newsletter, a help line, various workshops and "how-to" publications, and a "peer exchange" through which participants can share ideas and learn from one another's experience. Participants also receive public recognition through EPA newsletters and press releases, and are permitted to use the WasteWi$e logo in their promotional and advertising materials.

Opportunities for Local Government Participation

During the first two years of the WasteWi$e program, more than 500 businesses and industries volunteered for the program, including many Fortune 1000 corporations. Late in 1997, EPA was finalizing a comprehensive plan to expand the program to local governments and community development groups. As drafted, the plan offers two parallel options for local governments:

- Under the first option, local governments can join the WasteWi$e program as Partners, by signing agreements with EPA to develop voluntary waste reduction and recycling goals and to report annually how they have progressed. Under this option, EPA may allow school districts to join the program as independent entities.

- Under the second option, local governments, along with community development and business assistance organizations, can join WasteWi$e as Allies, to assist EPA in providing information and outreach services to small and medium sized-businesses in their areas. Together with such local organizations as chambers of commerce, university extension services and small business development centers, EPA plans to support a series of interactive satellite broadcasts on solid waste reduction topics, to be publicized and aired locally around the country.

Program Benefits to Local Governments

WasteWi$e benefits local governments by fostering innovative public-private partnerships that in some instances yield direct economic gains. For example, Virco Manufacturing, a maker of school and office furniture, in partnership with the Conway School District in Arkansas, initiated a recycling program for corrugated cardboard. During its first five months in one school, Virco collected and sold 39,000 pounds of corrugated cardboard, returning $2,000 in rev-

enue to the district. The following year, after the program was expanded to other schools, the district received $3,800 from the collection and sale of 85,000 pounds of cardboard.[4] There may also be significant potential for school districts to cut their costs for waste disposal. By instituting a recycling and garbage reduction program in its cafeterias alone, the Richmond School District in Contra Costa County, California saved $30,000 in waste transportation and disposal fees.[5]

COST SAVINGS AND WASTE REDUCTION THROUGH UNIT PRICING

- **Dover, New Hampshire**
  - **64.5% decrease in residential waste volume.**
  - **MSW budget down from $1.2 million to $878,000.**
- **South Kingstown, Rhode Island**
  - **71.4% decrease in residential waste volume.**
  - **Average annual household disposal cost down 43% from $92 to $52.**
- **Falmouth, Maine**
  - **35% decrease in residential waste volume.**
  - **Waste collection savings of $30,000.**
  - **Disposal fees savings of $88,000.**

UNIT PRICING PROGRAMS

By the end of 1997, all but six states had some requirement for waste reduction or diversion from landfills. Unit pricing programs are one mechanism that can help local governments comply with those requirements. A 1994 survey of 80 cities with populations of 50,000 or more found that 35 percent paid for waste disposal services out of property tax revenues.[6] In these communities, or where waste disposal costs are paid out of general revenues, residents may be unaware of the true cost of their waste disposal, and may have no incentive to reduce the quantities they generate. Unit pricing programs, also known as variable rate pricing or "pay-as-you-throw" programs, provide a direct economic incentive for waste reduction and recycling by charging households a disposal fee for each bag or container of waste they generate. Revenues from disposal fees offset the costs of disposal and recycling programs.

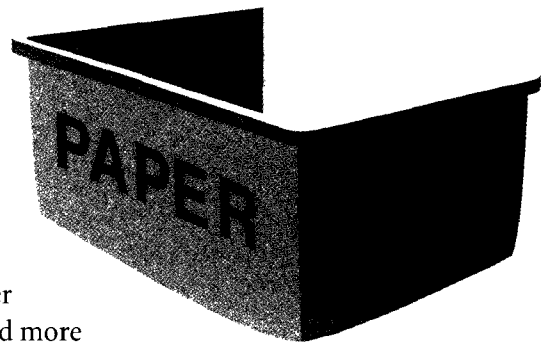
By 1996, more than 2,000 communities nationwide were operating unit pricing programs for solid waste, with the resulting MSW volume reductions averaging around 30 percent and ranging as high as 50 percent or more in some communities. Recent studies indicate that unit pricing can also produce increases of 30 to 70 percent in local recycling and composting rates. San Jose, California, the nation's eleventh largest city, began a unit pricing and recycling program in 1993. From 1993 to 1994, the volume of landfilled residential waste decreased more than 20 percent, from 250,000 tons to 198,000 tons, while the volume of residential recyclable materials collected more than doubled, rising from less than 31,000 to nearly 76,000 tons. The amount of residential yard waste diverted from the city's waste stream increased by nearly 50 percent, from 66,500 tons in 1993 to 96,800 in 1994.[7]

In general, the greatest waste reduction and recycling increase can be expected in communities that combine unit pricing with curbside recycling pickup and composting programs. One study has concluded that curbside recycling programs alone reduce waste volumes more than unit pricing programs alone. However, because recycling may initially increase capital and operating costs for solid waste disposal, it is often advisable to institute unit pricing programs concurrently in order to generate the needed revenue.

In designing unit pricing programs, local governments should consider several factors, including the size or type of container, the method of payment and the fee structure. Some programs charge a small base fee to cover the fixed costs of waste collection and transportation, combined with a per-container fee for disposal. Other programs charge a flat rate for each container of a given size or

weight. Either way, careful estimation of waste volumes and program costs can ensure that fees are sufficient to cover program costs. Many communities have not only managed to cover their waste disposal costs with unit pricing, but have also achieved significant cost savings over "conventional" solid waste management programs, as demonstrated by the following examples.[8]

- **Dover, New Hampshire.** In 1990, prior to implementation of its unit pricing and curbside recycling program, the City of Dover disposed of 11,000 tons of residential trash each year at a cost of $1.2 million. By 1996, after five years of unit pricing, residential solid waste amounts had dropped to 3,900 tons — a 64.5 percent decrease — and the city's waste disposal budget was down to $878,000 for its 1997 trash disposal and recycling programs combined.
- **South Kingstown, Rhode Island.** South Kingstown's unit pricing program, instituted in 1994 in combination with the opening of a free recycling center, reduced the city's residential waste volume by 71.4 percent, from 7,608 tons in 1992 to 2,175 tons in 1995. Within the first year of the program, the average annual waste disposal cost per household for a family of four dropped from $92 to $52.
- **Falmouth, Maine.** Residential waste volumes in Falmouth decreased 35 percent and recycling rates increased from 12 to 21 percent of the waste stream following imposition of a unit pricing program in 1992. The 900 ton drop in waste generation reduced the cost of the town's collection contract with a private waste hauler from $146,000 to $116,000, and, at the current tipping fee of $98 per ton, is saving the town an additional $88,000 per year in disposal fees.
- **Mendham Township, New Jersey.** Mendham Township followed up the initial waste reduction success of its recycling program with a switch to variable rates for solid waste disposal. The combination of these two programs allowed the town to cut back from two garbage collections each week to one and saved residents an average of $200 annually. The town saved money, increased recycling volumes by 83 percent, and reduced garbage production by 55 percent, all with no increase in illegal dumping.



Because of the high degree of public involvement and residents' cooperation needed to make them successful, most unit pricing programs also include extensive outreach and public education efforts. San Jose, for example, spent more than $1.5 million on its education and outreach program, which included radio, television, and newspaper public service announcements, mailings to all residential households, and more than 250 community meetings. The city has been responsive to residents' concerns, and random telephone surveys have indicated 80 to 90 percent approval of its unit pricing program. Equally high resident satisfaction has been reported in Seattle, where unit pricing increased recycling by 60 percent from 1980 to 1985. Eighty percent of the Seattle population favors the system.

$MART INVESTMENTS IN CONSTRUCTION AND DECONSTRUCTION WASTE MINIMIZATION

EPA estimates that construction and demolition (C&D) waste accounts for approximately 24 percent of all solid waste disposed in landfills nationwide. To encourage greater recycling and reuse, the agency's procurement guidelines, developed under the Resource Conservation and Recovery Act (RCRA), include recycled-content recommendations for a variety of construction products (see p. 4-13). Although C&D waste is usually sent to dedicated C&D landfills rather than MSW landfills, local governments can still realize significant cost savings from C&D waste minimization in public construction. Recycled C&D materials are often less expensive than virgin materials, and the recycling of demolition debris and unused construction materials can yield significant savings on transportation and disposal costs. Most successful C&D waste minimization strategies draw upon the solid waste management principles of *reduction, reuse,* and *recycling* to divert material from disposal in landfills. While these principles can be applied to private projects, the focus here is on their application to the public sector.

REDUCING C&D WASTE

For construction projects, waste reduction results from plans designed to minimize the amount of construction materials needed and from adopting on-site practices that generate less debris. The following measures can help achieve these objectives.

- **Use the pre-existing shell of a former building.** Metro, the three-county regional government of the Portland, Oregon metropolitan area, acquired the site of a former Sears department store for its new headquarters, it designed new offices within the shell of the pre-existing building. Using this approach, Metro saved approximately 80 percent of the building's structure from demolition and disposal, and saved $4 million in costs of new materials and construction.[9]
- **Design new buildings to use materials efficiently.** Incorporating standard sizes in building design, or "optimum value engineering," can reduce waste of excess materials as well as material and labor costs. For example, using increments in the floor and wall layout that match the standard dimensions of building materials can minimize the need to cut materials to special sizes. In addition, using computer design software that integrates information on project layout and materials, builders can easily assess the effects of different design options on material requirements.
- **Prevent material loss and damage.** Storing materials in a secure, protected place on the job site prevents losses and damage from weather, accidents and vandalism.
- **Save on materials packaging.** Purchase materials whose packaging is minimal, reusable or recyclable. It will reduce the quantity of waste disposed in landfills.

REUSING C&D MATERIALS THROUGH DECONSTRUCTION

Many materials that enter the C&D waste stream can be reused, often on the same project site. These include wood flooring and framing, plumbing and lighting fixtures, doors, windows, insulation, molding, siding, wall boxes, cabinets and various scrap materials. These items can often be salvaged through deconstruction. As opposed to conventional demolition, deconstruction involves carefully dismantling a structure and removing materials for reuse. Because deconstruction is more time and labor intensive than demolition, it may complicate planning and scheduling and raise initial costs of a project. However, deconstruction not only reduces the costs of waste disposal and purchase of new materials, but can also yield substantial revenue from the resale of salvaged materials, often more than offsetting the additional labor costs.

- When two California groups, Beyond Waste and San Francisco Community Recyclers, teamed up to deconstruct a building at San Francisco's Presidio in 1996, they salvaged 66,000 board feet of lumber. At a total cost of $53,000 for the one-month project, the $43,660 in lumber resale income yielded a net deconstruction cost of only $9,340 — nearly 45 percent less than the demolition bid of $16,800.
- In 1997, assisted by the Youth Employment Partnership, Beyond Waste deconstructed a warehouse owned by the Port of Oakland, at a total cost of $330,000. With $280,000 in income from the resale of 450,000 board feet of salvaged lumber, the net deconstruction cost of $50,000 was only one-third the demolition bid of $150,000.

The optimal mix of deconstruction and demolition for a specific project and the potential economic benefits of material reuse depend on several factors, such as the value of recoverable items, the prevailing cost of disposal and the availability of local salvage markets. In some cases, contractors simply salvage select items before conventional demolition. In others, they dismantle entire structures to be sold and rebuilt elsewhere.

RECYCLING C&D DEBRIS

As is the case with recycling of municipal solid waste, recycling of C&D materials diverts them from the waste stream for reprocessing into new products. Recyclable materials salvaged during C&D projects include lumber, cardboard, stumps and brush, metal, drywall, glass, concrete, asphalt and composition roofing. Potential cost savings from C&D debris recycling depend on several local factors. Usually, planners need to compare recycling fees against landfill tipping fees, and consider requirements for source separation and the distance materials must be transported to reach recycling outlets.

PROMOTING C&D WASTE MINIMIZATION: LOCAL GOVERNMENT POLICIES AND OUTREACH TOOLS

Because C&D waste minimization depends largely on the economic advantages of recycling over conventional disposal, local governments may be able to promote salvage and recycling markets by enhancing these advantages. They can make conventional disposal more expensive, for example, by raising tipping fees at municipally-operated C&D waste landfills. By including waste minimization requirements in their bid specifications for public projects, local governments can also use their purchasing power to help develop local markets for recycled materials. Use of source separation dumpsters free of charge can be another incentive. However, even where economics favor C&D waste minimization, builders and contractors may be slow to change long-established waste management practices. Enacting ordinances requiring C&D waste minimization may overcome their reluctance, but will not always ensure that the most efficient and cost-effective practices are adopted. Local governments, therefore, have an important role to play in promoting C&D waste minimization. They can help by combining technical assistance with education and outreach in order to increase contractors' recycling expertise and awareness while overcoming their resistance to new or unfamiliar practices.

TOOLS TO PROMOTE C&D WASTE REDUCTION

- C&D waste reduction ordinances
- Economic incentives
- Contractor bid specifications
- Technical assistance
- Guides to area recyclers
- Training and outreach
- Motivational tools

A variety of outreach tools have been successfully used to encourage builders and contractors to minimize and recycle their C&D wastes. Guides to local reuse and recycling businesses help contractors identify outlets for materials. Technical assistance such as information hotlines and recycling manuals and videos, together with salvage and reuse education workshops for project managers and construction workers, can improve contractors' expertise and speed adoption of C&D waste minimization practices. Motivational tools such as work site billboards that tally quantities of diverted waste remind crews of the importance of waste reduction and recycling. Billboards can also engage the public if properly placed.

CASE STUDIES: TURNING C&D WASTE MINIMIZATION POLICIES INTO PRACTICE

The five case studies presented below exemplify successful local government efforts to cut C&D waste in the public sector and promote it in the private sector.

KING COUNTY, WASHINGTON

HIGHLIGHTS

- **Contracts for public construction specify recycling/reuse of demolition debris.**
- **Free technical assistance to contractors developing waste management plans.**
- **95% of debris from demolition at the new Regional Justice Center site salvaged or recycled, saving the County $265,000 in waste disposal cost.**

King County, which includes the City of Seattle, uses a variety of policy and outreach tools to foster C&D waste minimization. Rather than mandate specific practices by ordinance, the county has chosen to encourage waste minimization through its contracts and bid specifications for selected public projects, such as the recent construction of its new justice center. The county's Solid Waste Division further encourages waste minimization in both public and private projects by providing free technical assistance to contractors and project managers in developing on-site waste control plans. The division also offers outreach and education through case studies of successful work site programs and a guide to the area's recyclers, as well as C&D waste recycling and contract specification booklets developed by the state's Clean Washington Center.

These tools brought the county impressive cost savings on the recent construction of its new regional justice center. The demolition of 28 buildings to clear the site produced 37,523 tons of material. Ninety-five percent of it was salvaged or recycled, saving $265,000 in waste disposal costs. Crushing 33,358 tons of concrete and asphalt debris and reusing it on site as fill material saved approximately $159,000. Salvaging 750 tons of reusable timber and lumber saved about $57,000, and recycling 918 tons of unsalvageable wood saved an additional $49,000.[10]

● METRO, PORTLAND, OREGON

HIGHLIGHTS

- **C&D waste makes up 26% of region's solid waste stream.**
- **Executive Order 47 requires waste minimization on public construction projects.**
- **Technical assistance and a guide to local C&D salvaging and recycling businesses.**
- **$4 million savings on reuse of existing building shell for new headquarters.**

Metro is the regional government of the Portland, Oregon metropolitan area, with a population of 1.2 million. Metro estimates that C&D waste makes up approximately 26 percent of its municipal solid waste stream, even though local economic conditions appear to favor C&D waste minimization. Regional landfill tipping fees are about $75 per ton, while recycling fees for most C&D wastes are $35 per ton or less. Nonetheless, only 49 percent of all C&D materials were diverted from the waste stream in 1995. According to Metro, diversion rates of more than 80 percent are possible.[11,12]

In an effort to increase diversion rates, Metro issued Executive Order 47, mandating C&D waste reduction, salvaging and recycling at all of its facilities and on all its property. The order requires contractors bidding on public projects to include plans to salvage or recycle waste whenever it is cost-effective. Metro assists contractors in developing such plans by providing them with education and outreach material, including a list of publications on C&D waste recycling and a guide to area salvaging and recycling firms.

Metro's waste minimization policy for public projects resulted in significant cost savings in the design and construction of its new headquarters in a former Sears department store. Willingness to reuse the existing building shell effectively "diverted" about 80 percent of the structure from demolition and disposal, and saved $4 million in avoided costs of new materials and construction. Through additional salvaging and recycling on the project, Metro diverted 8,024 tons of materials (77 percent of the waste generated during remodeling) and saved an estimated $35,000 (70 percent of the project's original waste hauling and disposal budget). Contractors salvaged 159 tons of wood, carpet, doors, bathroom fixtures and shrubs, and recycled 725 tons of metal, wood, sheet rock and corrugated cardboard. Seven thousand tons of brick, concrete, sand and dirt were reused as fill material both on and off the site, and as capping material for a closed landfill.[13,14,15]

AUSTIN, TEXAS

HIGHLIGHTS

- **Sustainable Building Guidelines establish "green" standards for municipal construction.**
- **City assisted demolition contractors by compiling a database of prospective salvage buyers.**
- **Housing units relocated for reuse as low-income housing, eliminating need for new construction.**

Landfill tipping fees in the Austin area are low, less than $20 per ton, and outlets for recycling C&D waste are limited. Nevertheless, the city is among the leaders in promoting C&D waste minimization. Through its Green Builder Program, an environmental rating system for private sector construction, the city sets criteria for C&D waste reduction. In 1994 the Austin City Council created the Sustainable Building Guidelines for construction and operation of municipal buildings. The guidelines require C&D waste reduction, reuse and recycling in all municipal projects.

Before adopting the Sustainable Building Guidelines, Austin tested various C&D waste reduction measures during demolition of a former Air Force base. Demolition involved removing airplane hangars, residential buildings and other structures. The project bid requests encouraged waste minimization and gave examples of possible practices, but stipulated that the city would not pay extra for reuse or recycling. To help hold the costs down, the city compiled a database of prospective buyers of salvaged materials and provided contractors with space at the job site to sell salvaged items. Several waste minimization measures were implemented successfully, including the following.

- Contractors stockpiled asphalt for recycling and reuse in new road construction and crushed concrete for use as fill material on the site.
- The city moved some residential buildings to new sites to be refurbished and used as low income housing. The moving and renovation costs were

comparable to the estimated cost of building new homes, thus conserving resources without extra expense.

- One contractor salvaged and resold cabinets, dishwashers, hot water heaters, vanities, doors and windows from demolished houses, and separated concrete, wood and metal debris from demolition waste for recycling. The contractor charged the government less for the demolition job because he incurred less cost.
- Contractors deconstructed airplane hangars piece by piece and sold them for reconstruction at other facilities.

● Los Angeles, California

Highlights

- **C&D waste comprises 15% of city's solid waste stream.**
- **State law requires 50% reduction in waste sent to landfills by the year 2000.**
- **$14 million in savings from recycling materials for road base and asphalt.**
- **1.6 million tons of debris diverted from disposal following the 1994 Northridge earthquake.**
- **Technical assistance and guide on C&D waste recycling and reuse.**

Los Angeles has developed ambitious waste minimization practices to comply with a state law that requires towns and cities to reduce the amount of waste sent to landfills by 50 percent by the year 2000. The city's Bureau of Street Maintenance, for example, recycles old paving materials into crushed road base and new asphalt. This program has saved the city $14 million in its first nine years. Following the 1994 Northridge earthquake, the Earthquake Demolition Recycling Program diverted approximately 1.6 million tons of debris from landfills.

C&D waste accounts for 15 percent of the city's solid waste stream. The Integrated Solid Waste Management Office is responsible for developing and implementing C&D waste reduction, reuse and recycling programs and policies, and providing technical assistance to the public and private sectors. The office offers a broad range of outreach and information resources, including audio tapes of a sustainable building workshop and a series of guides on C&D waste minimization. The guides provide information about recycling and reuse options for specific types of C&D waste in the Los Angeles area.

RUTLAND COUNTY, VERMONT

HIGHLIGHTS

- **Private landfill charges $90 per ton for C&D waste.**
- **County started a C&D recycling service to provide a less expensive alternative.**
- **District's recycling/reuse fees cover all facility costs**
- **Contractors save $22-$85 per ton on waste disposal costs.**
- **Illegal dumping has decreased by 1,000 tons annually.**

Rutland County, encompassing 16 towns with a combined population of 50,000, has taken a unique approach to C&D waste minimization by opening its own recycling facility. The Rutland County Solid Waste District hauls waste to a local private landfill where tipping fees for C&D waste are $90 per ton. As a result, the county has suffered from a considerable amount of illegal dumping by local contractors. In an effort to decrease illegal dumping by providing a less expensive alternative to the private landfill, the district has started its own grinding and recycling service for construction and demolition waste.

Providing the service at cost, either on-site or at its facility, the district charges $20 per ton to grind clean wood for use as boiler fuel, compost and mulch; $10 per cubic yard for concrete and asphalt that it crushes and sells to private contractors for road construction; and $5 per cubic yard for metal that it resells for $30 per cubic yard. Much of the remaining demolition debris is ground for $68 per ton and sent to the private landfill for use as daily cover. Thus, contractors save a minimum of $22 per ton by recycling mixed waste and they can save more by separating clean wood, concrete and asphalt. The district processes about 5,000 tons of material per year, half of all C&D waste generated in its service area, and estimates that illegal dumping has decreased by as much as 1,000 tons annually.

By designing a small-scale facility suitable for the limited quantity of waste it expected to process, the district was able to keep equipment costs low, purchasing a tub grinder, excavator, loader, detached trailer and mister (to limit dust) at a cost of $206,000. The facility also uses a truck that the district already owned and requires labor equivalent to 1.5 full time positions. As a result, the fees charged for recycling are not only lower than prevailing disposal costs, but also cover the district's costs to provide the service. Consequently, local governments that require their contractors to recycle C&D waste from public projects at the district's facility can save on disposal costs and the county incurs no additional costs for district operations.

$MART INVESTMENTS IN PURCHASING RECYCLED PRODUCTS

Although local recycling programs are a common means to promote resource conservation and reduce the environmental impact of waste disposal, they often suffer from a lack of buyers for recycled materials. In an effort to improve the

viability of local recycling markets, hundreds of local governments have taken steps to specify recycled products in their purchasing contracts. With their considerable buying power, local governments are in a position to negotiate favorable pricing terms, and have found that many recycled products became less expensive as a result.

Recycling markets and local "buy recycled" efforts have also been stimulated by federal and state procurement regulations. The Resource Conservation and Recovery Act (RCRA) requires government agencies to develop "affirmative procurement" programs for the purchase of various recycled-content products designated by EPA. This requirement applies to any federal, state, or local government agency or contractor that receives federal funds and spends more than $10,000 per year on one of the 24 designated recycled-content products.[16] EPA's Recovered Materials Advisory Notice lists representative recycled-material content ranges for each designated product, to assist purchasing agencies in developing contract specifications.

DESIGNATED RECYCLED-CONTENT PRODUCTS UNDER EPA'S COMPREHENSIVE PROCUREMENT GUIDELINE

- Paper and Paper Products
  - Non-paper Office Products
  - Office Recycling Containers
  - Office Waste Receptacles
  - Plastic Desktop Accessories
  - Toner Cartridges
  - Binders
  - Plastic Trash Bags
- Transportation Products
  - Traffic Cones
  - Traffic Barricades
- Vehicular Products
  - Engine Coolants
  - Re-refined Lubricating Oils
  - Retread Tires
- Park and Recreation Products
  - Playground Surfaces
  - Running Tracks
- Landscaping Products
  - Hydraulic Mulch
  - Yard Trimmings Compost
- Construction Products
  - Structural Fiberboard
  - Laminated Paperboard
  - Carpet
  - Floor Tiles
  - Patio Blocks
  - Building Insulation Products
  - Cement and Concrete Containing Coal Fly Ash
  - Ground Granulated Blast Furnace Slag

SOURCE: U.S. ENVIRONMENTAL PROTECTION AGENCY, OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE. ENVIRONMENTAL FACT SHEET: EPA ISSUES COMPREHENSIVE PROCUREMENT GUIDANCE. EPA530-F-95-010, APRIL 1995.

At least 45 states, the District of Columbia, and more than 500 local governments also have laws, ordinances or administrative policies mandating the purchase of recycled-content products by government agencies or their contractors.[17] The State of Washington, for example, requires local governments annually buying more than $500,000 in supplies to purchase recycled products, periodically report on their progress, and appoint procurement officers as liaisons with the state.[18] The City of Seattle has had a Buy Recycled Ordinance since 1992, requiring all city agencies and their vendors, contractors and consultants to purchase recycled products. The ordinance sets recycled-content standards for paper products, building insulation, lubricating oils, cement made with fly ash, latex paint, glass and plastic. It also lists specifications for retread tires and compost.[19]

RECYCLED OFFICE SUPPLIES

Recycled paper products are perhaps the most widely used and commonly available recycled office products. Most state and local government procurement policies include provisions for buying recycled paper, often specifying required percentages of recycled and/or post-consumer content. Office products made from recycled plastic, such as binders, desk accessories, wastebaskets and trash bags, are also increasingly available .

Some local governments have been reluctant to use recycled paper and other products due to a misperception that recycled materials are more expensive and lack quality. Many local governments that have switched to recycled products, however, have found that their fears about product quality were unfounded and have realized cost savings.

- By purchasing remanufactured toner cartridges for office copiers and printers, King County, Washington saved $200,000 in 1996 alone.[20]
- Under its Recycled Product Procurement Policy, 93 percent of King County's paper purchases in 1995-96, totaling nearly $953,000, were recycled-content products, up from only eight percent prior to adoption of the policy in 1990.[21] The County's policy specifies a 15 percent price preference for recycled paper, although it is normally available for less than a 10 percent price differential.[22]
- The City of San Jose, California saves $10,000 annually by returning toner cartridges to the supplier to be refilled and reused.
- The City of Cambridge, Massachusetts saves 75 percent by purchasing remanufactured toner cartridges through a state contract.[23]

SAVINGS FROM REMANUFACTURED TONER CARTRIDGES PURCHASES

- **King County, Washington**
  - **1996 savings = $200,000**
- **San Jose, California**
  - **Annual savings = $10,000**
- **Cambridge, Massachusetts**
  - **Savings = 75% of cost of new cartridges**

RECYCLED ROAD SURFACING AND INFRASTRUCTURE MAINTENANCE SUPPLIES

Local government public works departments spent more than $26 billion on highways in 1992. Although cost breakdowns are not available, it is likely that a large portion of that expense was devoted to roadway resurfacing. Some local governments reduce costs for road maintenance and repair by using demolition wastes such as crushed concrete and recycled asphalt for road surfacing. Some public works departments have also found that the use of recycled glass or plastic for construction and infrastructure maintenance applications can further cut their costs, as seen in the examples below.

- King County, Washington saved $75,000 in 1995-96 by using crushed concrete instead of virgin gravel for temporary road surfacing at the Cedar Hills landfill.[24]
- The Houghton Landfill in Kirkland, Washington saved over $6,500 in the summer of 1994 by using crushed concrete instead of virgin gravel as road surfacing material. At the same time, the Houghton Landfill also saved nearly $3,600 by substituting recycled glass aggregate for pea gravel as bedding for drainage pipes.[25]

SAVING ON RECYCLED MATERIALS IN PAVING AND ROAD SURFACING

- **King County, Washington**
  - **1995-96 Cedar Hill Landfill: $75,000**
- **Kirkland, Washington**
  - **1994 Houghton Landfill: $6,500**
- **Los Angeles, California**
  - **9 years of road & parking area improvements: $14 million**

- The City of Los Angeles saved $14 million over nine years by crushing old asphalt for use as road base, and by using 15 percent recycled-content asphalt for all street and parking area improvements.[26]
- By switching from conventional wooden boards to "lumber" made of recycled plastic for anchoring astroturf at the Kingdome stadium, King County saved 160 hours in maintenance labor and $1,600 on the cost of replacement wood, for total savings of more than $5,100 per year. The County also purchases recycled plastic lumber for stadium fence slats, signs and bleachers, and the Parks Department uses plastic lumber for park benches.[27]
- King County's Fleet Administration Division buys truck siding boards made of recycled plastic to replace wooden ones. The plastic boards are stronger and last longer, cutting replacement costs.[28]
- King County's Construction and Facilities Maintenance Department is testing Eco-glass paint that contains 30 percent ground recycled glass, as a sealer for cement block walls and swimming pools. The cost is comparable to latex paint, but the glass paint may offer superior water seepage prevention.[29]

Still other cost savings may be available to local governments through purchases of alternative road and public building maintenance supplies, as illustrated by the following examples.

- At water line repairs, the Santa Monica Street Maintenance Division uses cold mix asphalt as temporary backfill, but excavates and replaces it with permanent hot mix asphalt once repairs are complete. The Division is testing an alternative fill material which can be left in place permanently and capped with hot mix asphalt, for potential annual savings of $46,000 on excavation and disposal costs.[30]
- By switching from disposable air filters to reusable ones in ventilation systems at county garages, Itasca County, Minnesota is saving $4,700 and reducing waste generation by 53 cubic yards annually. This is a 97 percent savings over the costs of single-use filters. Installing partially reusable filters in the county courthouse saves an additional $780, or 46 percent of filter costs, and reduces waste generation by nearly 26 cubic yards each year.[31]

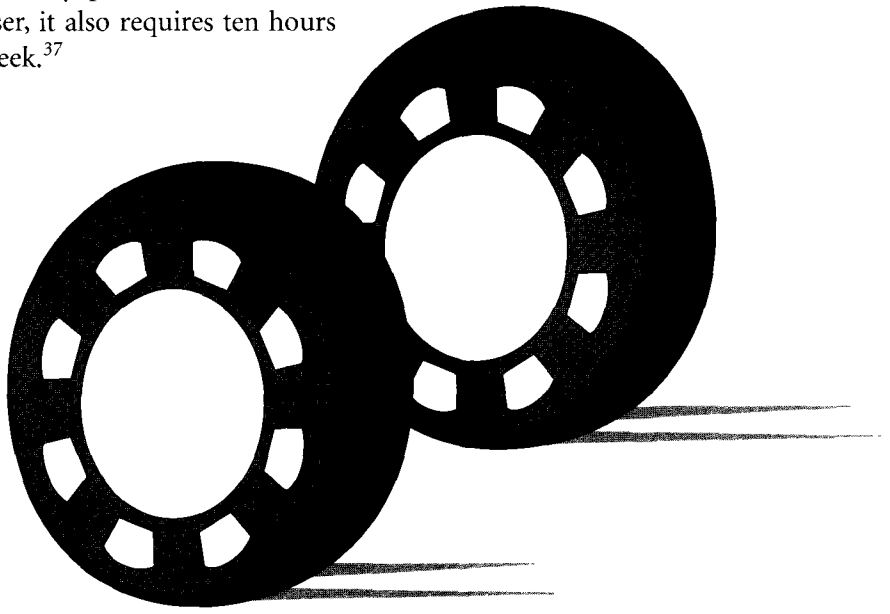
RECYCLED VEHICLE PARTS AND LESS TOXIC MAINTENANCE SUPPLIES

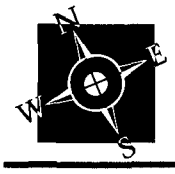
The large fleets of trucks and equipment, buses and passenger vehicles owned and operated by local governments provide opportunities for cost savings through the use of a variety of recycled maintenance supplies, including retread tires, re-refined engine oil, and recycled or remanufactured antifreeze and coolant. Retread tires perform as well as new tires and they cost much less. Prices of re-refined oil or remanufactured antifreeze do not yield great savings, but there can be a significant drop in transportation and disposal costs for used oil and antifreeze. Under so-called "closed loop" contracts, suppliers collect the used products for re-refining and re-processing. As the following examples illustrate, local governments have had favorable, and in some cases long-standing, experience with such products.

VEHICLE MAINTENANCE COST SAVINGS THROUGH THE USE OF:

- **Retread tires**
- **Re-refined oil**
- **Reconditioned air filters**
- **Propylene glycol antifreeze**
- **Re-manufactured antifreeze**
- **High pressure spray washer**

- The Town of Natick, Massachusetts purchases retread tires rather than new ones for its public works vehicle fleet, saving 43 to 57 percent or $80 to $140 per tire.[32]
- King County, Washington, spent $100,000 on retread tires in 1995-96, saving 62 to 69 percent ($218 for heavy equipment tires, $191 for light duty tires) over new tire costs. The county's public works fleet alone saved over $30,000 on such purchases in 1995 and almost $39,000 in 1996.[33]
- Phoenix, Arizona's Sanitation Truck Tire Recap Program diverted 409 tires from the city's waste stream and resulted in total savings of over $94,000 in disposal costs and tire purchases in 1995 alone.[34]
- The City of Santa Monica's Fleet Management Division has used retread tires for more than twenty years. For the past several years, the Division has also been using re-refined oil and propylene glycol antifreeze. Although propylene glycol is not a recycled product, it is less toxic than the standard ethylene glycol antifreeze. It also saves on supply costs and maintenance time because it does not require the addition of a pH enhancer.[35]
- By reconditioning air filters for multiple use in road graders and large trucks, Itasca County, Minnesota reduced the number of filters it purchases each year from 350 to 88. The county was able to cut filter replacement costs by $7,300 annually, or 52 percent.[36]
- By switching from a chemical degreaser to a high pressure spray washer using soap and water to clean engines and equipment, the Itasca County maintenance garage saves more than $9,000 each year, or 99 percent of the cost of purchasing the chemical solvents. The soap and water system not only performs as well as the chemical degreaser, it also requires ten hours less labor each week.[37]





GETTING STARTED

TIPS FOR MAKING $MART WASTE REDUCTION AND RECYCLING INVESTMENTS

Local governments can benefit fully from potential cost savings in their waste control and recycling programs through the development of a coordinated waste reduction and recycling plan that incorporates elements of the $mart Investments highlighted in this chapter. Important considerations in developing such a coordinated plan include:

- Unit pricing systems for waste reduction work best when combined with curbside recycling and yard waste composting programs. However, it is important to set fees for waste disposal high enough to cover any added costs of recycling and composting.
- To be most effective, C&D waste minimization programs should combine requirements for salvaging and recycling on public projects with education and outreach to contractors. Where possible, outreach materials should include guides to local outlets for salvaged and recycled materials.
- When initiating procedures for buying recycled products, pilot tests of such products may be necessary to overcome skepticism about their performance and resistance to change.

SOURCES OF ADDITIONAL INFORMATION

EPA WAVE PROGRAM

Smart Growth Network
Urban and Economic Development Division
Office of Policy, Planning and Evaluation
U.S. Environmental Protection Agency (2127)
401 M Street, SW
Washington, DC 20460
Phone: (202) 260-2750
Fax: (202) 260-0174
Internet Site: http://smartgrowth.org

EPA coordinates the Smart Growth Network, comprised of private sector, public sector and NGO partners. The network seeks to create and promote development practices that are economically, environmentally and socially beneficial. The network's Internet site includes information on deconstruction and construction waste management.

Triangle J Council of Governments
P.O. Box 12276
Research Triangle Park, NC 27709
Contact: Judy Kincaid, Solid Waste Planning Director
Phone: (919) 558-9343
Fax: (919) 549-9390
E-mail: jkincaid@nando.net

The Triangle J Council of Governments (TJCOG) is the regional planning council for the Wake, Durham, Orange, Chatham, Lee, and Johnston County region in North Carolina. TJCOG is working to promote C&D waste minimization in the triangle area. It has investigated state and local rules and regulations that created barriers to waste minimization and identified changes in public policy necessary to remove those barriers. TJCOG produces and distributes several resources, including a video for construction workers on C&D waste minimization, and the following guides:

- Guide to Construction and Demolition Waste Recycling and Disposal in the Triangle
- Construction and Demolition Debris Reduction and Recycling: A Regional Approach
- WasteSpec: Model Specifications for Construction Waste Reduction, Reuse, and Recycling

King County Solid Waste Division
Department of Natural Resources
400 Yesler Way, Room 600
Seattle, WA 98104-2637
Contact: Theresa Koppang
Phone: (206) 296-8480
Fax: (206) 296-0197

Metro Regional Environmental Management Department
600 Northeast Grand Avenue
Portland, OR 97232-2736
Contact: Bryce Jacobson, Associate Planner
Phone: (503) 797-1663
Fax: (503) 797-1795

C&D WASTE MINIMIZATION *continued*

City of Austin Planning, Environmental and Conservation Services Department 206 East 9th Street Austin, TX 78701 Contact: Laurence Doxsey Phone: (512) 499-3504 Fax: (512) 499-2859	City of Los Angeles Integrated Solid Waste Management Office Bureau of Sanitation 200 N. Main Street, Room 1450, City Hall East MS #944 Los Angeles, CA 90012 Contact: Kelly McArthur Ingalls Direct Phone: (213) 237-0143 General Phone: (213) 237-1444 Fax: (213) 847-3054 E-mail: ISWMO@loop.com
Rutland County Solid Waste District 2 Green Hills Lane Rutland, VT 05701 Contact: Michael Samson, District Manager Phone: (802) 775-7209	

MUNICIPAL SOLID WASTE REDUCTION

U.S. Environmental Protection Agency Office of Solid Waste WasteWi$e Helpline Phone: (800) EPA-WISE Contact: Joanne M. Oxley, Marketing & Communications Manager, WasteWi$e Program Phone: (703) 308-0199	
U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response (OSWER) Pay-As-You-Throw Helpline Phone: (888) EPA-PAYT [toll-free] Contact: Janice Canterbury e-mail: canterbury.janice@epamail.epa.gov	Through its toll-free Pay-As-You-Throw Helpline, OSWER offers a tool kit for solid waste planners who are considering unit pricing programs. Many of the materials in the tool kit are also available through OSWER's Pay-As-You-Throw world-wide web site (URL: http://www.epa.gov/epaoswer/ non-hw/payt/index.htm), including fact sheets, reports, and recent case studies of communities using unit pricing systems.
International City/County Management Association (ICMA) 777 North Capitol Street, NE, Suite 500 Washington, DC 20002-4201 Phone: (202) 289-4262 Fax: (202) 962-3500 Internet Site: http://www.icma.org	ICMA is a professional and educational association for more than 8,000 local government administrators worldwide. ICMA provides training programs, technical assistance, data services and publications to improve the quality of local government management and administration.

BUYING RECYCLED	
U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response (OSWER) RCRA Hotline: (800) 424-9346 [TDD (800) 553-7672 for the hearing impaired] Internet site: URL: http://www.epa.gov/epaoswer/non-hw/procure.htm	The hotline provides Comprehensive Procurement Guideline, as well as Buy-Recycled Series fact sheets on the recommended recycled content of different products. OSWER's Internet site, titled "Reduce, Reuse, Recycle... Through Procurement," is designed to facilitate implementation of the Comprehensive Procurement Guideline. The site lists manufacturers and suppliers of recycled-content products in the following categories : • Construction, • Landscaping, • Park and recreation, • Transportation, The list also includes vehicular and non-paper office products containing recovered material.
Buy Recyled Campaign U.S. Conference of Mayors 1620 Eye Street, NW Washington, DC 20006 Phone: (202) 293-7330 Northeast Maryland Waste Disposal Authority 25 S. Charles Street, Suite 2105 Baltimore Maryland 21201 Phone: (410) 333-2730	The U.S. Conference of Mayors' Buy Recycled Campaign, in coordination with the Northeast Maryland Waste Disposal Authority, has developed the "Buy Recycled Training Manual" for local government procurement officers. Additional information on obtaining the manual, or on buying recycled products, can be obtained by calling either organization.
Recycling Data Management Corporation P.O. Box 577 Ogdensburg, NY 13669 Phone: (800) 267-0707 Fax: (315) 471-3258	Recycling Data Management publishes The Official Recycled Products Guide, a national directory of more than 5,000 manufacturers and distributors of recycled products. Reprinted annually, the guide is also updated periodically throughout the year.
King County Recycled Product Procurement Program 500 4th Avenue, Room 620 Seattle, WA 98104 Contact: Eric Nelson Phone: (206) 296-4234 Fax: (206) 296-4211 e-mail: eric.nelson@metrokc.gov	King County, Washington has developed sample procurement contract specifications, modeled on its Recycled Product Procurement Program, that can be obtained from its world-wide web site (http://www.metrokc.gov/oppis/recyclea.html). The site also includes copies of the county's fact sheets summarizing its experience with various recycled products, as well as annual reports for its Recycled Product Procurement Program.

BUYNG RECYCLED *continued*

Alameda County Source Reduction and Recycling Board Contact: Mark Cullors Phone: (510) 614-1699 Alameda County, California's	Source Reduction and Recycling Board has sponsored the development of a buyers' manual on source reduction and recycled product procurement entitled "Resourceful Purchasing." This manual includes information on federal and state (California) purchasing requirements, recycled content standards, contracting procedures and model language for a recycled product procurement policy.

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21. bid.
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$MART TRANSPORTATION INVESTMENTS

BENEFITTING FROM $MART TRANSPORTATION INVESTMENTS

Local governments incur substantial costs to provide transportation services. In 1993, local governments spent more than $17 billion on public transit and over $26 billion on highways. These sums represented 80 percent and 38 percent respectively, of all governmental expenditures on public transit and highways and accounted for 6.3 percent of local government budgets. In addition, local governments spend millions to maintain and operate large fleets — public works and sanitation trucks, buses, and police and fire safety vehicles. A 1991 survey of 168 cities and 56 counties in California found that fleet costs approached five percent of their budgets, totaling $885 million.[1]

Local governments spent $43 billion in 1993 on public transit and highways.

$mart Transportation Investments, particularly in efficient transit systems that offer an attractive alternative to the use of automobiles, can both increase public transit revenues and decrease highway construction and maintenance costs. Local governments can also lower fleet maintenance and operation costs by reducing vehicle usage, eliminating underutilized equipment and buying less expensive or cleaner-burning fuels. All of these moves can reduce traffic congestion and air pollution and generally benefit both public health and the environment. $mart Public Transit Investments can also help to revitalize downtown and other neglected urban areas. The resulting opportunities for private investment and development can bring new tax revenues to fund indispensable community services and social programs.

TRANSPORTATION INVESTMENTS AND ACTIVITIES WITH POTENTIAL HIGH RETURNS

SHORT-TERM	LONG-TERM
Eliminate idle vehicles	Improve public transit
Reduce VMTs on fleet	Design commuting alternatives
Purchase fuel-efficient vehicles	Buy Alternatively Fueled Vehicles

$MART PUBLIC TRANSIT AND COMMUTING INVESTMENTS

EPA TRANSPORTATION PARTNERS PROGRAM

EPA's Transportation Partners Program supports local efforts to expand public transportation and to make it both more efficient and more accessible. In partnerships with local governments, businesses, and citizens' groups, EPA encourages new approaches to public transportation, and provides technical assistance for its improvement and expansion. The program also promotes mass transit, pedestrian-friendly community designs and such alternatives to automobile dependency as carpooling, bicycle commuting and telecommuting. Furthermore, EPA assists its partners with information on financing sources and brings publicity to the most innovative and successful projects through its annual "Way To Go!" awards and national media attention. After only two years in operation, the Transportation Partners Program has enrolled more than 100 organizations.

By late 1997, EPA had cooperative agreements with seven non-governmental organizations to provide technical assistance and guidance to partner communities. These were: the Association for Commuter Transportation (ACT); the Center for Clean Air Policy; the Local Government Commission's Center for Livable Communities; Public Technology, Inc.; Renew America; the Surface Transportation Policy Project; and the International Council for Local Environmental Initiatives (ICLEI). ICLEI in 1995 established its own Sustainable Transportation Program, with grants to local governments for promoting alternatives to personal vehicle use. In 1996, it awarded seven grants, ranging from $10,000 to $16,000, to communities around the country. The grants strengthen the winners' commitment to alternative transportation, helping them to subsidize carpools, shuttle buses and bicycle commuting, as well as commuter education and public transit.

With its emphasis on local solutions and local availability of an extensive technical support network, the Transportation Partners Program challenges and encourages communities to diversify their transportation options as they seek continued growth and economic development. Two communities that have taken that message to heart are profiled below: Chattanooga, Tennessee, a Transportation Partners "Way-To-Go!" Award winner, and Portland, Oregon. While these examples do not illustrate immediate savings, they clearly show how $mart Transportation Investments pave the way for long-term economic benefits.

● CHATTANOOGA AREA REGIONAL TRANSIT AUTHORITY (CARTA)

HIGHLIGHTS

- **Electric shuttle bus reduced traffic congestion and improved air quality.**
- **Downtown parking lots relocated, freeing land for prospective $12 million development.**
- **Projected increase of $800,000 in city and county tax revenues.**
- **90 percent of initial capital costs funded by federal and state grants.**
- **Free shuttle service reduced car commuting.**
- **Shuttle costs paid from parking fees and lease of retail space at new parking facilities.**
- **EPA Transportation Partners Program "Way to Go!" award.**

The Chattanooga Area Regional Transit Authority (CARTA) has revitalized the local economy by reducing the number of parking lots in the city, where 65 percent of the downtown land was once reserved for that use. As an alternative, the city established peripheral "park and ride" facilities served by an efficient electric shuttle bus connection to the downtown.

The shuttle project, winner of a Transportation Partners "Way to Go!" award in 1996, promises significant economic benefits to the community. Relocating parking to the periphery of the city and freeing up valuable downtown land for commercial redevelopment is expected to bring $12 million in new development and generate $800,000 in new city and county tax revenue. With 90 percent of the initial capital costs for the parking facilities and the shuttle buses funded by grants from the Federal Transportation Administration and the Tennessee Department of Transportation, CARTA was able to offer the shuttle service free of charge, thus encouraging increased use of mass transit. Once the parking facilities are complete, the system's operating costs of about $500,000 a year will be covered by parking fees and the lease of retail space at parking facilities.

The project's environmental benefits are already tangible. By increasing the availability and convenience of public transit, the shuttle attracts one million riders each year. The city's traffic congestion from automobiles and diesel-fueled buses is reduced and air quality significantly improved. The introduction of zero-emission electric shuttles has decreased particulate emissions by 600 pounds, carbon monoxide emissions by 2,900 pounds, nitrogen oxide emissions by 10,800 pounds, and carbon dioxide emissions by 3.5 million pounds a year.[2,3]

● TRI-MET (PORTLAND, OREGON)

HIGHLIGHTS

- **Light rail lines serve as corridors of new development.**
- **Transit system is a magnet for over $1.3 billion in new development.**
- **Transit use increased 220 percent.**
- **Six-lane downtown freeway replaced with a riverfront park.**
- **Eliminated the need for six parking structures.**
- **Voter approval of $600 million in bonds to fund system expansion.**
- **Community outreach and public involvement through "Transit Choices for Livability."**

Tri-Met, the regional transit authority for Portland, Oregon and the surrounding metropolitan area, has taken an aggressive approach to $mart Public Transit Investments with the development of its MAX light rail system. By working with the area's local governments on plans for growth along the light rail corridors, Tri-Met has encouraged transit-oriented rather than automobile-oriented commercial and residential development. As a result, transit use has increased by 220 percent, and no increase in road capacity has been necessary in downtown Portland for the past 20 years, despite growth in population and employment. The transit system also has enabled the city to replace a six-lane expressway with a downtown riverfront park, eliminated the need for six large parking towers and contributed to air quality improvements. Public support for Tri-Met's transit strategy has been strong; voters in 1990 and 1994 overwhelmingly approved general obligation bond issues totaling $600 million to expand the MAX system from 15 to 58 miles. This strong support reflects the success of Tri-Met's outreach and public involvement efforts (see Chapter 7).

Tri-Met's transit-oriented plans were governed by one principle: to build rail lines in areas that offer prime opportunities for development, in the hope that businesses will follow and locate where both employees and customers have easy access via public transit. And indeed, the effect on the region's economy has been spectacular. MAX lines have attracted more than $1.3 billion in new development over ten years, with prospects for $440 million more. The assessed value of property in the vicinity of transit stations has increased two to seven times faster than the county-wide rate, and two-thirds of local business owners report that their proximity to MAX rail lines benefits business. For city and county governments, increased property values translate into higher tax revenues, while for local developers and business owners access to light rail means lower parking ratios, lower development costs and a location advantage over the competition. [4]

ALTERNATIVE COMMUTING PROGRAMS

Traditional commuting in many urban areas accounts for 20 to 25 percent of all automobile trips. It adds to the wear and tear on roadway infrastructure and -

raises local governments' costs for road maintenance and expansion. Many communities across the country encourage the use of alternative transportation for commuting as a way of reducing the costs associated with traffic volume, air pollution and the need for more roads and parking facilities. Successful Trip Reduction Programs (TRPs) often include incentives for ride sharing or the use of public transit, parking restrictions for single-occupant vehicles and accommodations for bicycle commuters. Greater use of transit relieves congestion and can also increase revenues for public transportation. The examples below illustrate a variety of approaches to successful local government TRPs that encourage commuting alternatives among public sector employees.

- **Bellevue, Washington.** The City of Bellevue provides a variety of incentives to its 725 employees to discourage the use of single-occupant vehicles (SOVs) for commuting. SOV commuters are charged $35 per month for parking. That accounts for $100,000 of the annual TRP budget of $125,000. Out of those funds, the city provides a $15 per month bonus to employees who walk, bicycle, or carpool to work at least 80 percent of the time. Employees who take the bus at least 80 percent of the time receive a monthly payment of $31.50, equal to the cost of a monthly transit pass. Employees using alternative transportation at least 60 percent of the time can park for free on the days they drive. All city employees also have access to vanpools operated by the regional transit agency and partly subsidized by the city.

- **Los Angeles, California.** The City of Los Angeles, with 55,000 employees, has a Commuter Services Program that encourages ride sharing, public transit use, telecommuting, and bicycling. One of the city's most effective and popular options is its Alternative Work Schedule program, allowing workers to choose from three flexible schedules that permit them to work fewer days while still putting in the required 80 hours in each two-week period. The Commuter Services Office has estimated that the program has resulted in an annual reduction of more than 1.2 million vehicle miles traveled.

- **Chula Vista, California.** The City of Chula Vista emphasizes telecommuting in its Trip Reduction Program. The city has established two neighborhood telecenters to serve the entire community, allowing both private and public employees to work from remote locations. Workers who live near the centers are encouraged to bicycle or walk, and the city operates an electric shuttle service for those who live further away. City officials estimate that the telecenters eliminate 5,320 automobile trips annually, reducing VMT by more than 1,500 miles per month.

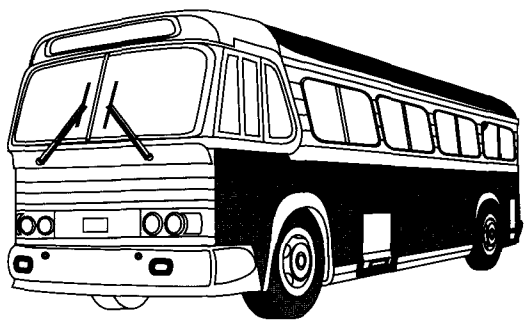
- **Boulder, Colorado.** Through its "GO Boulder" campaign, Boulder provides its employees with "Eco Pass" photo identification cards for the Regional Transportation District (RTD), allowing them to ride all its buses free of charge. To encourage private employers' participation in the Eco Pass program, the city subsidizes 25 percent of their pass costs for the first year and offers free Eco Passes to all private sector employees in the down-

town area, an initiative it funds through a special tax on downtown businesses. "GO Boulder" also offers free training for Employee Transportation Coordinators, its designated representatives at local businesses who promote alternative transportation options among coworkers. Almost one-third of Boulder's labor force works at companies with Employee Transportation Coordinators. The city's efforts produced a 14 percent increase in rides on RTD buses between 1992 and 1993.

- **San Francisco-San Mateo, California.** The San Francisco-San Mateo videoconferencing/trip reduction program helps the city and county criminal justice staff do their work with less travel. It employs videoconferencing technology to reduce the number of 40-mile round trips made by the staffers to meet with their clients at the county's two prisons. A 1996 "Way to Go!" award winner in EPA's Transportation Partners Program, the program is expected to eliminate 15,000 round trips in its first year of operation, reducing automobile travel by 600,000 miles.
- **Santa Monica, California.** As part of its Sustainable City Project, the City of Santa Monica has taken an aggressive approach to its Commute Reduction Program. The city pays its employees a minimum of $1 per day for each day they do not drive to work alone, reimburses employees for bus fares, offers a carpool matching service, provides its fleet vehicles for carpooling of at least three employees and arranges preferential parking for carpool riders. The city also has instituted a pilot telecommuting program. As a result, the average number of riders per vehicle at the city's four largest employment sites increased from 1.13 in 1990 to 1.68 in 1995, which is significantly higher than the Southern California regional average of 1.28. The program has reduced the annual vehicle miles traveled by city employees by 1.25 million, eliminating approximately 1,600 tons of auto exhaust emissions.

FINANCING $MART TRANSIT INVESTMENTS AND COMMUTING ALTERNATIVES

A variety of federal programs provide funds for local government transportation-related investments. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) established several sources of funding for public transit projects and commuting alternatives. Through the Congestion Mitigation and Air Quality Improvement Program (CMAQ), the Federal Highway Administration funds projects that improve air quality. In addition, the Federal Transit Administration, through its Surface Transportation Project (STP), finances several alternative transportation initiatives, ranging from mass transit improvements to telecommuting. Under both CMAQ and STP, local governments may apply federal funds previously reserved for highway projects to public transit development.



$MART VEHICLE FLEET INVESTMENTS

Fleet costs represent a significant expense for many local governments. Public works trucks, police cars, buses and passenger vehicles used for city and county business must all be refueled, maintained, insured and eventually replaced. Local governments can often lower their fleet costs by reducing the number of vehicle miles traveled on city and county business, eliminating unnecessary vehicles or purchasing more fuel-efficient vehicles. For example, the City and County of Denver have enacted a "Green Fleets Executive Order" designed to reduce both costs and air pollution. In 1994, by removing 47 nonessential vehicles from the fleet, the city and county saved $52,000 in operations and maintenance costs. Under the Executive Order, the city and county are also downsizing vehicles to smaller, more fuel-efficient models.

Depending on the price and availability of fuels, local governments may also be able to reduce fleet costs through the purchase of Alternative Fuel Vehicles (AFV). Under the Clean Air Act of 1990 (CAA) and the Energy Policy Act of 1992 (EPAct), local governments in certain areas will eventually be required to buy vehicles powered by alternative fuels such as compressed natural gas (CNG), propane or electricity. Although purchase prices are generally higher for AFVs than for conventional vehicles, federal and state grants and loans are available to offset these higher costs. Thus, local governments may quickly achieve savings on both fuel and maintenance costs. At present, both CNG and propane cost considerably less than gasoline or diesel fuels in many areas of the country, and CNG, electric and propane-powered vehicle maintenance costs are also lower than those for conventional vehicles. As a result, local governments are beginning to report cost saving success stories about their use of AFVs.

- **Jefferson, Wisconsin.** Jefferson's entire police fleet of twelve dedicated AFVs and five dual-fuel vehicles has been running on propane since the 1979 oil crisis. Each car is kept in service for two years, and fuel and maintenance cost savings over that time more than offset the cost of conversion. In addition, the cars fetch 15 to 20 percent more at auction than conventional vehicles.
- **Portland, Oregon.** In response to rising gasoline and diesel prices, the Portland School District began converting its school bus fleet to propane in 1983. The district estimates that current fuel savings on its fleet of 350 propane-run buses amount to $156,000 a year.
- **Evansville, Indiana.** In 1986, the Evansville-Vanderburgh School Corporation invested $250,000 in converting school buses to CNG. This capital outlay was paid back in one year by fuel cost savings. Current CNG fuel cost savings are approximately $0.60 per gallon compared to gasoline.
- **Long Beach, California.** The City of Long Beach estimates that with its current cost savings of $0.30 per gallon for CNG, the city could save $175,000 annually by switching from gasoline to CNG fuel for its entire 100-vehicle police fleet.

FINANCING ALTERNATIVE FUEL VEHICLE INVESTMENTS

A number of federal funding mechanisms and federally supported partnerships are available to assist local governments in the purchase of AFVs. Under a $90 million EPAct program, DOE funds projects in communities with populations of at least 100,000 to demonstrate the feasibility of alternative fuel use in urban buses. The program also gives financial assistance to local school districts for AFV purchases and conversions. Through its Clean Cities program, DOE offers funding for AFVs and the development of related refueling infrastructure, and provides technical assistance for fleet managers and mechanics. Under ISTEA, Federal Highway Administration CMAQ grants are available for public fleet conversions to AFVs.[5] In addition, as part of its Climate Change Action Plan, EPA, in partnership with Public Technology, Inc.'s Urban Consortium, funds and supports ICLEI's Green Fleets project, an international initiative to reduce greenhouse gas emissions. Eight U.S. cities and counties are currently participating in Green Fleets.[6]

Many states, utility companies and private businesses also supply funds for local government AFV programs. More than 25 states offer some form of subsidies, rebates, loans or other incentives for AFV purchases or vehicle conversions. Ten of these — Alabama, Delaware, Georgia, Iowa, Louisiana, Oklahoma, Texas, Virginia, West Virginia and Wisconsin — have grants or low interest loan programs specifically to assist local governments and school districts. Utility companies in 29 states offer their customers cash rebates, reduced rates for gas or electricity, or other financial incentives for the use of AFVs.[7] California communities may also be eligible to receive funds from local air quality districts under the state's Transportation Fund for Clean Air. The Bay Area Air Quality Management District, for example, collects about $17 million annually through a surcharge on vehicle registration fee, to fund public demonstration projects for clean fuel buses and AFVs.[8] Similarly, the South Coast Air Quality Management District has awarded two grants totaling over one million dollars to the Los Angeles Department of Airports to offset the cost of purchasing liquefied natural gas (LNG) shuttle buses for the Los Angeles International Airport.[9]

FINANCING AFV PURCHASES AND PROGRAMS

- **EPAct $90 million community assistance program**
- **EPAct $25 million loan program**
- **ISTEA grant program**
- **ICLEI Green Fleets financial support**
- **State rebates, grants, loans and incentives**
- **Utility customer rebates, discounts and incentives**

GETTING STARTED

TIPS FOR MAKING $MART TRANSPORTATION INVESTMENTS

Local governments can take several steps to evaluate the suitability of various $mart Transportation Investments for their communities.

- Assign a committee or task force to assess community transit weaknesses and needs, and to determine which weaknesses create a barrier to economic development. Meetings with neighborhood groups and local businesses are an effective means to identify transit priorities and foster support for $mart Transportation Investments that may require capital expenditures.
- Engage local businesses in a dialogue about employees' commuting patterns and possible strategies to encourage alternative commuting.
- Begin tracking mileage for fleet vehicles to identify low-use, possibly non-essential vehicles.
- Investigate the local availability of alternative fuels that offer potential cost savings over conventional fuels. Local gas or electric utilities may offer subsidies to cover the cost of AFV purchases or conversions. Also research the availability of state and federal grants and loans to purchase AFVs.

SOURCES OF ADDITIONAL INFORMATION

EPA TRANSPORTATION PARTNERS

EPA Office of Policy, Planning and Evaluation
401 M Street, SW
Washington, DC
Contact: Paula Van Lare,
Transportation Partners Coordinator
Phone: (202) 260-3729

EPA Transportation Partners Hotline
Phone: (202) 260-6830
Internet site: http://www.epa/gov/tp/

Public Technology, Inc.
Contact: Robert Hicks,
Business Director, Transportation Programs
Phone: (202) 626-2400

International Council for Local Environmental Initiatives (ICLEI) World Secretariat
City Hall, East Tower, 8th Floor
Toronto, Ontario M5H 2N2
Canada
Phone: (416) 392-1462
Fax: (416) 392-1478
Internet Site: http://www.iclei.org

ICLEI's members comprise more than 175 local governments of different sizes from around the world, including approximately 20 from the United States. ICLEI coordinates a variety of programs and offers publications promoting energy efficient buildings, land use planning, transportation and sustainable development planning.

PUBLIC TRANSIT SYSTEMS

Federal Transit Administration (FTA)
U.S. Department of Transportation
Office of Transit Administration and Safety
400 7th Street, SW, Room 6102
Washington, DC 20590
Phone: (202) 366-8511
Internet Site: http://www.fta.dot.gov/

The FTA distributes ISTEA funds for public transit construction through the Surface Transportation Project

Tri-County Metropolitan Transportation District of Oregon (Tri-Met)
4012 SE 17th Avenue
Portland, Oregon 97202
Contact: Steve Johnson,
Public Information Officer
Phone: (503) 238-5854

Tri-Met is the transportation authority for the Portland metropolitan area, and can provide information on Portland's experience with its innovative light rail system.

PUBLIC TRANSIT SYSTEMS *continued*

American Public Transit Association (APTA) 201 New York Avenue, NW, Suite 400 Washington, DC 20005 Phone: (202) 898-4000 Internet site: http://www.apta.com	APTA maintains a 10,000 volume library on urban transportation and publishes the APTA Directory, Passenger Transport: The Weekly Newspaper of the Transit Industry, and Transit Fact Book. APTA also holds annual conferences and triennial international expositions

COMMUTING ALTERNATIVES

National Growth Management Leadership Project 300 Willamette Building 534 SW Third Avenue Portland, OR 97204 Phone: (503) 223-4396	The project conducts national land use and transportation research to demonstrate how changes to land use can increase the economic feasibility of alternatives to automobiles.
Community Transportation Association of America 1341 G Street, NW, Suite 600 Washington, DC 20005 Phone: (202) 628-1480 Internet site: http//www.ctaa.org	The Community Transportation Association is a coalition of organizations working to improve mobility and access to services for the elderly and disabled.
Surface Transportation Policy Project 1100 17th Street, NW Washington, DC 20036 Phone: (202) 466-2636 Internet site: http://www.transact.org/stpp.htm	The Surface Transportation Policy Project is a non-profit coalition of groups promoting transportation policies that conserve energy, protect the environment, and make communities more livable. Its Internet site includes a listing of publications on transportation policy, land use, and community planning.
International City/County Management Association (ICMA) 777 North Capitol Street, NE, Suite 500 Washington, DC 20002-4201 Phone: (202) 289-4262 Fax: (202) 962-3500 Internet Site: http://www.icma.org	ICMA is a professional and educational association for more than 8,000 local government administrators worldwide. ICMA provides training programs, technical assistance, data services and publications to improve the quality of local government management and administration.

ALTERNATIVE FUEL VEHICLES

Alternative Fuels Data Center (AFDC) National Renewable Energy Laboratory 1617 Cole Boulevard Golden, CO 80401-3393 Phone: (800) 423-1DOE Internet: http://www.afdc.doe.gov

ALTERNATIVE FUEL VEHICLES *continued*

Clean Cities Program
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585
Contact: Jeff Hardy, Co-Director
Phone: (202) 586-1885

National Clean Cities Hotline
P.O. Box 12316
Arlington, VA 22209
Phone: (800) 224-8437

Office of Heavy Vehicle Transportation
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585
Contact: Richard Wares
Phone: (202) 586-8031

Federal Highway Administration (FHWA)
U.S. Department of Transportation
400 7th Street, SW
Washington, DC 20590
Phone: (202) 366-0660
Internet site: http://www.fhwa.dot.gov/

The FHWA distributes ISTEA funds for projects that improve air quality, including public fleet conversions to alternative fuels, through the Congestion Mitigation and Air Quality Improvement Program

ENDNOTES—CHAPTER 5

1. The Results Center, Division of IRT Environment, Inc. California Energy Commission. Energy Partnership Program. The Results Center Profile #64. 1993.
2. U.S. Environmental Protection Agency, Office of the Administrator. "Chattanooga Electric Bus Program," in EPA's Transportation Partners Presents the Way to Go! Awards. September 10, 1996; p. 8.
3. U.S. Department of Energy. Center of Excellence for Sustainable Development, Cities and Counties Success Stories. "Chattanooga/Hamilton County, Tennessee", available on the world-wide web at http://www.sustainable.doe.gov/ss/CHATTANO/index.html.
4. Tri-Met Strategic Planning Department. Beyond the Field of Dreams: Light Rail and Growth Management in Portland. September 1996.
5. U.S. Department of Energy, National Renewable Energy Laboratory. Cities and Counties Resource Guide. December 1994.
6. International Council for Local Environmental Initiatives. "Green Fleets Project Description." Available on the Internet through ICLEI's world-wide web page at http://www.iclei.org. See also, U.S. Environmental Protection Agency. "EPA's State and Local Outreach Program." Available on the Internet through EPA's Enviro$ense page at http://es.inel.gov.
7. U.S. Department of Energy, Clean Cities Program. Clean Cities Guide to Alternative Fuel Vehicle Incentives and Laws - 1st Edition. Available in summary form on the Internet through the Clean Cities Program world-wide web site at http://www.ccities.doe.gov.
8. California Energy Commission. "Laws, Regulations, and Requirements Affecting Alternative Fuel Vehicles." Available on the Internet through the Commission's world-wide web site at http://www.energy.ca.gov.
9. U.S. Department of Energy, Clean Cities Program. "Clean Cities Profile: Los Angeles Clean Cities Program." Available on the Internet through the Clean Cities Program world-wide web site at http://www.ccities.doe.gov.

$MART DEVELOPMENT INVESTMENTS: BUILDING CODES AND ZONING

BENEFITTING FROM $MART DEVELOPMENT INVESTMENTS: LOWERING THE PUBLIC COSTS OF DEVELOPMENT

Development can be a community asset or liability, depending on where it occurs and how buildings are designed and constructed. New development often requires new infrastructure. The public must pay for new water and sewer lines, expanded wastewater treatment capacity or extension of transit systems. Local governments may also incur additional operation and maintenance costs for the growing solid waste disposal, wastewater treatment, public transportation and police and fire protection needs of new development. Sprawl development that fails to utilize existing infrastructure to its full potential may also impose indirect costs on the community in the form of increased traffic congestion, diminished open space and exacerbated environmental problems such as flooding, loss of wildlife habitat or water and air pollution.

Local governments annually spend an average of 13 percent of their budgets on the public infrastructure associated with development – on roads, water supply, sewer lines and public transit. By adopting policies and practices that utilize existing infrastructure for new development, local governments can minimize their capital costs for public service expansion. At the same time, concentrating new development around existing streets and transit corridors can restrain urban and suburban sprawl, preserving open space and agricultural land. One recent study in California, for example, concluded that current patterns of low-density sprawl development could result in the loss of one million acres of farmland and $72 billion in agricultural sales from the state's Central Valley by the year 2040.

POLICIES AND TOOLS TO PROMOTE $MART DEVELOPMENT

In general, the public costs of new development can be classified as either "building dependent" (associated with the design and construction techniques employed in individual buildings) or "location dependent" (associated with the location of new development in the context of existing infrastructure and services). Building dependent costs derive from several factors that local governments can usually influence through building codes, including water consumption, energy efficiency and landscape design. Location dependent costs involve factors usually controlled by local governments through zoning ordinances, including development density and zoning classifications.

BUILDING CODES

Tools that local governments can use within their building codes and building permits to encourage $mart Development include:

- specifications for low-flow plumbing fixtures,
- minimum standards for energy efficient designs, building materials and HVAC systems,
- site design requirements to utilize xeriscaping techniques and minimize storm-water runoff, and
- incentives such as reduced fees for permits and plan reviews, or an expedited review schedule for building designs that meet certain criteria.

Austin, Texas's Energy Star and Green Builder Programs, and Santa Barbara, California's Green Stamp Program, described below, provide examples of successful building code and permit incentive programs. Areas facing more severe pressures on public infrastructure may wish to rely on even more restrictive measures. The City of Santa Monica, California, for example, requires developers of large projects to construct on-site wastewater treatment plants to eliminate additional flows to the city's sewers.

● AUSTIN, TEXAS'S ENERGY STAR AND GREEN BUILDER PROGRAMS

HIGHLIGHTS

- **New homes rated for energy efficiency (one to three stars).**
- **Municipal utility's power reserve expanded at a fraction of the cost of new plant construction.**
- **Standards for water conservation and eco-friendly building materials.**
- **Special recognition for transit-oriented or pedestrian-oriented development.**

In 1986, the Austin City Council ordered the municipal electric utility to hold down rates by finding alternatives to the construction of a new power plant. In response, the city created its innovative Energy Star Rating Program. To promote energy efficiency in new residential construction, the program rates home designs on a scale of one to three stars, taking into account the efficiency of the air conditioning and heating system and the home's insulation, site orientation and other factors. Builders and home buyers are targeted for education and outreach to tout the benefits of energy efficiency. Builders also receive public recognition for their participation in the program and get assistance in publicizing and marketing the energy efficiency of their homes. Most local builders participate in the program, with the result that 90 percent of new homes in the Austin area are rated. The city estimates that the Energy Star Program has expanded the municipal utility's electrical reserve capacity at approximately one quarter of the cost of increasing power supply through construction of a new pulverized coal power plant.

In 1990, Austin received a $75,000 grant from the Urban Consortium Energy Task Force to expand the Energy Star Rating Program into a "Sustainable Systems Rating Program" for residential design and construction. Dubbed the "Green Builder Program," this wider rating system includes criteria for water conservation, solid waste reduction and the use of "eco-friendly" building materials. Employing a four-star rating scale, the program combines prescriptive requirements with flexible options for meeting its criteria. Special recognition is given to builders who utilize existing public infrastructure, enhance bicycle and pedestrian transit, locate homes within a ten minute walk to public transportation, a grocery store and a park, and spare ecologically sensitive areas crucial to the maintenance of water quality or wildlife habitat. Green Builder certificates for remodeling are awarded to builders who comply with the rating guidelines in at least 75 percent of the renovation. Like Austin's original Energy Star Program, the Green Builder Program includes education and outreach for both builders and home buyers, and assists participating builders in marketing.

The Green Builder Program has been internationally recognized as one of only twelve winners worldwide of the United Nations Local Government Initiatives Honours Programme at the 1992 United Nations Earth Summit in Rio de Janeiro. It has also received national honors, including awards from Demand Side Management, Public Technology Inc., and Renew America. Equally important for the city is the fact that the program has achieved its objectives of saving energy and promoting sustainable growth. Its $270,000 annual budget has been offset by saved capital and avoided operating costs for Austin's municipal electric utility. In addition, the program has spurred creation of new businesses such as rainwater "harvesting" services that benefit from its rainwater collection and reuse criteria. [1,2,3,4,5]

● Santa Barbara, California's Green Stamp Program

Highlights

- **Building plans reviewed by a committee of 18 builders (IBRC).**
- **Green Stamps awarded to designs that exceed energy efficiency standards by 15 to 25 percent.**
- **Expedited review and 50 percent fee reduction for plans with Green Stamp.**
- **Projected program expansion to water conservation and use of building materials.**
- **Projected model "eco-building" to demonstrate Green practices and technologies.**

Recognizing that California's existing energy efficiency standards do not achieve the full potential for energy efficiency in building design and construction, Santa Barbara has introduced its Green Stamp Program to encourage developers to surpass the state's standards. To administer the program, the county appointed 18 local building professionals to a team named the Innovative Building Review Committee. The committee meets twice a month to advise developers on energy efficient designs. It also works with the county to provide builders with cur-

rent information on energy efficient equipment and financing opportunities. To encourage energy efficient development, the committee awards a Green Stamp to residential building plans that exceed the state's energy efficiency standards by 15 percent, and to commercial, industrial or governmental building plans that exceed state standards by 25 percent. As an incentive for builders and designers, plans with a Green Stamp are reviewed by the county's Building Inspector's Office within ten days instead of the normal four to eight weeks. In addition, the county's plan review fee is reduced by 50 percent, saving the applicants between $40 and $200 on each plan. The expedited review also saves interest on loans and allows developers to start and complete construction sooner. That gives them a competitive advantage in leasing and selling their buildings.

The Innovative Building Review Committee is making the Green Stamp requirements more stringent and broadening them to include criteria for designs in such areas as water use and building materials. The county is developing further standards for an expanded program with multiple energy efficiency target levels, using the current standards as a Green Stamp "baseline." The more stringent standards will require greater energy efficiency and better water conservation, as well as the use of eco-friendly building materials. In return, Green Stamp will provide additional incentives for compliance. The county also plans to build a model "eco-building" to display recommended practices and technologies and to acquaint developers with the costs, performance and payback periods of the features the building incorporates. [6]

ZONING STRATEGIES

The public costs classified as "location dependent" are those service costs that are influenced by development patterns and land use. They can be minimized through zoning strategies that encourage $mart Development in existing infrastructure service areas. Suggested components of such strategies are presented below. Specific zoning tools that can be used to implement each component are indicated in parentheses and discussed in the following section.

- **Promote higher density development.** (Rezoning, downzoning, transferable development rights, sliding development fees). The provision of public services is more cost-effective when development densities (i.e., the number of people per unit area) are higher, because the same infrastructure or services reach more people.
- **Concentrate development near public transit corridors.** (Rezoning, sliding development fees, tax credits). Concentrating development near public transit enhances residents' mobility and increases customer and employee access to businesses without adding to traffic congestion and air pollution caused by automobiles. It also increases public transit use, thereby augmenting local government revenue.
- **Encourage mixed-use zones.** (Rezoning, transferable development rights, tax credits). Areas with mixed residential, commercial and civic uses enhance residents' quality of life by putting a range of services within their reach. By reducing automobile use and making options such as walking and

bicycling more viable, mixed-use development brings down traffic congestion and limits road construction and maintenance costs.

- **Conserve open space.** (Downzoning, transferable development rights). According to the National Park Service, the vegetation in parks and greenways can help control water, air and noise pollution. It also reduces stormwater runoff, moderates ambient temperature, lowers heating and cooling costs, and often entices people to walk or bicycle rather than drive cars. The National Park Service reports that open space is viewed as an important factor in local quality of life, which improves a community's ability to retain and attract residents and businesses.[7]
- **Avoid ecologically or geologically sensitive areas.** (Downzoning, transferable development rights). Wetlands and wildlife habitat are often damaged or destroyed by development. This can result in flooding, contamination of nearby surface waters and a decline in wildlife populations. Construction on steep slopes can increase erosion and sediment loads in water bodies. All such impacts can hurt areas where the economy depends on recreation, tourism and natural resources.

ZONING TOOLS

To implement the strategies outlined above, use these tools:

- **Downzone** (i.e., rezone for lower development densities) some boundary and outlying areas to discourage development.
- **Transferable development rights.** Let property owners and developers transfer rights from downzoned areas to areas targeted for development. This helps conserve open space and environmentally sensitive areas, and can encourage development near existing infrastructure.
- **Rezone areas near transit corridors**. Allow for higher densities or mixed uses consistent with pedestrian-oriented and transit-oriented design.
- **Allow tax credits** for development in designated enterprise zones near existing infrastructure.
- **Impose sliding development fees.** Charge developers with the costs of extending infrastructure to remote sites, to encourage the use of sites served by existing infrastructure.

The case studies of Lancaster, California, and Montgomery County, Maryland, illustrate the use of these tools.

• LANCASTER, CALIFORNIA'S URBAN STRUCTURE PROGRAM: SLIDING DEVELOPMENT FEES

HIGHLIGHTS

- **City charges developers a fee calculated to cover the public costs of new development.**
- **Fee covers the infrastructure capital costs and projected impact on operating costs.**
- **Developers have an incentive to build in areas with existing infrastructure.**

Lancaster, located approximately 70 miles north of downtown Los Angeles, underwent tremendous growth in the 1980's and faced substantial pressure for development on the city's outskirts, where no public infrastructure or services existed. To address the public cost implications of increased development pressure, the city adopted its General Plan for future development. To implement the plan, in 1993 the city created the Urban Structure Program.

Under the Urban Structure Program, the city defrays its cost of expanded public services by charging developers the full public cost of their projects. Based on project-specific information supplied by the developer, the city uses a computer model to calculate the added public service and infrastructure costs of each development, and to determine the appropriate development fee. The fee, paid by the developer, covers one-time capital costs for development-related infrastructure (e.g., drainage and flood control systems) and facilities (e.g., administrative buildings), as well as the projected net negative fiscal impact of each development on ongoing municipal operations over a 20 year period. The program holds down local government costs by transferring the financial responsibility for new infrastructure from the public to the private sector. At the same time, it provides developers with economic incentives to build in areas with sufficient existing infrastructure, thereby minimizing urban sprawl and preserving open space in outlying areas. [8]

• MONTGOMERY COUNTY, MARYLAND: DOWNZONING AND TRANSFERABLE DEVELOPMENT RIGHTS

HIGHLIGHTS

- **Under "five acre zoning," county lost 1,300 acres of agricultural land annually.**
- **40,000 acres downzoned to 25 acre zoning to discourage sprawl.**
- **No extension of water and sewer lines into downzoned areas.**
- **Downzoned landowners compensated with transferable development rights.**

Southern Montgomery County forms part of the Washington, D.C. metropolitan area, while its northern and western reaches are primarily agricultural. During the 1970s, county zoning codes allowed one house per five acres on the outskirts of the growing metropolitan area, and the county was losing approximately 1,300 acres of farmland annually to suburban sprawl. The county also faced a sizable financial burden to provide the necessary public infrastructure and facilities for new, sparsely developed residential neighborhoods. In an effort to discourage

continued sprawl and preserve agricultural land, the county downzoned an area of 40,000 acres. The new zoning codes allowed only one house for every 25 acres. As further constraints, the county declared that roads could not be widened nor sewer and water lines extended in the "protected" areas.

Farmers in Montgomery County objected to the downzoning. They claimed that lost development potential would hurt them financially by ending the economic opportunity of selling land to home builders and by lowering property values. In response, the county devised a system of transferable development rights (TDRs) that would compensate farmers for the lost value without increasing the county's financial burden. Landowners in the downzoned area received TDRs equivalent to their lost development potential, which they could then sell to developers on the open real estate market. This in turn, allowed developers to exceed the permitted development densities in designated "receiving" urban areas of the county. For example, a landowner with a 25 acre plot could have built five houses under the old zoning code but only one under the new. He would receive four TDRs that he could sell to a developer interested in exceeding the specified zoning density within a receiving area elsewhere in the county. This system allowed Montgomery County to protect farmland and manage the region's pattern of development during a period of continued growth.

GETTING ASSISTANCE FOR $MART DEVELOPMENT INVESTMENTS

The programs outlined below provide assistance to local governments for the development and implementation of $mart Development policies and tools.

$MART GROWTH NETWORK

$MART GROWTH
NETWORK

The $mart Growth Network ($GN) is a coalition of stakeholders in the development process, including government officials, developers, lending institutions, and environmentalists. Coordinated through the Urban and Economic Development Division of EPA's Office of Policy, Planning and Evaluation, the $GN's mission is to foster national, regional, and local partnerships that promote environmentally, economically, and socially beneficial development practices. The $mart Growth Network supports changes in development patterns by providing members with educational and technical assistance materials including:

- model zoning ordinances and codes,
- information on financing brownfields redevelopment,
- an eco-industrial park planning model, and
- data on the impacts of sprawl.

Through its Internet site, http://www.smartgrowth.org, the $GN also offers access to presentation materials, planning tools, on-line forums, and literature explaining and supporting $mart Growth concepts.

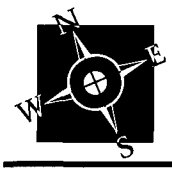
SUSTAINABLE DEVELOPMENT CHALLENGE GRANT PROGRAM

Established in 1995 as part of the National Performance Review's Reinventing Environmental Regulation initiative, the Sustainable Development Challenge Grant (SDCG) Program promotes the vision and goals of the President's Council on Sustainable Development. The SDCG program awards competitive grants to local governments, community groups, non-profit organizations, and universities to support community-based projects that advance environmentally and economically sustainable development. The program also fosters community partnerships to leverage additional public and private sector investments in sustainable development activities. Recently funded projects include:

- **Preserving sustainability in Central Virginia.** This project brings together six local governments in the Charlottesville, Virginia area, that are committed to working with the private sector to better plan and manage the region's growth. The coalition is preparing a State of the Region report outlining the area's most urgent development challenges and opportunities. The coalition is also drafting agreements on action plans to implement its vision of a sustainable future.
- **Marketing the economic benefits of sustainable development in the Rappahannock River watershed.** Five local governments in the Rappahannock River watershed have joined with private developers and conservation groups to evaluate alternative development practices. Their goal is to identify and implement practices that reduce the ecological effects of development and encourage more efficient land use.
- **Sustainable neighborhood design for the desert southwest.** Arizona State University's College of Architecture and Environmental Design is working with the governments of Phoenix and Scottsdale to explore planning options for two new neighborhood developments covering a total of 300 acres. The project will culminate in sustainable development guidelines and model neighborhood designs that can be shared with other southwestern desert communities.

LIVABLE COMMUNITIES INITIATIVE

Through the Livable Communities Initiative, the Department of Transportation's Federal Transit Administration (FTA) provides funding and technical assistance for public transit projects that enhance sustainable development. In particular, it supports projects that link transit planning and community planning, involve residents and community organizations in the planning and design process, and reduce dependence on automobiles through such means as mixed-use development and pedestrian-oriented design. Projects eligible for funding include design, construction or renovation of transit stations and park-and-ride facilities, and transit pass programs and marketing.



GETTING STARTED

TIPS FOR MAKING $MART DEVELOPMENT INVESTMENTS

- The key requirement in a strategy for $mart Development Investments is to identify the most urgent development pressures and priorities in your community. One way to start defining those priorities is to review the recent growth history of your community and its effects on public expenditure allocations.
- Changes in local development policies and practices can affect the character of an entire community and influence housing markets. Therefore, it is important to seek the support and input of local residents and developers in designing development incentives or changes to building and zoning codes.
- Meet with developers and local home builders to discuss goals for community development, prospective changes in zoning and building codes, proposals specifying energy or water conservation techniques and possible development incentives. Developers and home builders may have insights into the feasibility and potential success of specific options.
- Hold public meetings to discuss specific development issues faced by the community. Solicit residents' input on issues such as mixed use development, density, pedestrian- and transit-oriented design, transit needs and neighborhood planning.

SOURCES OF ADDITIONAL INFORMATION

GOVERNMENTAL ASSOCIATIONS AND NONGOVERNMENTAL ORGANIZATIONS

American Farmland Trust 1920 N Street, NW, Suite 400 Washington, DC 20036 Phone: (202) 659-5170 Fax: (202) 659-8339 Internet Site: http://www.farmland.org	American Farmland Trust has produced several studies regarding the public costs of different land uses, including Density-Related Public Costs.
American Planning Association 122 S. Michigan Ave., Suite 1600 Chicago, IL 60603 Phone: (312) 431-9100 Internet Site: http://www.planning.org	The American Planning Association's (APA) 16 divisions include City Planning and Management; Environment, Natural Resources, and Energy; and Transportation Planning. APA operates the Planners Book Service, which serves as a clearinghouse for publications and other resources on many topics, including land use planning, open space conservation and energy planning.
International City/County Management Association (ICMA) 777 North Capitol Street, NE, Suite 500 Washington, DC 20002-4201 Phone: (202) 289-4262 Fax: (202) 962-3500 Internet Site: http://www.icma.org	ICMA is a professional and educational association for more than 8,000 local government administrators worldwide. ICMA provides training programs, technical assistance, data services and publications to improve the quality of local government management and administration.
Local Government Commission (LGC) — Center for Livable Communities 1414 K Street, Suite 250 Sacramento, CA 95814 Phone: (916) 448-1198; (800) 290-8202 Fax: (916) 448-8246 Internet Site: http://www.lgc.org/clc	The LGC's Center for Livable Communities helps local governments and community leaders develop land use and transportation programs to support more livable and resource efficient land use patterns. The center offers workshops, conferences, publications, a newsletter (Livable Places Update) and a resource library.
The Trust for Public Land (TPL) 116 New Montgomery, Fourth Floor San Francisco, CA 94105 Phone: (415) 495-4014; (800) 714-LAND Fax: (415) 495-4103 Internet Site: http://www.igc.apc.org/tpl	TPL is a non-profit organization that works in partnership with government, business and community groups to conserve natural areas and open space by acquiring property, holding it for local governments until public funds are available, and selling the land to public agencies at or below market value. TPL also publishes Greensense, a free newsletter about financing land conservation.

GOVERNMENTAL ASSOCIATIONS AND NONGOVERNMENTAL ORGANIZATIONS *continued*

U.S. Green Building Council 90 New Montgomery Street, Suite 1001 San Francisco, CA 94105 Phone: (415) 543-3001 Fax: (415) 957-5890 Internet Site: http://www.usgbc.org	The U.S. Green Building Council (USGBC) developed a voluntary national green building rating system for commercial buildings that includes criteria for building materials, solid waste management, and energy and water use. The USGBC offers resources and educational and training programs on green building practices. In addition, the Council offers the Sustainable Building Technical Manual and a quarterly newsletter entitled, Green Building Report: An Update from the U.S. Green Building Council.

U.S. ENVIRONMENTAL PROTECTION AGENCY

$mart Growth Network Urban and Economic Development Division Office of Policy, Planning and Evaluation U.S. Environmental Protection Agency (2127) 401 M Street, SW Washington, DC 20460 Phone: (202) 260-2750 Fax: (202) 260-0174 Internet Site: http://www.smartgrowth.org	EPA coordinates the $mart Growth Network, comprised of private sector, public sector and NGO partners. The network seeks to create and promote development practices that are economically, environmentally and socially beneficial. The network has an Internet site that provides extensive information and resources concerning building practices and managing development and growth.

Sustainable Development Challenge Grant Program Office of Air and Radiation U.S. Environmental Protection Agency (MC-6101) 401 M Street, SW Washington, DC 20460 Contact: Pamela Hurt Phone: (202) 260-2441 Internet Site: http://www.epa.gov/docs/region03/sdwork/challeng.htm	EPA's Sustainable Development Challenge Grants are awarded on a competitive basis to provide seed funding for projects developed by local governments and other local organizations. EPA awarded $524,000 to ten projects during the program's pilot phase in the 1996 fiscal year.

U.S. DEPARTMENT OF ENERGY (DOE)

Building Energy Standards Program Pacific Northwest Laboratory PO Box 999 MSIN K5-08 Richland, WA 99352 Phone: (800) 270-2633	Funded by DOE, this program encourages an exchange among building industry professionals and organizations, state and local code officials, and researchers to facilitate the development and adoption of building energy efficiency standards.
Energy Efficiency and Renewable Energy Clearinghouse (EREC) PO Box 3048 Merrifield, VA 22116 Phone: (800) 363-3723 Fax: (703) 893-0400 E-mail: die.erec@nciinc.com Internet Site: http://www.eren.doe.gov/consumerinfo/	The Energy Efficiency and Renewable Energy Clearinghouse contains over 500 documents in 26 subject directories. Hard copies of these and other documents can be ordered from the EREC office. EREC energy experts answer specific questions about energy efficiency and renewable energy by fax at the number provided above or by e-mail.
Center of Excellence for Sustainable Development Office of Energy Efficiency and Renewable Energy U.S. Department of Energy Denver Regional Support Office 1617 Cole Boulevard Golden, CO 80401 Phone: (800) 363-3732 Fax: (303) 275-4830 Internet Site: http://www.sustainable.doe.gov	DOE's Center of Excellence for Sustainable Development provides information on sustainable communities, energy efficiency, land use planning and management, transportation, green building and related topics.

U.S. DEPARTMENT OF TRANSPORTATION

Livable Communities Initiative Office of Planning Federal Transit Administration U.S. Department of Transportation 400 7th Street, SW Washington, DC 20590 Phone: (202) 366-2360 Internet Site: http://www.fta.dot.gov/library/planning/livbro.html	The Livable Communities Initiative provides guidance, technical assistance, and funding to state and local agencies for several types of planning activities, including developing innovative land use and zoning practices

U.S. NATIONAL PARK SERVICE

Recreation Resources Assistance Division
Rivers and Trails Conservation Assistance Program
PO Box 37127
Washington, DC 20013
Phone: (202) 343-3780
Internet site: http://www.nps.gov/rtca/

The Rivers and Trails Conservation Assistance Program provides assistance to states, local governments, and citizen groups working to protect river, trail, and greenway resources. The Program produced a free resource book entitled, Economic Impacts of Protecting Rivers, Trails and Greenway Corridors, which describes potential impacts of open space conservation on property values, local spending, tourism, business development and public costs.

LOCAL GOVERNMENTS

City of Portland Energy Office
1211 SW Fifth Avenue, Suite 1170
Portland, OR 97212-3711
Phone: (503) 823-7222
Fax: (503) 823-5370
E-mail: pdxenergy@ci.portland.or.us
Internet Site:
http://www.ci.portland.or.us/energy/web

Portland, Oregon's energy office manages a variety of programs to reduce energy use in the public and private sectors.

City of San Jose
Environmental Services Department
777 N. First St., Suite 450
San Jose, CA 95112
Phone: (408) 277-5533
Fax: (408) 277-3606

San Jose's IDEAS (Innovative Design and Energy Analysis Service) program promotes energy efficiency in commercial and industrial buildings and offers a guide to energy efficient design, lighting, heating, ventilating and air conditioning for use by developers. IDEAS uses computer software to determine the most appropriate technologies for a building based on its size, location and purpose.

City of Lancaster, California
Community Development Department
Contact: Dave Ledbetter
Phone: (805) 723-6100

Lancaster's Urban Structure Program developed a model to calculate the costs and revenues to the local government of new developments, and the appropriate development fees to charge builders. The Community Development Department sells the Urban Structure Program Documentation Report, which provides information about the Program, including the specific calculations used in the model.

LOCAL GOVERNMENTS *continued*

San Diego Association of Governments (SANDAG) 401 B Street, Ste 800 San Diego, CA 92101 Phone: (619) 595-5300 Fax: (619) 595-5305 E-mail: webmaster@sandag.cog.ca.us Internet Site: http://www.sandag.cog.ca.us	SANDAG, an association of 18 city and county governments in the San Diego metropolitan area, serves as the Regional Planning and Growth Management Board, the Regional Transportation Commission, and the Congestion Management Agency. SANDAG's activities include developing Geographic Information System (GIS) databases and analyzing planning policies for sensitive land; developing bicycle and pedestrian facilities; implementing a roadway congestion pricing pilot program; and planning for regional growth and environmental management. SANDAG offers numerous publications concerning its plans for energy use, habitat conservation, open space, growth management and land use
Tri-County Metropolitan Transportation District of Oregon (Tri-Met) 4012 SE 17th Avenue Portland, Oregon 97202 Contact: Steve Johnson, Public Information Officer Phone: (503) 238-5854	Tri-Met is the transportation authority for the Portland metropolitan area. It has worked with other agencies to couple land use and transportation management in the region by limiting parking in the downtown area; providing incentives for carpooling; replacing a segment of a downtown freeway with an urban park; expanding the existing public transportation system; building a new light rail system; and changing zoning codes and offering incentives for high residential densities near transit corridors and for new development within existing neighborhoods

ENDNOTES—CHAPTER 6

1. International Council for Local Government Initiatives, Project Summary Series, "Austin, USA — Housing Construction," Project Summary #49, Internet Site, http://www.cities21.com/leicomm/lei-049.htm (accessed 3/3/97).
2. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Energy Efficiency and Renewable Energy Clearinghouse, "Build Up Energy Savings with Residential Standards," Internet Site, http://204.243.73.5/library/REE/REESTAND.TXT
3. City of Austin, Green Builder Program, Explanation of Green Building Star Rating Levels, April 1996.
4. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Center of Excellence for Sustainable Development. Renew America, Success Stories, "City of Austin Green Builder Program."
5. Doxsey, W. Laurence (Coordinator, Green Builder Program, City of Austin Planning, Environmental and Conservation Services Department). The City of Austin Green Builder Program.
6. Urban Consortium Energy Task Force, 1998 Request for Proposals, "Competitive Advantages of Energy Efficiency: Santa Barbara County."
7. U.S. National Park Service, Rivers Trails and Conservation Assistance Program, Economic Impacts of Protecting Rivers, Trails and Greenway Corridors, 1995.
8. Dave Ledbetter, City of Lancaster, Personal Communication with Aaron Martin, Industrial Economics, Inc., March 26, 1997.

COMMUNITY OUTREACH: GAINING SUPPORT FOR $MART INVESTMENTS

THE IMPORTANCE OF PUBLIC SUPPORT

Many $mart Investments highlighted in this guide require the active involvement and support of local residents and community leaders. Some may require voters to support policy changes or authorize bond measures to finance initial costs. Others may succeed only if residents or local business people are won over to making changes in their lifestyles, habits or market preferences. Expanded and improved transit systems, for example, are of little value if residents and local business employees do not use them. Conserving municipal water supplies to save operating costs for water treatment and distribution systems ultimately depends on the willingness and ability of residents, businesses, and industries to reduce their water consumption. In addition, some services, such as solid waste disposal, may be perceived in the community as "free," making it difficult for residents to understand the need for "new" pricing systems or changes in the nature and level of service. Community outreach and education efforts that ensure support for changes in the ways local governments provide basic services are thus a critical component of any $mart Investment plan.

COMMUNITY OUTREACH TOOLS

Effective community outreach strategies generally draw on some combination of four basic tools: education, motivation, facilitation and direct implementation.

- **Education** tools inform the public about programs and include bill inserts, mass mailings, videos, media campaigns, telephone hotlines, Internet sites and other ways of raising public awareness.
- **Motivation** tools employ incentives and techniques to raise the level of community participation. Motivation tools include discounted transit passes, free showers and bicycle lockers in downtown buildings to promote bicycle commuting, business challenges to increase recycling rates, community events, and billboards tallying cumulative energy savings or waste reductions. Economic incentives, such as returning energy cost savings to the responsible departments, can be very effective motivational tools.
- **Facilitation** tools disseminate technical information and other resources to assist the community in carrying out programs. Facilitation tools could include a wide range of materials — everything from manuals and software for calculating energy savings, waste minimization training workshops and water conservation audits, to directories of local recyclers and maps of

bicycle commuting routes. The Global Action Plan (GAP) is gaining support in many communities as a grassroots facilitation tool (see sidebar).

- **Implementation** strategies are hands-on programs that utilize local government resources to make new practices a reality. They include direct installation of low-flow plumbing fixtures by local government crews, construction of telecommuting centers and implementation of curbside recycling programs.

DEVELOPING AN OUTREACH STRATEGY

City and county managers should draw on all of the tools described above in developing community outreach strategies for making $mart Investments. The appropriate strategy and combination of tools for ensuring maximum effectiveness of a particular investment will depend on the nature and objective of the investment as well as on the character and interests of the targeted groups.

The development of an outreach strategy that will effectively change the behavior of the targeted groups entails the following steps.

1. Identify the audience. The groups involved in change may be local government departments, local businesses and/or citizens. Identifying the groups critical to ensuring success will provide the basis for the outreach strategy.
2. Identify the factors that will make change attractive to different groups. Understanding how different groups perceive the change and its benefits for them will help determine the message necessary to gain their support.
3. Evaluate any actual or perceived barriers to change. Perceived barriers can often be overcome with information and education tools, while actual barriers may require local government involvement in the form of facilitation and implementation.
4. Determine the type of information and assistance critical to bringing about the change, based on the understanding of the factors and barriers identified in the previous steps.
5. Identify the best tools for motivating change among each of the interest groups.

THE GLOBAL ACTION PLAN: TURNING AWARENESS INTO ACTION

The Global Action Plan (GAP) is an innovative facilitation tool for building grassroots support and commitment.

- **Household EcoTeams of friends, family members, neighbors, or co-workers undertake behavior changes that foster sustainable lifestyles.**
- **The Household EcoTeam Workbook provides detailed guidance for a six-step plan of environmental action:**
  - **reduce garbage;**
  - **improve home water efficiency;**
  - **improve home energy efficiency;**
  - **improve transportation efficiency;**
  - **be an eco-wise consumer;**
  - **empower others.**

SUCCESSFUL LOCAL INITIATIVES

Many local government programs profiled in this guide have successfully developed outreach strategies that employ a wide variety of outreach tools to gain community support for $mart Investments. Highlighted below are the outreach tools that have made four such programs especially successful.

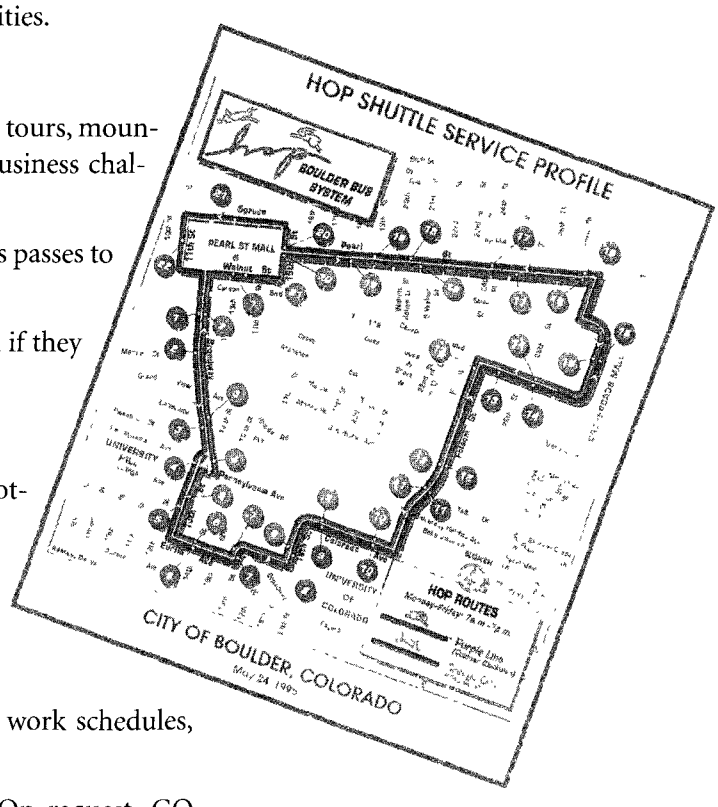
GO BOULDER — TRANSIT AND COMMUTING ALTERNATIVES

GO Boulder is a comprehensive program to promote various forms of alternative commuting in Boulder, Colorado, including bicycling, public transit and car-

pooling. Its success results from extensive use of education, motivation and facilitation tools. Go Boulder can be reached at (303) 413-7304, or on the Internet at http://bcn.boulder.co.us/transportation/go-boulder/center.htm.

▶ Education Tools

- Telephone hotline for information on transportation alternatives.
- Internet site providing information on GO Boulder activities.



▶ Motivation Tools

- Bike Week. This community event includes bike races and tours, mountain biking, bike to work day, bike safety clinics and a business challenge.
- ECO Pass allows employers to offer discounted annual bus passes to employees.
- ECO Pass holders are guaranteed a free ride home by taxi if they have to work late unexpectedly or have an emergency.

▶ Facilitation Tools

- Bicycle safety tips available by calling the GO Boulder hotline.
- Bike and bus maps.
- Boulder Ride Arrangers. This is a free computerized service that matches compatible commuters.
- Information for businesses about flex time, compressed work schedules, variable work hours and telecommuting.
- Transportation planning services for local businesses. On request, GO Boulder will develop and recommend a plan for more efficient and economical employee transportation alternatives.
- Employee Transportation Coordinator training. GO Boulder trains representatives of local businesses to provide in-house support and information on commuting alternatives. Coordinators hold monthly breakfast meetings to share ideas.

TRI-MET — TRANSIT CHOICES FOR LIVABILITY

Tri-Met's aggressive plan to develop light rail and other public transit systems that support community growth in Portland, Oregon includes significant outreach and public involvement efforts drawing on a full range of education, motivation, facilitation and implementation tools. Information on the Transit Choices program is available at Tri-Met's Internet site at http://www.tri-met.org.

▶ Education Tools

- Telephone lines for information on employer commuting programs, handicapped access and park and ride services.
- Internet site includes schedule and route information.

▶Motivation Tools

- Free parking at nearly 60 park and ride lots.
- Bicycle racks on Tri-Met buses let cyclists with permits ($5) use public transit.
- Reduced downtown parking rates for carpoolers.
- Reduced transit fares for seniors and disabled passengers.

▶Facilitation Tools

- On-site transportation promotions for local businesses and training for company representatives on the "how-to" of using Tri-Met and carpooling.
- "Do-it-yourself" guide for planning and implementing alternative employee commuting programs.
- Transit Choices for Livability — a series of community workshops held in Portland's fastest growing suburbs to identify neighborhood transit needs and solicit residents' input in the design and location of new bus and light rail routes.

▶Implementation Tools

- Door-to-door ride service for disabled customers unable to use regular public transit.
- The 750 ideas generated in the Transit Choices for Livability workshops are the basis for pilot projects, including new bus routes, more frequent service and bus stop upgrades for the communities of Beaverton, Gresham, Hillsboro and Oregon City.

SANTA MONICA'S BAY SAVER PROGRAM

Santa Monica's Bay Saver program promotes the use of low-flow plumbing fixtures and other water conservation measures, using education, motivation, facilitation and implementation tools. More information on the Bay Saver Program may be obtained by contacting Dean Kubani in the City of Santa Monica Environmental Programs Division, at (310) 458-2227, or by accessing the Division's Internet site at http://pen.ci.santa-monica.ca.us/environment.

▶Education Tools

- Water bill inserts promoting conservation.
- Displays at plumbing stores and home improvement centers.
- Media campaign; newspaper, radio and TV public service ads and announcements.
- Information packets distributed on request.
- Water conservation educational programs for local schools.

▶ Motivation Tools

- Demonstration of sustainable gardens at City Hall and the Civic Auditorium.

▶ Facilitation Tools

- On-site residential, commercial, and industrial water use surveys to identify conservation opportunities.
- Annual sustainable landscape workshops for residents and landscape professionals.

▶ Implementation Tools

- 1,000 ultra low-flow toilets distributed free of charge to property owners at a special "kick-off" ceremony.
- City-funded water efficiency revolving loan fund provides interest-free loans to institutional, commercial and residential water customers to pay for plumbing fixture retrofits, irrigation system upgrades and other conservation measures.

AUSTIN'S GREEN BUILDER PROGRAM

Austin's Green Builder Program has received awards and widespread recognition for its accomplishments in promoting energy conservation, water conservation and other sustainable practices in residential construction. The program's success is due in part to extensive community outreach efforts utilizing education, motivation and facilitation tools. Information on the Green Builder Program, as well as links to the city's Green Builder News and a variety of articles on green building practices, can be found on the program's Internet site at http://www.ci.austin.tx.us/greenbuilder.

▶ Education Tools

- Information for prospective buyers on the value and availability of green homes.
- Customer service telephone number.
- Newsletter, fact sheets and brochures.
- Informational newspaper advertisements.

▶ Motivation Tools

- Partnerships with building associations, environmental organizations, businesses, the Greater Austin Chamber of Commerce and other organizations.

▶ Facilitation Tools

- Technical guidance and marketing assistance for building professionals using and promoting green building practices.
- Program provides buyer referrals and a directory of participating building professionals.
- Detailed technical guide to green building practices.

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