

Planning for a Sustainable Future

A Guide for Local Governments



NEW!
Green Jobs Chapter



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Introduction to Sustainability Planning

What is Sustainability?

The U.S. Environmental Protection Agency (EPA) defines sustainability as “meeting the needs of the present without compromising the ability of future generations to meet their own needs.” In other words, sustainability attempts to balance the needs of people today with the future needs of our children and the natural systems that sustain all life.

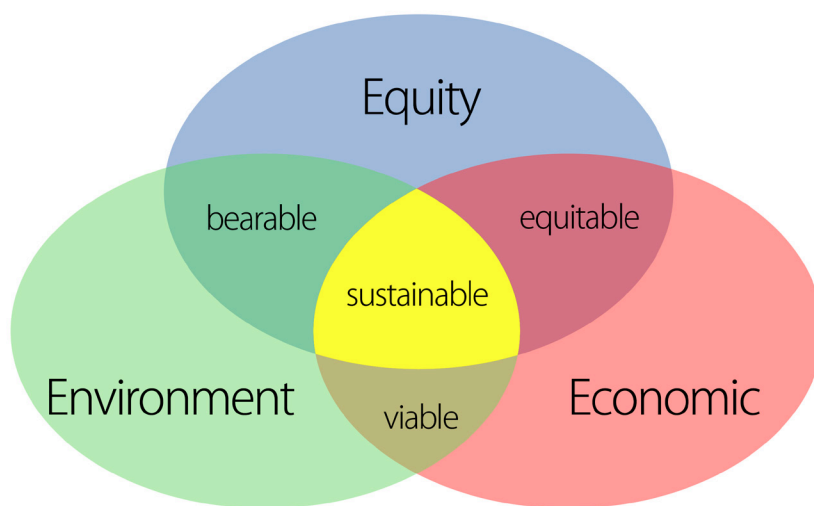
In an era of population growth, increasing economic competition, and environmental challenges ranging from climate change to air pollution and decreasing water levels to rising energy costs, planning is essential to our future and the well-being of our communities. Planning in the face of these challenges must transcend traditional zoning or general land use considerations. It can also promote sustainability by incorporating the three “E’s” – economy, environment and equity - in plans for development.

Increasingly, many local governments, ranging from towns and cities to counties and regional partnerships, are taking more long-term, comprehensive approaches to economic development, with the goal of improving overall sustainability. They have recognized that planning for a sustainable future can bring real-world present-day benefits to our towns and cities.

What are the best sustainability practices currently in use? How can a community move from an idea to a plan to successful action? This handbook, which includes information gathered from more than two dozen cities, towns and counties across the United States, will answer these questions and provide a roadmap for developing effective plans for a sustainable future.

Climate Change: The challenge of our Generation

For over the past 200 years, the burning of fossil fuels, such as coal and oil, and deforestation have caused the concentrations of heat-trapping “greenhouse gases” (GHGs) to increase significantly in our atmosphere. Human-induced climate change poses adverse, wide-ranging effects on a global scale. All nations, states and local communities are potentially vulnerable to the consequences of climate change. Experts in the field of climate and earth sciences have projected that even if CO₂ emissions were to be halted immediately, adverse impacts, such as an increase in extreme weather, water scarcity and resulting heightened public health threats, would



extend to the world's largest city-centers and rural townships.

Local governments have the power to strengthen community-wide resilience in the face of changing climate and reduce the effects of climate change by lowering their greenhouse gas emissions. Changes made by local governments, no matter how small, can make a global difference. Every day, local governments make decisions that impact energy use, including those related to vehicle fuel, building electricity use, air quality, economic development, public health, and quality of life. Actions that reduce greenhouse gas emissions can have positive impacts on all of these factors. Sustainable, climate-friendly actions can have positive benefits, including reducing costs for residents and businesses, saving energy and water, reducing waste, and preparing for the future and potential impacts of climate change. Actions that improve sustainability for communities can also bring green jobs to them.

Reasons to Plan

1. Reduce greenhouse gas emissions.
2. Be resilient in a changing climate.
3. Poise your community for green development.



This guide has been updated to address climate change more explicitly in this edition. Climate change is not only an air quality topic. Energy is used to pump, treat and heat water; using recycled or re-used materials reduces the amount of energy needed to extract raw materials and manufacture goods, and decreasing waste reduces methane emissions from landfills. Therefore, saving water, recycling and reducing waste also saves energy and reduces greenhouse gas emissions.



Look throughout the Areas of Opportunity for this globe-logo to learn about actions with a climate benefit.

Taking Climate Action and Measuring Carbon Footprint

This guide provides information that will not only increase your community's sustainability, but also help to mitigate the adverse impacts of climate change. Because every community is different, the resources in this guide suggest specific actions to combat climate change that fit your community. The first step in developing the most useful course of action for a community is to create a community action group responsible for climate change issues. The actions this group can take will also increase the sustainability of your municipality and are incorporated in more detail throughout this handbook.

Most greenhouse gas emissions in communities are from buildings and transportation, and your community can begin to address these right away. For this reason, communities do not have to complete an inventory of greenhouse gas emissions to take action to prevent climate change. EPA programs can help you take these initial steps.

Here are some examples of ways that local governments can make a difference:

- make smart land use choices that can reduce vehicle emissions
- provide access to clean transportation, and multi-modal transportation (i.e., bus rapid transit, shuttles, bike lanes, and carpools)
- target schools and institutions for energy efficiency strategies
- create more parks and green spaces, which absorb CO₂
- purchase renewable energy
- promote building retrofits and changes in local building standards
- expand recycling and waste management system capacities
- change community values and behaviors

While not totally necessary, an inventory may help your community. A municipal greenhouse gas inventory is a tool that measures the greenhouse gas emissions associated with local government operations. Once a municipal operations are inventoried, many communities take the next step of completing a community-wide inventory. Tracing the "carbon footprint" of your community can help planners to quantify and communicate the benefits of different actions, prioritize future actions as well as justify costs for projects,



and make a strong case for grants and other external funding.

Creating a municipal or community-wide inventory requires following a protocol for consistent quantification and categorization of greenhouse gas emissions. The Clean Air and Climate Protection Software (CACPS) can help communities create inventories and analyze impacts of actions on traditional air pollutants and greenhouse gas emissions. This software and training are available to members of ICLEI Local Governments for Sustainability and the National Association of Clean Air Agencies (NACAA). However, non-members can also receive the software by contacting EPA directly.

Recommended Resources:

EPA's Climate Change Program

<http://www.epa.gov/climatechange/> 


ICLEI Local Governments for Sustainability

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

Learn "Inventory 101" using EPA's online tutorial

<http://www.epa.gov/climatechange/index.html> 

EPA Local Climate and Energy Webcast Series

<http://www.epa.gov/cleanenergy/energy-programs/state-and-local/webcast.html> 

Northeast Report on Climate Impacts - projected regional impacts of climate change

<http://www.northeastclimateimpacts.org> 

National Oceanic and Atmospheric Agency's Regional Integrated Science and Assessment program (RISA)

http://www.climate.noaa.gov/cpo_pa/risa/ 



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Getting Started

Assess the Challenge

The critical first step in developing a successful sustainability plan is an assessment of community strengths and weaknesses as well as current and future needs. Every community is characterized by a set of unique features – from its climate and topography to local development patterns. The issues on which you focus will determine the structure of your local sustainability plan, but most of the municipal plans discussed in this handbook cover the following topics:

- transportation
- land use planning
- open space protection
- energy, air quality and climate
- water supply, storm water and wastewater
- solid waste and recycling
- climate change

Your final plan may include some or all of these issues or other areas of concern, but the overall goal is to be comprehensive because many of these areas are interconnected.

A look at the best practices used by similar communities can provide a comprehensive list of the opportunities and options useful in reaching sustainability goals. The following are some helpful questions to ask in developing community-specific benchmarks:

- What communities in your region or state are facing similar challenges in terms of the environment, climate change, population growth and the local economy?
- What are the similarities between your community and others, and what plans have been devised and/or implemented to meet the challenges?
- Are there examples of “best practices,” as is or modified, to help your community reach its objectives?

Environmental threats, economic pressures and changing regulations often spur or drive planning efforts, so it’s worth thinking through these related issues as well:

- What environmental, economic or regulatory impacts are the highest priorities? How were the priorities determined?
- What studies or projections (environmental, land-use patterns, economic development) exist for your community, region, or state for the next five, 10, 20, or 50 years?
- What are the regulatory requirements that currently apply or that may be developed down the line?
- What is the potential for mitigating or preventing various threats and how difficult or easy will it be to implement change?
- 🌐 What are the potential synergies that might result from tackling a range of issues at the same time? For example, can improved open space protection preserve biological resources and reduce flood risks? Can improvements to a government’s vehicle fleet lower its energy costs and reduce local air pollution?

TIP: As your list grows longer, you may wish to employ a spreadsheet or database of some kind.

Recommended Resources:

Start with a basic self-assessment. The National Environmental Services Center, funded by EPA, provides a comprehensive checklist to jump start the process. www.nesc.wvu.edu/netcsc/Self_Assmnt/SelfAssessment.pdf
www.nesc.wvu.edu/training.cfm

Climate Impacts: Identify Vulnerabilities and Prepare for Natural Disasters

Protecting against natural disasters should be a key planning priority. Natural disasters will always pose potential threats, but careful planning can keep them from becoming management disasters. Certain communities can expect to see an increase in natural disasters due to climate change, making preparedness even more critical now. By assessing your community's vulnerabilities and implementing mitigation strategies, the potential impacts can be reduced.

Risk is determined by evaluating the potential hazard and assessing the vulnerability to the impact. Although evaluating risk is often more qualitative than quantitative, it can be useful to think about risk as a product of the hazard multiplied by the vulnerability. Risk assessment usually follows a three-step approach:

- understanding the nature, location, intensity and probability of the key threats in your area
- determining the degree of vulnerability to those threats
- identifying the resources available to manage or respond

In evaluating vulnerabilities to particular threats, it is common to consider:

- land use patterns, engineering of key infrastructure such as roads and bridges, and the architecture of the built environment
- social factors related to the well-being of individuals, communities and society
- economic conditions, with an understanding that distressed and low-income neighborhoods may have a more limited capacity to evacuate or recover
- environmental concerns, including how the degradation of natural areas such as wetlands can increase the damaging impacts of events

Particular care should be taken in evaluating how risks associated with natural disasters can be potentially compounded by the existence or condition of human-made infrastructure such as a flood causing an overflow of a wastewater treatment plant. Your emergency preparedness strategy should also consider possible threats such as the potential for an accidental or intentional chemical release, explosion, outbreak of disease, or even, depending on the area, radiological release. Government agencies in your area, such as police, fire and emergency management, routinely track and evaluate these types of threats, so a multi-stakeholder approach that involves relevant local and regional agencies is critical. In addition, it is worth considering global threats such as climate change and population growth.



Recommended Resources:

Federal Emergency Management Agency (FEMA) Web site - preparing for disasters, determining risks and planning for emergencies

www.fema.gov/plan/index.shtm


National Oceanic and Atmospheric Administration (NOAA) - Community Vulnerability Assessment Tool

www.csc.noaa.gov/products/nchaz/startup.htm


FEMA - HAZUS (Hazards US) software for estimating potential losses from natural hazards.

www.fema.gov/plan/prevent/hazus/index.shtm

The Climate Change Science Program

www.globalchange.gov 

NOAA - Regional Climate Modeling Tool

www.ncar.ucar.edu/research/climate/regional.php 


International Council for Local Environmental Initiatives (ICLEI) Planning Locally for Climate Change, a climate change guidebook.

www.iclei.org/ 

EPA Regional Vulnerability Assessment

www.epa.gov/reva/

Climate Risk Information by the New York City Panel on Climate Change

http://www.nyc.gov/html/om/pdf/2009/NPCC_CRI.pdf 

EPA Events of National Significance

www.epa.gov/emergencies/content/learning/national_response.htm

U.S. Forest Service book, Restorative Commons: Creating Health and Well-being through Urban Landscapes

<http://www.nrs.fs.fed.us/pubs/8810>

Center for Disease Control Natural Disasters and Extreme Weather

www.bt.cdc.gov/disasters/

ICLEI Global Platform for Disaster Risk Reduction

[www.iclei.org/index.php?id=6880&tx_ttnews\[backPid\]=6877&tx_ttnews\[tt_news\]=2008&cHash=a05f248d7d](http://www.iclei.org/index.php?id=6880&tx_ttnews[backPid]=6877&tx_ttnews[tt_news]=2008&cHash=a05f248d7d)

UN World Conference on Disaster Reduction

www.unisdr.org/wcdr/

Portland Office of Emergency Management.

www.portlandonline.com/oem

The Sarasota County and City of Santa Barbara Offices of Emergency Services

www.scgov.net/EmergencyServices/EmergencyManagement/emergencymanagement.asp
www.santabarbaraca.gov/Resident/OES/

The NJ Natural Capital study

www.state.nj.us/dep/dsr/naturalcap/natcap-1.pdf



Work through Existing Resources and Networks

As you begin to create your sustainability plan, it's a good idea to take a look at related work being done by other organizations in your area. Are there agencies conducting relevant studies? Is there a local group involved in protecting open space, a business association analyzing the impacts of growth, or a school program focusing on stream cleanups or water quality?

Chances are that at least some plans, studies and committees have been created over the years. Organize a meeting with the coordinators of existing projects to better coordinate your planning.

Annual reports tracking water and energy consumption as well as wastewater and solid waste generation should be readily available from local and regional utilities. Land use planning and environmental documents such as open space preservation plans and natural resource protection plans, and environmental impact statements and reports will also be useful in identifying what has been done and what needs to be done. Anything older than five to 10 years may need to be updated, but even older efforts can provide worthwhile guidance and data, which will come in handy when targets are set and progress is measured.

Once you've taken a survey of ongoing efforts and historical data, the next step is to look at the local capacity needed to manage the planning.

Build Coalitions

Successful planning efforts are typically broad-based and encourage participation by the whole community. By partnering with residents and existing groups, the effects of your sustainability plan can be amplified and staff workload can be minimized.

Local volunteers are a key group to consider as part of your partnerships, since they directly benefit and can help make the public case for your plan to their

neighbors and friends. Organizing volunteer days and getting community members involved in the planning process is not only helpful, but required in some areas such as land use planning.

Forming ad hoc committees or commissions, overseen by government officials, is another effective way to address specific environmental planning issues while allowing interested community members to contribute their expertise. Inviting community members to participate in meetings is a good way to recruit them to serve on a committee. The Westchester County Global Warming Task Force in New York, for example, allows interested community members to work on specific issues without being permanent members.

Local environmental groups are another potential set of organizations with which communities can partner during the planning process. Environmental groups often bring specialized expertise in areas such as watershed protection or smart growth planning. Ensuring that all local environmental concerns are considered can help create broad-based support for the planning process. Some examples are Denver, Colorado, where the city has involved the FrontRange Earth Force in its planning process, and Westchester County, New York, which is working with the Natural Resources Defense Council (NRDC) and Riverkeeper, among other groups.

Because environmental sustainability and the long-term economic viability of communities are linked, businesses, business associations and chambers of commerce are also important partners. Resource and planning issues, such as the availability of



water, the price of energy and accessibility to transportation, are often of critical importance to the local business community. In addition, local businesses can provide both technical resources and funding for your sustainability planning process.

Along with community members, non-profits and business groups, other government agencies are another key constituency to consider. For instance, a city or town may want to, or in some cases, be required to involve regional or state agencies in their planning process. Outside agencies may be able to provide a wealth of resources and assistance, including grants, loans or other financing.

Academic organizations are also possible partners. As members of the community, universities, colleges and technical schools may have a direct interest in the local government sustainability planning

process. In addition, these organizations can provide technical resources, research support and venues for public discussions. The Montgomery County Greenhouse Gas Task Force, for example, was developed as the result of a project conducted by Pennsylvania State University graduate students.

Faith and service organizations, transportation advocacy groups and labor unions are also potential partners depending on the interests of local groups and the needs of the community.

In creating workable coalitions, try to balance the desire for broad support from many sectors of the community and the need to keep the groups from becoming unwieldy.

Educate Colleagues and the Public

Once you take your baseline, look at applicable planning approaches, and assess potential partners, the next essential step is to articulate the need for a plan to your city, town or county government. As part of your internal outreach, you may want to create a project brief that outlines possible benefits, looks at costs and creates a timeline for major milestones.

Based on an analysis of various sustainability plans, the best ones are concise, discuss top-level goals and are not too technical. They emphasize the challenges unique to individual communities and the benefits of planning for the community. They also make a combined appeal to civic culture, area values and economic benefits.

Strong leadership is essential to the success of your sustainability plan. This role can be taken on effectively by an elected official, a planning or community development department in the local government, a community-based commission, a prominent local business or a hybrid ap-

proach that combines all of these stakeholders. The importance of leadership cannot be over estimated.

In developing your plan, confirm that leaders in local government and senior managers in implementing departments are aware of:

- the implementation strategy and schedule for the programs
- the estimated labor commitment needed for program success
- when, how and what to communicate to employees on a regular basis
- how your programs align with current management plans and programs

One of the most significant challenges in discussing sustainability is creating greater public awareness of the interdependence between the environment, the economy and community life, and the reasons they don't have to conflict with each other. Cooperation between public agencies, non-profit organizations and the private sector can create compelling messages and materials to improve public understanding of the issues and the planning process. Effective outreach materials should be specific to your area and based on the actual experiences of local people, organizations and the government.

Recommended Resources:

Place Matters

www.placematters.org

Sustainable Communities Network

www.sustainable.org/living/education.html 

The Education for Sustainability web site, created by the Center for a Sustainable Future.

www.ffof.org/pcsd/toc.html

The Green Chill Partnership

<http://www.epa.gov/greenchill>

Secure Funding, Reduce Costs

As initial planning is conducted and environmental objectives are being defined, you will also need to consider how you will fund the planning process and future projects. Just as each municipality's sustainability plan will vary, so will their approach towards funding.

Some municipalities find support through government grants programs. Various grants are available from EPA, the U.S. Department of Energy and state departments of environmental protection. For example, the Burlington Legacy Project in Vermont was funded in part by an EPA Sustainable Development Challenge Grant.

TIP: Prepare your organization to apply for grant opportunities by registering your search parameters and automatically receive an e-mail notification of new grant opportunities.

www.grants.gov/search/subscribeAdvanced.do

Public-private partnerships are also potentially valuable financing tools. The United States Conference of Mayors provides numerous examples of municipalities teaming up with non-governmental organizations, utilities, water boards, businesses and other partners. Not only do such efforts frequently result in funding to help in reaching sustainability goals, they also help foster support for planning efforts.

Among the most frequently cited and successful sources of sustainability funding are programs that result in cost savings. In some cases, upfront investment in long-lasting infrastructure — projects that are amortized over decades — can be offset by long-term savings.

According to the United States Conference of Mayors, typical cost savings come from:


- energy reduction strategies (e.g., on-site



- renewable energy or replacement of lighting with high-efficiency alternatives)
- purchase of low-energy appliances
- green building projects
- vehicle emissions reduction programs such as the replacement of leaking gas caps
- arbor projects that add shade and/or create natural stormwater buffers
- recycling programs
- education and training
- traffic-signal optimization

Weighing the benefits and costs of a given approach is a frequent first-step in the budgetary process, but it is rarely straightforward, especially when assessing environmental benefits. How does one quantify the value of clean air, open space, a pristine shoreline, quality of life, or, for that matter, human lives, especially those of future generations? One broad rule of thumb is that it is usually best to start with the most pressing problems and those that lend themselves to the most direct and cost-effective solutions. Then use a systematic planning approach such as an environmental management system (EMS), described in the next section of this handbook, to continue to improve performance over time.

It is also important to consider the full cost and full benefits of each approach to determine an accurate payback period. For example, preventing sewer overflows into rivers and seas can improve drinking water, aquatic-based commerce and tourism. Electricity and fuel-saving programs can reduce operating costs, and recycling materials, like aluminum and copper, can be lucrative. The payback periods may be shorter than you think. In just one instance, the San Diego Refuse Disposal Division saved \$868,000 in heavy equipment and diesel charges by shutting off equipment during breaks and lunch periods.

 **TIP:** Use ENERGY STAR®'s Cash Flow opportunity calculator to estimate the payback period for investments. ENERGY STAR is a joint EPA, U.S. Department of Energy program that helps businesses

and individuals protect the environment through superior energy efficiency.
www.energystar.gov/ia/business/cfo_calculator.xls

Recommended Resources:

EPA and other federal grant opportunities
www.grants.gov

The U.S. Department of Energy database of incentives for renewable energy and efficiency
www.dsireusa.org 

U.S. Department of Energy Funding for Energy Efficiency
www1.eere.energy.gov/financing/

The U.S. Department of Housing and Urban Development - Home Ownership Zones.
www.hud.gov/offices/cpd/affordablehousing/programs/hoz

EPA's Guidebook of Financial Tools: Paying for Sustainable Environmental Systems www.epa.gov/efinpage/efinfin.htm

Center for American Progress Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy www.americanprogress.org/issues/2008/09/pdf/green_recovery.pdf

EPA-industry partnership to reduce greenhouse gas emissions from businesses
<http://www.epa.gov/stateply/>

Use a Planning Framework

Even the most successful sustainability planning effort needs a systematic approach for managing and reducing environmental impacts. Environmental Management Systems (EMS) provide a vetted



framework that allows communities to address both specific and broad environmental issues in order to realize desired outcomes. By addressing root causes and integrating environmental approaches into everyday operations, environmental stewardship can become a priority across your entire organization.

Every EMS follows a basic four-step model:

- the Plan phase is used to analyze current environmental impacts and legal requirements, and then to set appropriate environmental goals and objectives
- the Do phase moves to implementing specific programs and processes to meet objectives and targets. Tasks might include training employees and establishing operational controls. Being precise about assigning responsibilities to ensure accountability is a must
- the Check phase includes internal auditing, monitoring progress, assessing successes and failures, identifying areas for improvement and benchmarking. Evaluating employee understanding of the system and retraining employees when necessary is key to keeping the system current and useful

- the Act phase is for reviewing progress, performing management reviews and implementing improvements to the plan, which can start the planning process anew

General information the EMS process can also be found on EPA's Web site:

www.epa.gov/ems/index.html

EPA has found that an EMS can help municipalities:

- improve environmental performance and enhance regulatory compliance
- prevent pollution and conserve resources
- reduce environmental hazards
- attract new businesses and create new markets
- increase energy efficiency and reduce costs
- enhance employee morale and awareness as well as recruiting
- enhance a community's image with the public, regulators, lenders and investors

Communicating the successful results of your EMS is a great way to demonstrate cost savings, environmental improvements and leadership.

Recommended Resources:

The Public Entity EMS Resource Center
www.peercenter.net/

Clean Air Climate Protection (CACP) software by Local Governments for Sustainability (ICLEI)
<http://www.icleiusa.org/action-center/tools/cacp-software>

Climate and Air Pollution Planning Assistant (CAPPA)
www.iclei-usa.org/action-center/tools/decision-support-tool

The International Organization for Stan-

dardization (ISO)

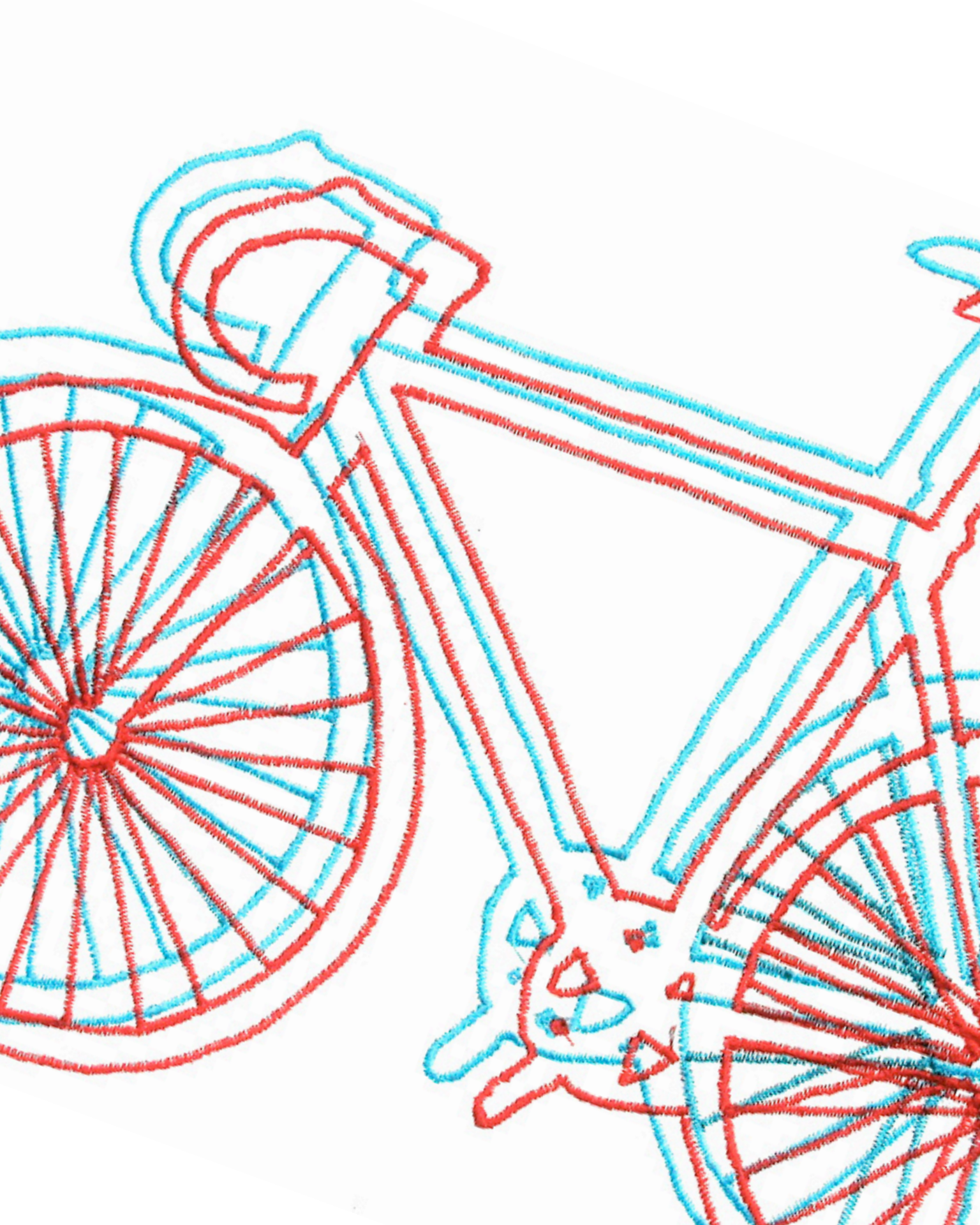
www.iso.org/iso/iso_catalogue/management_standards/iso_9000_iso_14000/iso_14000_essentials.htm

Sustainability Reporting Framework and Guidelines

www.globalreporting.org/AboutGRI/

The U.S. Green Building Council - new LEED® (Leadership in Energy and Environmental Design) system for neighborhood design.

www.usgbc.org/DisplayPage.aspx?CMSPageID=148



3

Areas of Opportunity

Transportation

In 2005, according to the U.S. Department of Transportation, traffic congestion resulted in 4.2 billion hours of travel delay, 2.9 billion gallons of wasted fuel, and a net urban congestion cost of nearly \$80 billion. The social and environmental impacts of congestion, such as the value of lost time and extra air pollution created by idling, are no less important. Proposing more and wider roads only temporarily mitigates congestion and results in lasting consequences – more air pollution from increased vehicle traffic, more stormwater run-off due to increases in impervious surfaces, and threats to open spaces and wildlife corridors.

What are called for are innovative approaches that add more options for public transportation and reduce the need for driving. The good news is that communities that have successfully added public transportation and revitalized downtown areas have often reaped big rewards, including reduced commute times, improved air quality and a reduction in greenhouse gas emissions. Other less quantifiable benefits include reduced asthma rates, improved integration of disparate neighborhoods, especially for communities with environmental justice concerns, and increased safety for pedestrians, cyclists and drivers alike. Commuters who have public transportation options are often able to save money, especially as fuel prices continue to increase. Promoting walking and bicycling can promote physical fitness and reduce health care expenses.

Best Practices and Solutions

Planning approaches range from simple changes of existing infrastructure to comprehensive efforts to rethink how a region travels. Although the creation of major new projects, such as the introduction of light rail, can take time and require major capital spending, these efforts can be linked with other large-scale projects to revitalize downtowns and reshape development patterns.

There are a range of feasible and cost-effective transportation approaches that are worth considering, including:

-  car-pooling programs
- creation or upgrade of bike lanes and paths, sidewalks and walking paths to encourage non-motorized transportation
- installation of clean diesel technologies on municipal vehicles, equipment and buses
-  upgrade and expansion of public transportation services such as bus rapid transit, trolleys, ferries, trains and light rail
- optimization of transportation routes and timing
- agreements with local businesses to stagger delivery and commute times, and encourage telecommuting
-  incentives to use public transportation by providing park and ride spaces
-  promotion of car sharing services such as providing on-street parking for car sharing businesses in your community
-  support of walking and biking by providing bike route maps, bike parking and street beautification programs
- development of “transportation corridors” between communities by linking existing public transportation services with neigh-

boring communities

- creation of public transportation along or parallel to existing highway/arterial corridors

To develop a strategic action plan for sustainable transportation, communities may need to establish a dedicated planning group to work jointly with local, state and federal agencies. Reducing congestion and improving access to public transport requires the integration of land use planning for new residential development and major employment and entertainment attractions with the creation of accessible transit hubs.

Measuring Success

Communities may evaluate their progress by measuring operational effectiveness and efficiency, environmental impacts, behavioral changes in public transportation choices and infrastructure security. Some specific indicators could include:

- fossil fuel consumption, by mean annual gallons of fuel savings
- greenhouse gas emissions, in annual tons of carbon equivalents
- traffic congestion, in total hours saved each year
- commute times, by average length
- miles of bike lanes
- public transit ridership and system revenue
- miles of public transit routes
- distance traveled to public transportation circuits
- results of rider or driver satisfaction surveys
- plans to modify public transportation systems such as retrofitting buses or investing in electric-powered systems
- the number of people traveling by car-pool

Recommended Resources:

EPA, HUD and DOT Partnership Agreement

<http://www.epa.gov/dced/pdf/dot-hud-epa-partnership-agreement.pdf>

EPA, HUD and DOT Livability Principles

<http://www.epa.gov/dced/2009-0616-epahuddot.htm>

EPA State and Local Transportation Resources

www.epa.gov/otaq/stateresources/index.htm

EPA Transportation Conformity Resources

www.epa.gov/otaq/stateresources/transconf/index.htm

The U.S. Department of Transportation - Transportation Toolbox for Rural Areas and Small Communities and Urban Partnership Agreements.

<http://ntl.bts.gov/ruraltransport/toolbox/www.upa.dot.gov/>

The U.S. Department of Transportation - "Transportation Vision for 2030"

www.webs1.uidaho.edu/ce501-400/resources/Addressing%20sustainability%20in%20transportation%20systems.pdf

The U.S. Department of Transportation - how to get funding for bicycle and pedestrian projects.

www.fhwa.dot.gov/environment/bikeped/bp-broch.htm#funding



Transportation Case Study: Gadsden, Alabama Municipal Biodiesel Production

One renewable fuel alternative to conventional petroleum-based diesel fuel is biodiesel, which can be made using vegetable oils or animal fats. Because biodiesel can be produced on a relatively small scale, municipalities have begun to collect used cooking oil and waste vegetable oil to convert into biodiesel fuel for use in municipal vehicle fleets. In order for a municipality to determine whether biodiesel production is an appropriate and feasible option, the following must be considered:

- availability of used cooking oil and waste vegetable oil in the community
- ways to develop a recycling program and to process the oil into biodiesel
- testing procedures for the finished fuel product, and
- methods for storing and dispensing the fuel

Recycling waste products by converting it to fuel will reduce the demands on landfills and wastewater treatment facilities. Following established procedures to convert waste vegetable oil ensures that municipalities are creating a safe, clean fuel product that complies with federal regulations for fuel quality.

The city of Gadsden, Alabama has successfully implemented a waste vegetable oil recycling and biodiesel production program since the fall of 2007. Soaring fuel costs, along with extremely high maintenance costs for its wastewater treatment system resulting from grease introduced by households and restaurants, encouraged the city to initiate this waste vegetable oil recycling and biodiesel production program. The city minimized fuel expenditures while reducing wastewater treatment system maintenance by converting the used cooking oil from local restaurants and households into biodiesel that is used to fuel the vehicles in the municipal fleet.

The city's municipal fleet staff worked in partnership with personnel from Auburn University and the Alabama Cooperative Excursion System to develop and establish the system for biodiesel production. Steel drums and plastic jugs were

used for restaurant and residential waste vegetable oil collection. The oil was poured or pumped into chemical storage totes; excess water was removed before pumping the oil into a biodiesel processor where the transesterification process occurred. After the reaction was completed, the biodiesel was separated from the byproduct glycerin, which is commonly used to manufacture soaps, and allowed to cool. The finished biodiesel was then blended with conventional diesel fuel to create B10 (a mix of 10% biodiesel and 90% ultra low sulfur diesel) and B20 (a mix of 20% biodiesel and 80% ultra low sulfur diesel) blends for a variety of diesel fleet vehicles and equipment.

To educate the public about the program and to gain community support, a media event was held at the city's fleet facility during which political leaders, representatives from fleet management, and other key players explained the program goals and shared basic information on biodiesel production. The city's fleet management also reached out to the local restaurants to notify them about the new program to recycle waste vegetable oil. Gadsden collects approximately 80% of the waste vegetable oil from restaurants and 20% from homes.

Overall, this program has provided the city of Gadsden, Alabama with cost and fuel savings, improved air quality and reduced sewer maintenance costs. Since the program began, there have not been any reports of fleet vehicle maintenance problems and the fleet manager, along with the mayor and the city council, are pleased with the results of the program and committed to continuing and expanding it.

For additional information on the waste vegetable oil recycling and biodiesel production program in Gadsden, Alabama:
<http://farmenergy.blogspot.com/>

For more information on producing biodiesel for municipal vehicle fleets:
<http://www.nrmdi.auburn.edu/bio/documents/AUMunicipalBiodieselGuideFINAL.pdf>




Land Use Planning

Land use planning is a critical element in developing vibrant and livable communities, increasing property values, ensuring economic vitality, addressing potential human health issues, promoting transportation efficiency, ensuring affordable housing, and improving environmental sustainability. Compact, efficient urban development improves the health and quality-of-life of area residents, revitalizes the local economy and increases environmental sustainability. Development of compact areas, even in small downtown areas, can reduce travel times, help preserve open space and reduce the commercial pressure to sprawl. Neighborhoods with walkable areas stimulate a strong sense of place, encourage a healthier environment where individuals get more daily activity and breathe cleaner air and enhance an area's overall livability, while encouraging the development of strong, vibrant communities with a reduced carbon footprint. Open green spaces not only contribute to emissions absorption and cleaner air but also promote recreational activity.

Zoning is the main tool in land use planning and can be used to direct development and redevelopment in urban areas to ensure that municipalities grow in a sustainable manner. Innovative land use planning policies and smart growth techniques are central in creating comprehensive municipal sustainability plans.

Larger municipalities may find it beneficial to create a new office for sustainability to work in cooperation with existing planning. Smaller municipalities may not have this option. In such cases, it may be effective to recruit local residents, community leaders, business owners and environmental groups to advise local government on land use decisions and development goals.

Best Practices and Solutions

 Smart Growth is a principle-based approach to development that values the residents, environment, and uniqueness of communities. Some of the general smart growth principles include: distinctive attractive communities with a strong sense of place, walkable communities, directing developing towards existing communities, preserving natural beauty and critical environmental areas, stakeholder collaboration, and offering a range of housing opportunities.

Smart growth principles can be applied to a range of critical planning issues including community quality of life, urban design, economic development, environmental issues, human health, affordable and accessible housing, and transportation. Smart growth principles usually encompass the following:

- a range of housing choices and price-points based around compact, walkable neighborhoods
- mixed land use in the form of combined retail and residential development
- community and stakeholder collaboration in development decisions
- support for distinctive, attractive communities with a strong sense of place
- predictable development decisions that are fair and cost effective
- preservation of open space, farmland, natural beauty and critical environmental areas
- a variety of transportation choices
- development directed towards existing communities and transportation corridors
- compact building design
- appropriate remediation and redevelopment of brownfields
- formal parks and plazas in proximity to residential areas

Large cities such as Denver, Seattle and Portland offer excellent insight into sustainable land use planning practices. While smart growth principles offer an excellent theoretical framework for taking steps towards sustainable growth, these city planning departments have demonstrated how such principles can be used on the ground.

Measuring Success

Some specific indicators of successful land use planning are:

- population density and distribution
- percent of green space per neighborhood
- vehicle miles traveled per capita and average commute times
- frequency of walking or bike trips per capita
- results of surveys of neighborhood safety and livability
- energy use per capita
- number of energy efficient buildings in the municipality

Recommended Resources:

EPA's Smart Growth techniques
www.epa.gov/smartgrowth/

Smart Growth Principles
www.smartgrowth.org/

EPA Brownfields Assessment Grants can be used for community planning
http://epa.gov/brownfields/assessment_grants.htm

The City of Portland's Sustainable Development Commission guide for identifying indicators and measuring progress to determine the success of sustainable planning and development strategies
www.portlandonline.com/shared/cfm/image.cfm?id=133058

Seattle Department of Planning and Development
www.seattle.gov/dpd/

Green Print Denver
www.greenprintdenver.org/

City of Portland Bureau of Planning
www.portlandonline.com/planning/

Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices
http://www.epa.gov/oswer/docs/ghg_land_and_materials_management.pdf

Smart Growth for Coastal and Waterfront Communities
<http://www.epa.gov/smartgrowth/sg-coastal.html>

Anticipated impacts of sea level rise on the Eastern Seaboard
<http://www.epa.gov/climatechange/effects/coastal/sap4-1.html>

Sierra Club Cool Cities program
www.coolcities.us/resources.php

Dept of Commerce's Sustainable Manufacturing Initiative
<http://www.trade.gov/competitiveness/sustainablemanufacturing/index.asp>



Land Use Planning Case Study: Portland, Oregon Land Use Planning Evolves

Recognized among American cities as one of the most dedicated to planning, Portland is frequently cited for its progressive transportation and land use policies, downtown redevelopment and success in containing urban sprawl. Building on this success, Portland's Bureau of Planning initiated a comprehensive plan to guide growth and development within the city over the next 30 years. The "Portland Plan" identifies a number of goals and outlines regional development policies that encourage walking, access to public transit and the preservation of open space, while allowing for population growth and economic development.

The goals of the plan include:

- creating a rich and enjoyable environment for pedestrians throughout the central city
- striving for excellence in the design of new buildings
- encouraging construction to enhance the human scale of buildings, streets and open spaces
- promoting districts with distinct characters and a diverse and rich mixture of uses
- identifying and protecting significant public views
- locating the highest density populations downtown and along potential and existing transit corridors

Through careful planning and a holistic approach to land use decisions, Portland's Bureau of Planning has allowed for substantial increases in new jobs, housing units and commercial spaces, without increasing the number of acres occupied by the central city.

Further information is available online:

www.portlandonline.com/planning



"Land-use planning should protect ecosystems and open space as these areas often provide critical natural services."



Biological Conservation and Open Space Preservation

As our nation's population continues to grow and as development of open space continues, preserving special natural places and prime agricultural land becomes ever more important. Open space can be a soggy wetland, a verdant forest or a breezy grassland. 🌍 These ecosystems provide habitat for an abundance of wildlife, critical protections such as flood control, and add to aesthetic appeal, CO2 absorption and a general sense of well-being.

Preserving open space is a frequently used strategy in comprehensive municipal sustainability planning and garners high levels of public support because of the attractiveness of open spaces and their value to local residents both socially and economically. Open space preservation can provide aesthetic appeal and recreation opportunities, while enhancing local real estate values and making communities more livable. Burlington, Vermont; Westchester County; Sarasota County, Florida; Brownsville, Texas; and Davis, California all provide excellent examples. Lake Champlain Bikeways, for example, a public-private partnership in Burlington, Vermont connects various practical as well as historic sites around the city, appealing to both residents and visitors alike.

Best Practices and Solutions

Techniques to safeguard environmentally sensitive areas vary across communities and types of surrounding ecosystems.

EPA identifies three of the most common approaches:

- protecting wetlands
- establishing buffers along rivers and streams
- creating greenbelts and conservation easements

Plan Smart New Jersey identifies three key open space protection tactics. First, it promotes conservation easements, restrictions requiring a property to be maintained forever in an underdeveloped or natural state. Second, it encourages developer set-asides, which are voluntary protections created when projects are planned. The Plan Smart guide suggests that for maximum effect, "the jurisdiction should encourage developers to set aside land in stream corridors, mature forests, and other key environmental areas identified during the planning process, or it should use the in-lieu contributions to purchase this land." And third, it includes outright purchase, which, "provided the jurisdiction is committed to maintaining the land in a natural state, is the best way to ensure that land remains preserved."

Measuring Success

Some specific indicators for biological conservation and open space preservation are:

- acres of land in easement
- acres of protected wetland areas
- number of bike paths in proximity to popular sites
- completing an assessment of ecosystem services in your community

Recommended Resources:

EPA - Community Based Environmental
Protection

www.epa.gov/care/library/howto.pdf

New Jersey's Plan Smart Full Guide

www.plansmartnj.org/projects/gig/index.html

The Defenders of Wildlife Incentives for
Conservation

www.defenders.org/programs_and_policy/habitat_conservation/private_lands/landowner_incentives

New Jersey Natural Capital Study

<http://www.state.nj.us/dep/dsr/naturalcap/nat-cap-1.pdf>



Open Space Preservation Case Study: Burlington, Vermont Engaging Community to Protect Wildlife

As the area around Burlington grows, wildlife and people have been coming into greater contact. As part of the city's open space preservation efforts, volunteers are gathering data on where animals live and the routes they travel to help them make informed decisions about ecosystem protection, land use planning and development.

The volunteers are trained by a local non-profit organization, Keeping Track, which encourages community participation in the long-term stewardship of wildlife habitat. This mission is achieved through monitoring, cooperation, data management, conservation planning and education.

Volunteers must complete six full-day training workshops in the field plus two classroom sessions. Participants are taught scientifically-based data collection methods and then help with field work, monitoring and other facets of the program. Keeping Track has trained nearly 1,300 volunteers, representing almost 100 communities, and has gathered valuable data to help shape local land use preservation efforts.

Further information is available online:

www.keepingtrack.org/





Solid Waste Generation and Recycling

According to EPA statistics for 2006, the average person in the U.S. generated 4.6 pounds of waste per day and recycled 1.5 pounds. The energy saved by recycling is the equivalent of more than 10 billion gallons of gasoline per year. Yet, the two most common management strategies for municipal garbage are to construct local landfills to dispose of solid waste or to transport the waste to other communities.

As populations increase, landfills reach capacity and newer facilities remain difficult to site. If municipalities choose to remotely dispose of their waste, they incur the added cost of transporting it. These costs include depreciation of vehicles, personnel hours to transport trash, fuel for the vehicles, long-term costs of environmental degradation, as well as administrative costs and uncertainty associated with contract negotiations.

Wherever your trash goes, a comprehensive sustainability plan should have the goal of reducing the amount of trash that enters the waste stream. Solutions include programs to encourage recycling and reusing materials, increasing composting of organic waste and turning waste into usable energy. More and more communities are looking at their waste stream as a potential source of energy. The term waste-to-energy is used for many different types of projects, including capturing landfill methane for electricity generation or fuel use, diverting organics for processing in anaerobic digestors, or converting waste vegetable oil into biodiesel.

As we reduce our waste stream, more land can be used for other services, and less money needs to be spent to manage waste. A community sustainability plan should address the 3 R's of the waste stream — reduce, reuse and recycle.

In addition, many items placed in household trash are hazardous materials that should be disposed of properly. These include paints and chemicals, batter-

ies, electronics (E-waste) and light bulbs. Construction debris and materials (C&D) come from waste that results from the construction, renovation and demolition of buildings, roads and bridges. While C&D is not accounted for in municipal solid waste, the municipal waste stream includes building demolition and renovation materials from construction.

Best Practices and Solutions

A waste audit is a crucial first step in reducing the flow of garbage. It can identify opportunities for waste diversion, prevention and reduction, and increasing recycling. Review historic data to determine how much is being thrown out, how much is being recycled (if a program exists), and any other programs that your community may have in place. It's also important to document the costs associated with disposal and reduction programs.

Once a basic inventory is complete and a baseline is defined, you can identify targets. Your initial target could be as simple as starting a recycling program (if one doesn't exist) or expanding an existing program. Using the baseline inventory, you can monitor and compare future waste generation to see if your program is a success.

Reducing Waste:

- implement a "Pay as you Throw" system that charges residents for what they actually throw out to encourage them to discard less to save money
- use full cost accounting, which identifies and assesses the costs associated with managing a solid waste facility to account for the real costs of solid waste management. It also assists with short and long-term planning by local policy makers to identify opportunities to streamline and improve operations

- implement or expand a compost program. Organize short-term seasonal events specifically for grass clippings, fallen leaves or Christmas trees. Later, transition to a long-term municipal-run food waste program for residents, farmer's markets, local restaurants/businesses or schools and hospitals
- make better purchases. Buying products that are longer lasting or recyclable, contain less packaging materials, and are less harmful to the environment is a proactive step to reducing your municipal solid waste. Refer to the green procurement section for more information

Reuse and Recycling:

- improve information on how to recycle properly and create incentives for recycling programs in your community
- provide opportunities for second life or reuse of soft used items, such as a materials and waste exchange

Safe Disposal of Hazardous Waste:

Both commercial and residential hazardous wastes are harmful to the environment and to human health if not disposed of in the appropriate manner. Whether it's an annual or year-round program, household and commercial hazardous waste should be a part of your municipal solid waste reduction program to ensure these materials are disposed of appropriately.

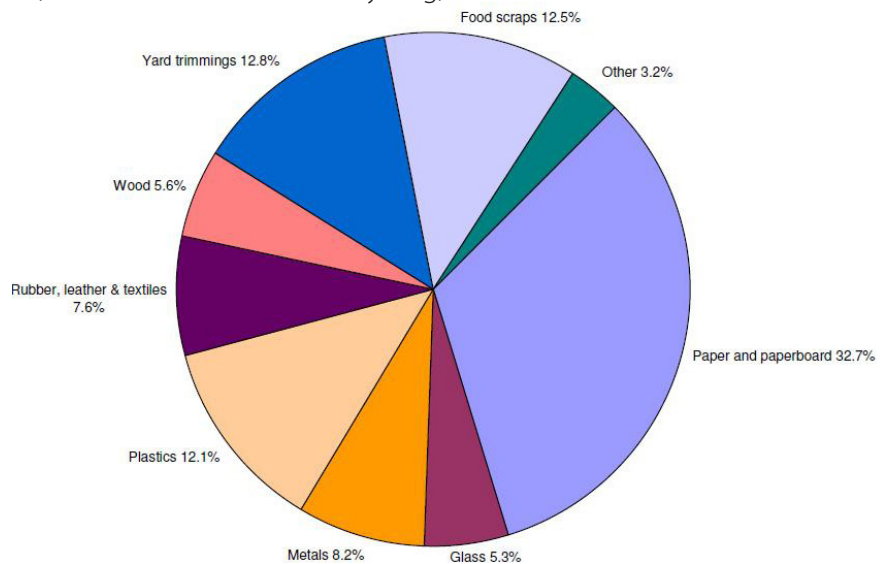
E-Waste:

Electronics waste is an increasing component of local waste streams and the new frontier in solid waste management. Many municipalities and facilities have instituted programs to address hazardous materials in the waste stream. E-waste programs are still relatively young, and often experimental. As a result, E-waste is generally handled through special collection events rather than as a continuous collection program.

According to EPA, approximately 1.9 to 2.2 million tons of used or unwanted electronics was disposed of in 2005. The majority, 1.5 to 1.9 million tons, was disposed of in landfills, while only 345,000 to 379,000 tons were recycled. It is clear

Municipal Solid Waste, Materials Generated in 2007

(254 Million Tons before Recycling)



Source: EPA, 2007

that there is still considerable room for improvement, and e-waste strategies should be an integral component of any local sustainability planning effort.

Construction and Demolition (C&D) disposal:

Keeping this material out of the waste stream can conserve landfill space. C & D waste reduction can also be addressed through green building practices and by setting up recycling centers for building materials.

Measuring Success

Some specific indicators for solid waste generation and recycling are:

- reduction of the waste stream reaching local landfills or being exported
- increased percentage of recycled materials (e.g., metal, plastic, glass, paper, yard trimmings and E-waste)
- reduction in the amount of recycled materials found during a secondary sort

- creation of a waste stream baseline via an audit

TIP: EPA has developed a voluntary, standard methodology for measuring recycling rates. This Web site helps state and local government officials learn more about the standard methodology:
www.epa.gov/recycle.measure/

Recommended Resources:

EPA's Waste web site
www.epa.gov/epawaste/index.htm

EPA Waste Assessment Web site
www.epa.gov/epaoswer/osw/conserve/onthego/program/assess.htm


Decision Makers' Guide to Solid Waste Management
<http://www.epa.gov/osw/nonhaz/municipal/dmg2/>

The EPA WasteWise partnership program
www.epa.gov/wastewise/

EPA's Pay As You Throw (PAYT) program
www.epa.gov/payt/intro.htm
www.epa.gov/epawaste/conserve/tools/payt/states/index.htm

EPA Full Cost Accounting Resource
www.epa.gov/epawaste/conserve/tools/fca/index.htm

The Florida State Department of Environmental Protection - full cost accounting software & report, "The FUNdamentals of FCA"
www.dep.state.fl.us/waste/categories/fca/default.htm

EPA - composting, local legislation, environmental benefits, publications and links
www.epa.gov/compost/ 

Maryland annual 40% waste reduction initiative
<http://www.mde.state.md.us/programs/Land/RecyclingandoperationsProgram/Pages/Programs/LandPrograms/Recycling/index.aspx>

EPA Report "Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices"
http://www.epa.gov/oswer/docs/ghg_land_and_materials_management.pdf

EPA's In Your Community Web site
www.epa.gov/osw/wycd/community.htm

EPA tools to reduce local consumption
www.epa.gov/osw/conserve/tools/localgov/index.htm

Communicating the Benefits of Recycling
www.epa.gov/osw/conserve/tools/localgov/benefits/index.htm

EPA guidelines for procuring recycled-content products
www.epa.gov/epaoswer/non-hw/procure/index.htm 

Recycling Market Exchange
www.epa.gov/jtr/comm/exchange.htm

San Francisco EcofinderRRR - allows residents to look up what can be recycled, reused or disposed of, how to do it, and where to bring it
www.sfenvironment.org 

EPA's Recycle on the Go initiative
www.epa.gov/epaoswer/osw/conserve/onthego/index.htm

Earth 911
<http://earth911.org/>

RecycleBank.org
www.recyclebank.com/

San Francisco's Zero Waste Program
http://sfenvironment.org/our_programs/overview.html?ssi=3

Resource Conservation and Recovery Act (RCRA) on-line program

www.epa.gov/osw/inforesources/online/index.htm

Proper disposal of paints, pesticides, cleaners, oils and other types of household hazardous waste

www.epa.gov/osw/conserve/materials/hhw.htm

EPA e-cycling resources and tips

www.epa.gov/osw/conserve/materials/ecycling/index.htm

Goodwill Industries and Dell Computers partnership to reuse and recycle

www.reconnectpartnership.com/

Waste-to-energy information

www.epa.gov/cleanenergy/energy-and-you/affect/municipal-sw.html

EPA's Landfill Methane Outreach Program

www.epa.gov/lmop/

In 2003, San Francisco adopted aggressive waste reduction goals. By 2010, the city aims to divert 75 percent of waste headed to the landfill; by 2020 the goal is to divert 100 percent of the waste stream. According to the Department of Environment's Strategic Plan, they are currently two thirds (69 percent) of the way to reaching their zero waste goal. The city has made rapid progress by implementing a 3-cart system for waste collection, providing grants, forging partnerships and promoting a host of other recycling and waste reduction initiatives.

The 3-cart system is a convenient, user-

friendly system that encourages recycling of waste by making the process as easy as possible. Containers are color coded to help sort waste into the appropriate cart: bottles, cans and paper in the blue cart, compostable items (food scraps and yard waste) in the green cart and all non-recyclable, non-compostable garbage in the black cart.

The ecofinderRRR Web site-based program has a quick and advanced search function to find out how to dispose of almost anything. The extensive database of options can be sorted by material, location, services (e.g., pick up, drop off, etc.), end use (e.g., recycle, repair, reuse, etc.), and by associated costs (e.g., buy back, free, payment, etc.).

Collaboration between SF Environment, the Commission on the Environment, the Board of Supervisors and the Mayor has been extremely successful at creating policy by passing resolutions and ordinances that help reach the zero waste goal. The intent is to have the government lead by example while encouraging the general public and private sector to follow along. Recent resolutions are encouraging innovative approaches such as "precautionary" purchasing to minimize waste, a demolition debris recovery plan and a new program to recycle computers and electronics.

SF Environment also offers a variety of grant programs that disperse approximately \$600,000 a year to initiatives that increase the diversion of waste in a cost-effective way. Funds are available to non-profit organizations for projects ranging from reuse



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Express

Express

CASH

Express

CASH
TICKET

X11 VIA WEST 4TH ST
078

9 NEW YORK 9
078

X10 VIA JEFFERSON
078

X7 VIA WEST 4TH ST
VIA 6 AVENUE
078
1933

X19 VIA CHURCH
078

11

Energy, Air Quality and Climate

Communities need reliable sources of affordable energy. With rising fuel prices and growing concerns about the impacts of fossil-fuel power generation, sustainable energy solutions have never been more important, especially at the municipal level. Energy based on fossil fuels, whether for electricity, heating or transportation, results in air pollution. 🌍 Fossil fuel consumption causes both chemical and particulate air pollution, better known as smog. Ozone and acid rain can be problems too, depending on local conditions. The burning of fossil fuels contributes more than 80 percent of total annual U.S. greenhouse gases.

Improving energy efficiency and adding renewable energy sources can help communities reduce air pollution while reducing the output of greenhouse gases. In turn, reduced air pollution can improve public health and lower energy costs. By integrating energy efficiency strategies into your community planning process, the cost of improvements can be kept to a minimum. Renewable energy development, biofuel production and retrofits or upgrades of existing infrastructure often create new opportunities for green collar jobs. Combining these approaches with transportation efficiency improvements discussed earlier make an even bigger difference.

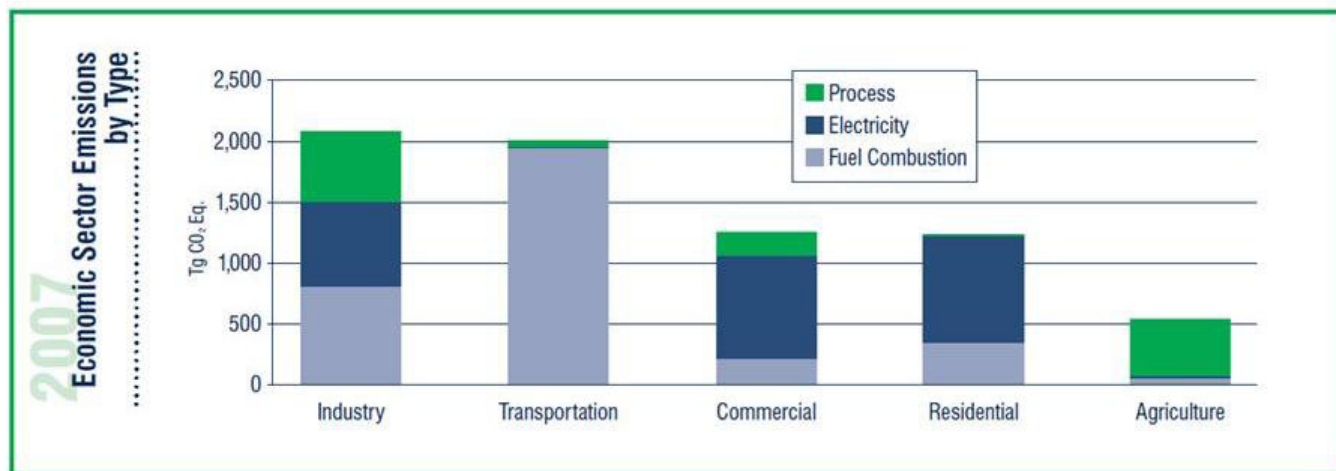
Best Practices and Solutions

Save Energy

Energy efficiency is often the best place for localities to start when trying to make more effective use of resources. Although efficiency upgrades can require initial investment, by increasing the level of efficiency, these upgrades frequently pay for themselves in nine months to three years as shown by the Portland case study.

Strategies to promote energy efficiency include:

- conducting an energy audit of city buildings to identify the most cost-effective projects. Utilities and energy service providers often offer them
- joining Portfolio Manager and save



Source: US EPA 2009

money and energy by tracking building energy use

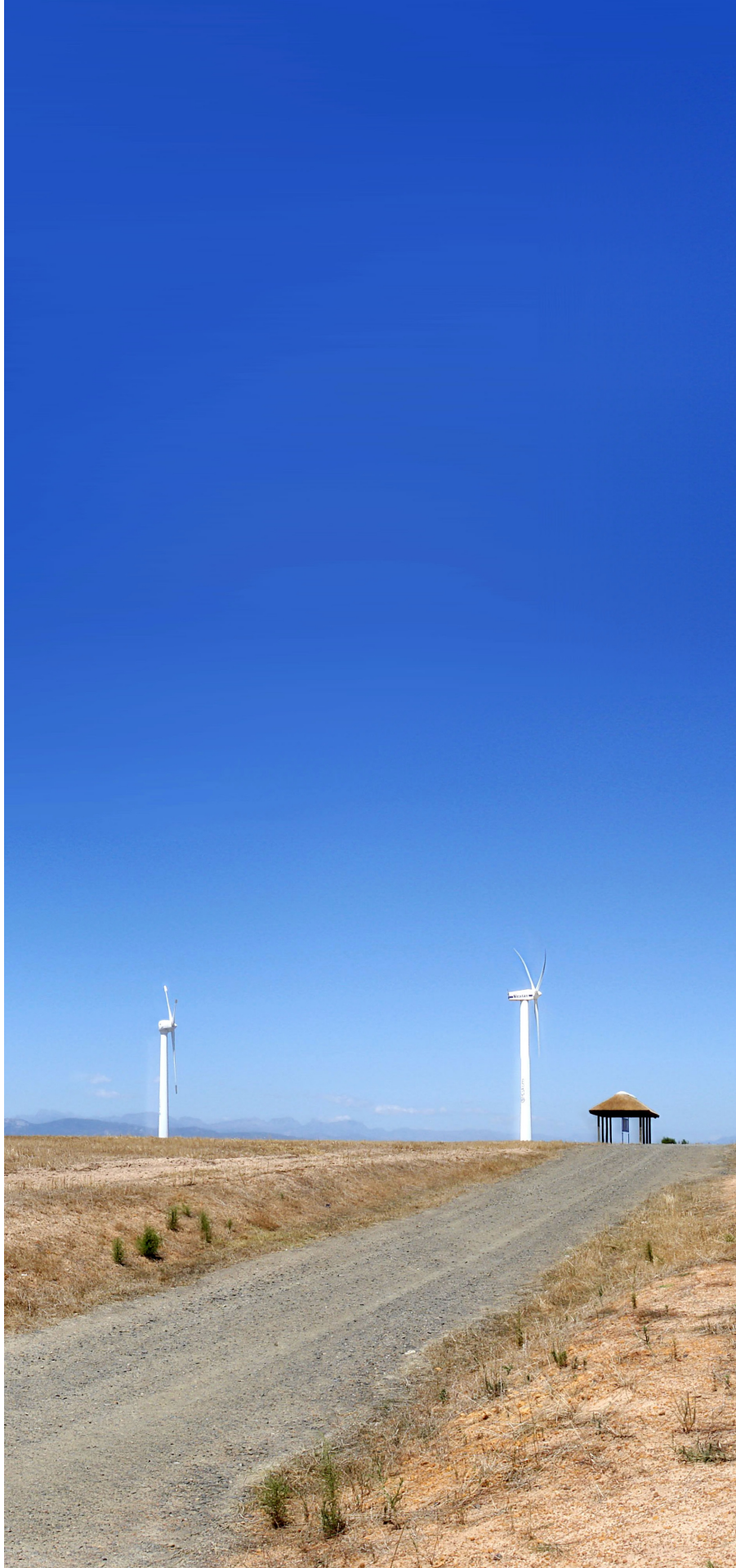
- bringing the ENERGY STAR challenge to your community
- encouraging and supporting private audits in both businesses and residences through the provision of information, technical support or even economic incentives or awards
- starting a weatherization program in local neighborhoods with old housing stock
- promoting the ENERGY STAR "Change-A-Light" program to local businesses. By replacing older lighting systems with higher efficiency lighting, communities can reap significant gains in both energy use and, in many cases, operation and maintenance spending as well
- supporting energy efficiency upgrades by local industry to improve the efficiency of appliances; heating, ventilation and air conditioning systems; and industrial process equipment
- purchasing energy efficient equipment, appliances - see the Green Procurement section

Use Renewable Energy

Local governments can buy renewable energy, and promote consumer option programs. Building and maintaining renewable energy installations can be a source of new "green collar" jobs for communities. Three great examples are described online at:

- www.njcleanenergy.com/renewable-energy/programs/cleanpower-choice-program/new-jersey-cleanpower-choice-program
- www.portlandonline.com/auditor/index.cfm?a=146102&c=28608

Communities can also promote distributed generation or, the use of small-scale power generation technologies located close to where energy is used. Examples of distributed generation power can be sourced by fuel cells, microturbines, photovoltaic panels and small scale wind. This strategy avoids the loss of energy during transmission and can boost local economies through new development and lo-





cally earned profits. More importantly, it can give facilities energy reliability during extreme storms. Renewable energy can potentially offer more stable costs in a market of rising energy costs. Local strategies to promote clean energy include:

- micro-generation
- on-site solar
- combined heat and power
- geothermal
- wind
- landfill methane capture

TIP: To find out how energy is produced in your community, type in your zip code at:

www.epa.gov/cleanenergy/energy-and-you/how-clean.html

Measuring Success

Measurements of success for energy can include:


- dollars saved on energy costs
- units of energy consumption reduced (e.g., Btu's)
- amount of local energy supply from renewable sources
- amount of pollutant emissions reduced (e.g., CO₂, SO_x, NO_x)
- jobs created to meet energy efficiency and renewable energy demands

Recommended Resources:


ENERGY STAR, the EPA/U.S. Department of Energy program that goes beyond labeling energy efficient appliances to assist building and utility owners and operators and local governments in conserving energy

www.energystar.gov/ 
www.energystar.gov/index.cfm?c=government.bus_government_local 

ENERGY STAR Challenge for Communities
www.energystar.gov/index.cfm?fuseaction=challenge_community.showIntroduction 

[cfm?fuseaction=challenge_community.showIntroduction](http://www.energystar.gov/index.cfm?fuseaction=challenge_community.showIntroduction) 

EPA Green Power Partnership program
www.epa.gov/greenpower/index.htm 

EPA's Combined Heat and Power Program
www.epa.gov/chp/partnership/index.html 

The U.S. Department of Energy's Technical Assistance Program for local governments
<http://www1.eere.energy.gov/wip/assistance.html>

The U.S. Department of Energy Solar America Cities program 
www.solaramericacities.energy.gov

The California Distributed Energy Resources Guide
www.energy.ca.gov/distgen/

Alliance to Save Energy (ASE)
www.ase.org/

American Council for an Energy Efficient Economy (ACEE)
<http://aceee.org/>

Consortium for Energy Efficiency (CEE),
www.cee1.org/

PGE online calculator of potential energy and economic savings for homeowners
www.pge.com/myhome/saveenergymoney/resources/appliancecalculator/

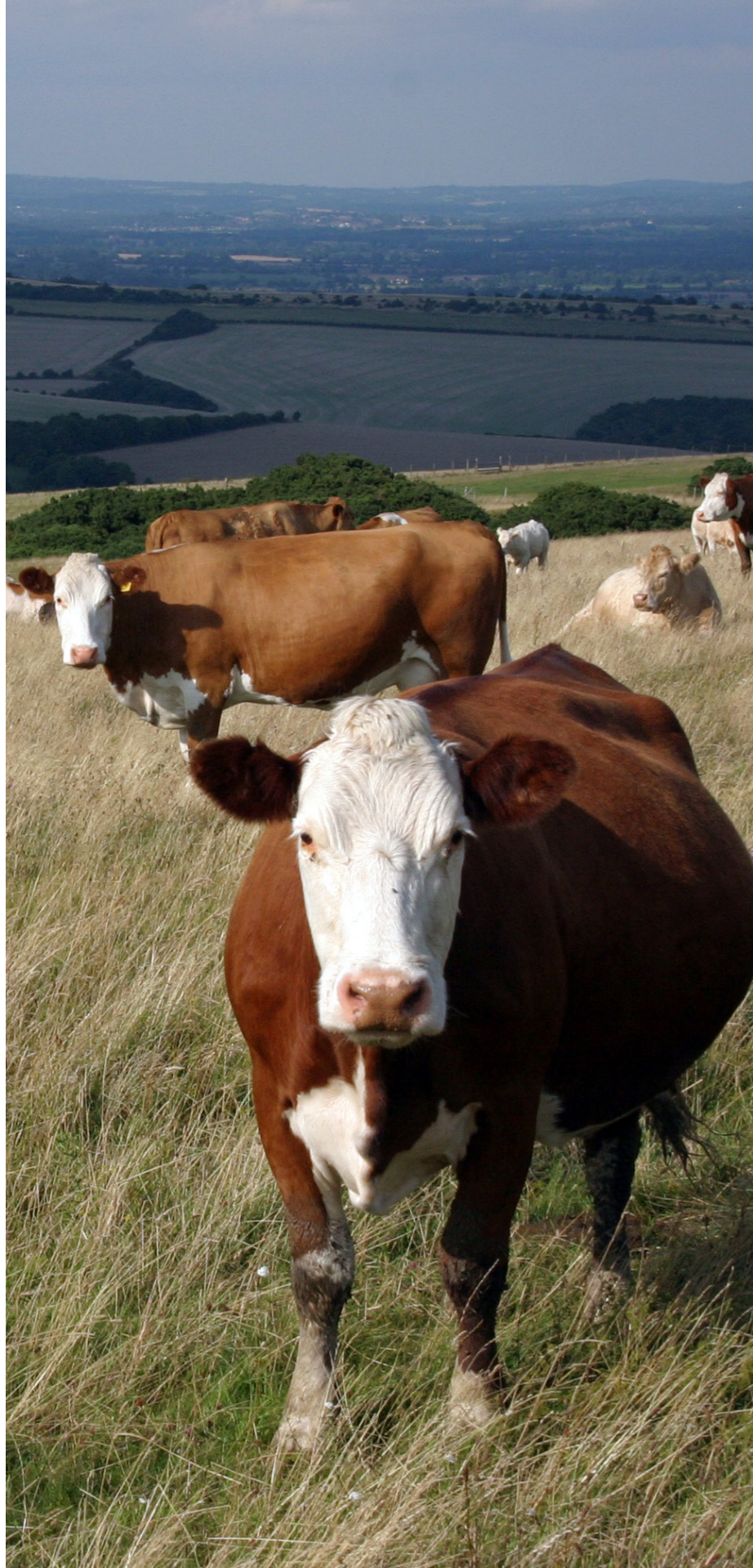
NYC energy cost-saving ideas
www.nyc.gov/html/nycwasteless/html/at_agencies/govt_case_studies_energy.shtml

New York State's Energy Smart Communities Program
www.getenergysmart.org/CommunityOutreach/EnergySmartCommunities.aspx

EPA's Clean Energy-Environment State and Local Program

www.epa.gov/cleanenergy/energy-programs/state-and-local/index.html

www.epa.gov/climatechange/wycd/stateandlocalgov/local_resources.html





Energy Case Study No. 1: Portland, Oregon Energy Challenge Saves City Millions

In 1991, Portland, Oregon established the “City Energy Efficiency Challenge.” This bold initiative started with energy audits at eight city bureaus that each contributed one percent of their energy bills to help fund the efforts. The city then obtained a small low interest loan of \$777,000 to help fund energy efficiency measures.

The \$2.6 million spent on energy efficiency improvements during the first three years generated average internal rate returns of 25.7 percent, with a pay-off time of 3.8 years. By the late 1990s, the energy savings reached \$1 million per year, with total savings of \$9.46 million between 1991 and 2001. Current annual energy savings are \$2 million per year, or 15 percent of the city’s energy bills.

In addition to dramatic energy efficiency improvements and considerable savings to local taxpayers, Portland has also turned its energy sources “green.” In 1995, the city entered into an agreement with Pacific Gas and Electric to receive five percent of its electricity from renewable sources. As of 2007, Portland receives 10 percent of its electricity from renewable sources, and is looking to increase its use of renewable power.

Further information is available online at:

www.portlandonline.com/osd/index.cfm?a=bbbhde&c=ecdji
www.smartcommunities.ncat.org/success/city_energy.shtml

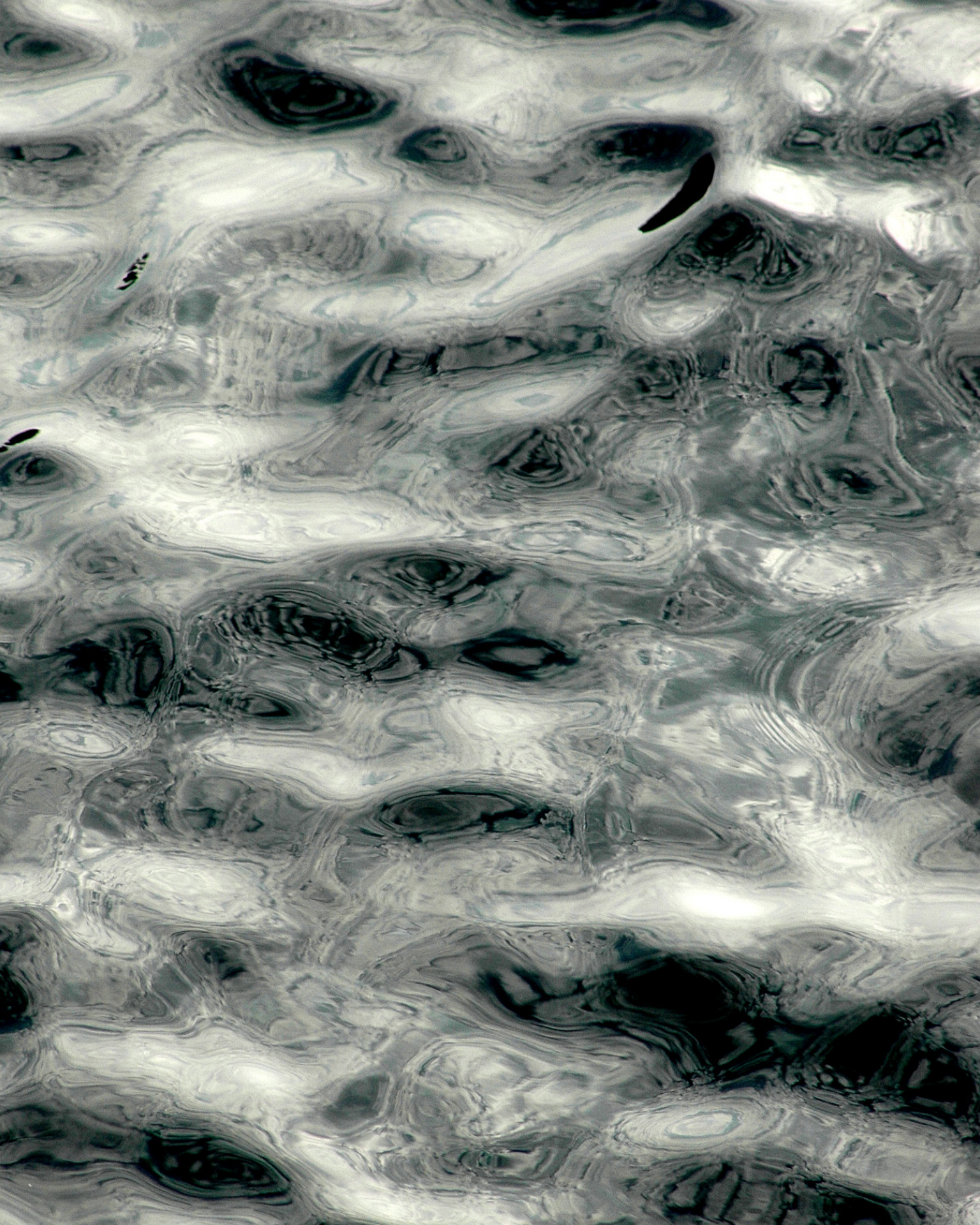


Energy Case Study No. 2: Fresno, California “Cow Power” Powers up the Grid

Pacific Gas and Electric Company (PG&E) has teamed up with BioEnergy Solutions on a biogas-to-pipeline injection project. It produces renewable gas from animal waste, and is the first project in California to deliver pipeline-quality, renewable natural gas to a utility. It delivers up to three billion cubic feet of renewable natural gas a year to PG&E.

This system reduces methane emissions by 70 percent at Vintage Dairy, a 5,000-cow dairy in the town of Riverdale. Since methane has a global warming potential 21 times more potent than CO₂, this approach could be an effective climate change fighter. Manure from the cows is flushed into an almost 300,000 square-foot covered lagoon, which traps the methane gas released during manure decomposition. The methane is scrubbed to meet PG&E’s standards for power plants and then delivered to the utility through the pipeline. The utility uses the methane to create electricity for its central and northern California customers.

BioEnergy Solutions, founded by David Albers, a third-generation dairyman and owner of Vintage Dairy, pays for and installs the infrastructure needed to process the manure and pump the methane into the PG&E pipeline. Proceeds from gas sales and emissions credits are used to help reduce the greenhouse gas emissions of other dairy owners.



Protecting Water Quality and Ensuring Future Supply

Community prosperity relies on continuous access to clean water, from reliable drinking water supplies to clean waters that support recreation and viable commercial and sport fishing industries. Water is becoming more scarce around the world, as populations increase, surface waters and our aquifers are drained faster than nature can recharge them.

Many local governments, particularly in the arid West and Southwest, including Salt Lake City and Las Vegas, have been aware of the importance of water resources for some time now. Other communities with rapid population growth and variable rainfall are just beginning to come to terms with the harsh reality that water is a precious and scarce resource, which must be used wisely and conserved whenever possible.

The physical scarcity of water is not the only concern. Local fisheries are very sensitive to watershed health too. Protection of local watersheds helps to ensure the long-term health and profitability of recreational and commercial industries for all communities. The “dead zone” in the Gulf of Mexico, expected to grow to the size of New Jersey, threatens to permanently cripple Gulf fisheries.

Often, municipal water management strategies must be shared across regional borders because watersheds overlap multiple jurisdictions and water treatment facilities serve multiple communities. Municipalities are also influenced by a myriad of federal, regional and local standards for water treatment, quality and conservation. The most common approach is to address the need for water resource sustainability through a targeted water strategy. However, many communities also address wa-

ter resource concerns through land use planning and other smart growth policies with a goal of conserving valuable water resources.

What is common to all localities is the ongoing potential for improvements in local water use efficiency and water resource protection. Water resources can be protected and conserved through a variety of strategies involving: efficient use of municipal supplies; on-site collection, water recycling and treatment; wastewater treatment system improvements; and the reduction of non-point source pollution of local watersheds and aquifers.

Best Practices and Solutions

Promote Water Conservation

Using water efficiently is the key to promoting water conservation and saving money. EPA estimates that the average household spends as much as \$500 per year on its water and sewer bill. Conserving water also reduces energy use, which translates into additional savings.

EPA’s WaterSense program helps protect the future of our nation’s water supply by promoting water efficiency and enhancing the market for water-efficient products, programs and practices:

www.epa.gov/watersense/index.htm

Greenscaping encourages conservation of water resources and decreases reliance on polluting fertilizers and pesticides.


Landscaping with beautiful, drought-resistant plants in arid climates enhances the local aesthetic and helps to retain much-needed moisture.

TIP: For more information, look to EPA's Greenscapes Web site:

www.epa.gov/epaoswer/non-hw/green/lrgscl.htm

Landscaping with native plants is a creative way to conserve water and beautify communities, especially in communities with desert-like climates. The Southern Nevada Water Authority program on landscapes provides recommendations for arid areas.

www.snwa.com/html/land_index.html

The U.S. Department of Energy, within its Department of Energy Efficiency and Renewable Energy, has a program that specifically addresses water efficiency. 

www.eere.energy.gov/femp/water

Green building practices promote water conservation and wastewater reduction. Some green buildings and facilities use water catchment systems and gray water recycling and treatment to capture rain water and reuse wastewater. Green roofs provide stormwater control in addition to reducing the heat island effect of urbanized areas. Green buildings often incorporate water efficient technology such as aerators, low-volume toilets, low-flow showerheads and water-efficient landscaping and/or irrigation systems.

GreenerBuildings.com estimates that many commercial buildings could reduce water use by 30 percent or more through efficiency measures. More information and practical examples can be found at www.greenerbuildings.com/feature/2008/01/30/using-water-management-strategies-boost-triple-bottom-line
www.greenerbuildings.com/blog/2008/05/08/smart-water-management-a-low-risk-green-initiative-with-a-fast-payback

Protect Local Watersheds from Point Source Pollution

Point source water pollution is pollution that can be traced back to a specific discharge source, like a factory or wastewater treatment plant. Discharges from these sources are usually controlled through government permits that set limits on the amount they are permitted to release into the environment.

Communities that have centralized wastewater collection and treatment systems are already part of the National Pollution Discharge Elimination System (NPDES), the federal regulatory program that sets limits on pollution.

<http://cfpub.epa.gov/npdes/>

For areas that don't have existing public wastewater treatment systems, switching to centralized ones may or may not be realistic, or even the preferred option. This depends on local characteristics such as population density, climate, topography, geology and how close drinking water sources are to housing. If you are from a smaller community, see:

www.epa.gov/OW-OWM.html/mab/smcomm/index.htm

Municipal storm sewer systems are considered point source pollution under many circumstances and are regulated under the federal NPDES program.

http://cfpub1.epa.gov/npdes/home.cfm?program_id=6

The use of green design principles can naturally filter stormwater run-off, diverting it from wastewater systems and storm drains. Green infrastructure reduces demands on local wastewater treatment plants, lowers costs and energy use, and protects natural water bodies from pollution.

http://cfpub.epa.gov/npdes/home.cfm?program_id=298#case
<http://www.epa.gov/owow/NPS/lid/costs07/documents/reducingstormwatercosts.pdf>

Protect Local Watersheds from Non-point Source Pollution

Non-point source pollution is water pollution from urban run-off and unregulated non-industrial or agricultural sources. It affects local watersheds, coastal habitats and degrades water quality posing threat to long-term water security and environmental health.

Some strategies to address non-point source pollution are:

- collection and treatment of runoff prior to its entry into waterways
http://sfwater.org/detail.cfm/MC_ID/14/MSC_ID/118/C_ID/3084
- preservation and construction of local wetlands as buffers for aquatic natural systems
www.epa.gov/OWOW/wetlands/restore/
- on-site runoff retention and/or treatment of run-off and provisions for surfaces that are not impervious
<http://egov.cityofchicago.org>
<http://clerk.ci.seattle.wa.us>
- partnerships with local industry for effluent reductions through green industrial practices and water conservation measures
http://www.bouldercolorado.gov/index.php?option=com_content&view=article&id=10108&Itemid=3372
- education of the general public about the specific non-point sources in their communities and the options for minimizing impacts
www.epa.gov/owow/nps/toolbox/
www.co.thurston.wa.us/health/ehhm/outreach.html
- watershed monitoring with local non-profits, schools and other community groups to identify problem areas
www.epa.gov/volunteer/
www.usawaterquality.org/volunteer/links.html
www.watershedstewardsproject.com/

Measuring Success

Indicators of successful water efficiency strategies might include:

- reductions in community water consumption, set benchmarks related to localities with similar characteristics (e.g., population, climate, topography)
- participation in both private sector partnerships and residential water efficiency programs
- number of new construction (municipal buildings and/or general public) and renovation projects with water efficiency techniques

Watershed health can be monitored through:

- annual rates of local compliance with federal and state water quality regulations
- chemical and physical water quality indicators (e.g., pH, temperature, nutrient levels, water clarity, the presence of toxins and harmful bacteria)
- the level of treatment required to produce safe drinking water and any changes to treatment regimes
- population levels and health of local plants and animals (water and land)
- surface water flows and aquifer recharge rates
- the relative amount of each local stream or river that is “daylit,” or not diverted through underground pipes beneath buildings and roads, and has a natural buffer around it
- the ratio of water-permeable surfaces and green spaces to paved surfaces or spaces occupied by buildings with conventional roofs
- the percentage of tree canopy cover for new construction projects

Recommended Resources:

EPA funding for local water infrastructure development, as well as watershed protection and conservation programs

<http://cfpub.epa.gov/npdes/greeninfrastructure/fundingopportunities.cfm#fundingtools>

www.epa.gov/safewater/dwsrf/pdfs/guide_dwsrf_funding_infrastructure.pdf

www.epa.gov/safewater/dwsrf/pdfs/fs_dwsrf_swp-funding-matrix.pdf

National Environmental Service Center's National Environmental Training Center for Small Communities

www.nesc.wvu.edu/pdf/train/products/regulations_chart.pdf

EPA's Consumer Confidence Reports

<http://water.epa.gov/lawsregs/rulesregs/sdwa/ccr/index.cfm>

EPA's Office of Ground Water and Drinking Water

www.epa.gov/safewater/dwinfo/index.html

EPA Regulations of total maximum daily loads (TMDLs)

www.epa.gov/owow/tmdl/

Georgia Pollution Prevention Assistance Division - "Successful Water Efficiency Programs for Non-Residential Water Customers" presentation.

www.georgiaplanning.com/watertoolkit/Documents/WaterConservationDroughtManagement/SuccessfulWaterEfficiencyPrograms.ppt

"Benchmarking Performance Indicators for Water and Wastewater Utilities: 2007 Annual Survey Data and Analyses Report," produced by the American Water Works Association and Water Environment Federation

www.awwa.org/bookstore/productDetail.cfm?ItemNumber=34298

[cfm?ItemNumber=34298](http://www.awwa.org/bookstore/productDetail.cfm?ItemNumber=34298)

EPA Information and Resources on Non-point Source Pollution

www.epa.gov/owow/nps/whatis.html

Water Environment Research Foundation report has information and case study links.

www.werf.org/livablecommunities/pdf/benefits.pdf

EPA State and Individual Watershed Trading Program

www.epa.gov/owow/watershed/trading/tradingmap.html

Conservation Technology Information Center Water Quality Training Guide

<http://www.conservationinformation.org/CTIC%20HOME/FIND%20INFORMATION/CTIC%20Initiatives/>

EPA's Water Quality Trading Scenario: Multiple Facility Point Source Trading Publication

www.epa.gov/npdes/pubs/wqtradingtoolkit/multiple-ps.pdf



Water Case Study: Sedona, Arizona is "Water Wise"

The city of Sedona, located in the northern Verde Valley region of Arizona, is a very arid desert community, dependent on a limited supply of ground water. Water conservation is an urgent matter year-round.

The "Sedona is Water Wise" program offers a variety of tools to promote water conservation. Recognizing that over half of the water use was going to landscaping and irrigation, the city began to promote simple techniques such as the use of native plants and containers to catch and store rain water to water plants. Sedona also promotes water conservation strategies for houses, industry, tourists and public education facilities.

Sedona has implemented an award program to recognize individuals, organizations and businesses that demonstrate water wise conservation practices. Its purpose is "to promote the importance of water conservation and to stimulate a greater interest in conserving Sedona's water by recognizing those who contribute to protecting this precious and limited resource."

Further information is available online:

www.sedonaaz.gov/egov/sidePage.aspx?dID=906





Green Jobs

This chapter is an introduction to what is meant by “green jobs” and how actions to promote green jobs can support your local workforce, the environment, and the economy.

“Green jobs” is often cited as an essential part of solving environmental and economic troubles. Yet, to many, it is not clear what a green job is or what a green economy would look like. There are several working definitions and a few are provided below.

EPA Administrator Lisa Jackson describes green jobs as a solution to the economic and environmental challenges our communities face: “What we have is an energy and jobs agenda with an environmental benefit – one solution for two generational challenges. I have worked in environmental protection for more than 20 years. In that time, I’ve seen countless situations where environmental priorities have been put on hold out of fear for how they might affect economic growth. But we know better. We know that the choice between our economy and our environment is a false choice.”

The Environmental Protection Agency has a working definition, “jobs that devote a substantial portion of their work to improving energy efficiency, increasing the supply of renewable energy, and/or preventing, reducing, or cleaning up pollution.”

According to the US Department of Labor, “A changing job market and the emerging clean energy economy are creating new jobs and greening old jobs.” Green jobs are both a response to a changing global economy and an opportunity to achieve environmental and social goals. The hope of green jobs is that the individuals trained in these areas will reduce a community’s energy consumption, increase energy independence and a host of other environmental outcomes while contributing to our local economy. For individuals, this can

result in bettering their own lives by enhancing their job skills and earning higher wages for expertise in specialty areas.

The American Recovery and Reinvestment Act of 2009 places a large focus on greening the American economy and provides funding for green jobs. In fact, \$500 million is dedicated to job training programs that prepare workers for careers in energy efficiency and renewable energy. Resources for grant seekers are listed in this chapter below.

Examples of Green Jobs

- Urban Tree Canopy crews who maintain urban forests
- Next generation of waste water and drinking water treatment plant operators and engineers
- Energy efficiency auditors and retro-fitters
- Certifications for plumbers who install purple pipes, for water recycling
- Manufacturing of solar panels, wind turbines and other renewable energy technology
- Installation of solar panels, wind turbines and other renewable energy technology
- Establishing and expanding recycling programs

Best Practices

Across the country, communities are developing new and different ways to generate green jobs. Some successful green jobs programs are partnerships between government agencies and local organizations already engaged with the target trainees. These green jobs programs combine traditional job training programs with specific modules on the environment and sustainability topics. Organizations already engaged in job training programs and community colleges can add an additional green-job course to their program, such as a building retrofit certificate program, or teach green techniques in existing courses.

The success of a green jobs training program depends on the placement of participants in employment after completion of the training. Organizations engaged in green job training should begin building partnerships with local organizations in need of employees with these skills before program implementation so that curricula can be tailored to employer hiring needs. Community leaders can convene local organizations to forge partnerships and raise the profile of a green jobs agenda. Examples of key organizations that could be included: job training institutions, high schools, summer education programs, community colleges, universities, research facilities, union education professionals, professional accreditation organizations, and prominent businesses in your community.

EPA offers free training curricula on lead abatement, occupational health & safety, and water quality. The U.S. Department of Labor has job training centers through out the country and offers online training programs. These can easily be added to an existing training program.

Actions for Local Governments

- Communities can implement job training programs through community based organizations, employment organizations, and other local partners.
- Local governments can acknowledge businesses that are successfully doing pollution prevention as leaders in the community. TIP: For larger communities, it can be easier to look at one sector at a time to compare performance.
- Local governments can be an engine for generating green jobs through the procurement of renewable energy, cool roofs, and energy-efficient products and working with green contractors, and service providers for city-owned buildings and property.
- Community leaders can raise the profile of their location for new green employers
- State level public utility boards can encourage home retrofits and use of energy-efficient products by providing free audits and subsidizing or giving tax credits for using green products. New Jersey has had a successful incentive program for residential energy efficiency; information can be found here: <http://www.njcleanenergy.com/main/rebates-and-promotions/rebates-and-promotions>.
- Local governments can also prioritize green job growth in land use development policy when dealing with developers and grant recipients.

Recommended Resources:

Brownfields Job Training Grants
http://www.epa.gov/brownfields/grant_info/jtgrant0709.pdf

Green Jobs Training Catalogue
http://www.epa.gov/npdes/pubs/gi_green-jobs_feb09.pdf

U.S. Department of Labor Job Corps
<http://www.jobcorps.gov/home.aspx>

Advisory for State and Local Government Labor Commissioners and Grant Seekers
http://wdr.doleta.gov/directives/corr_doc.cfm?docn=2755

GreenPrint: Green Jobs Guide
<http://cepa.maxwell.syr.edu/pages/greenprint>

List of grant opportunities compiled by Center for Environmental Policy & Administration
http://cepa.maxwell.syr.edu/pages/184/Grant_List-1.pdf

American Recovery and Reinvestment Act: Grants
<http://www.recovery.gov/Opportunities/Pages/Grants.aspx>

EPA Brownfields Program Activities Under the Recovery Act
<http://www.epa.gov/brownfields/eparecovery/index.htm>

EPA Brownfields: Job Training Grants
<http://www.epa.gov/brownfields/job.htm>

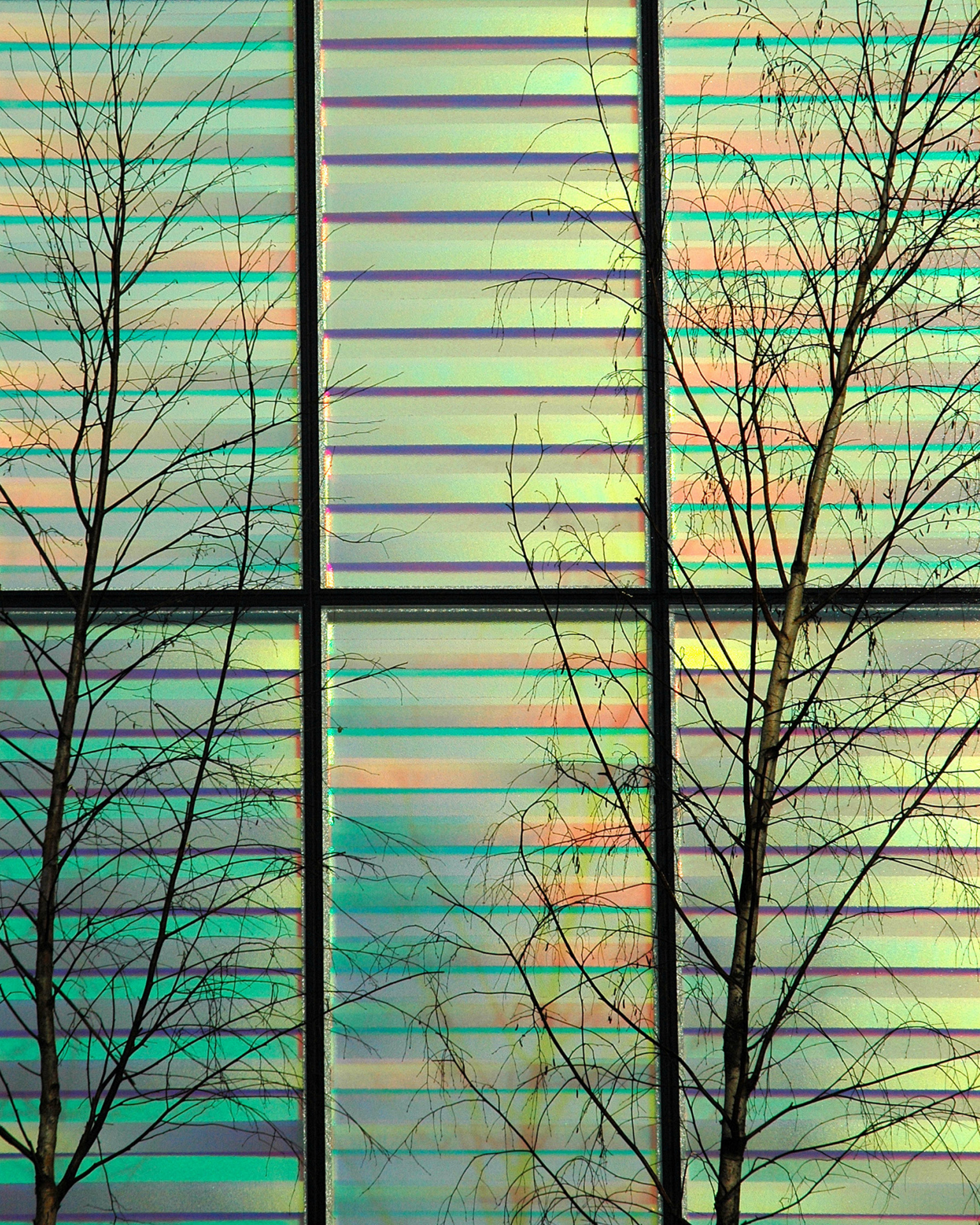


Green Jobs Case Study: Syracuse, NY Bringing Green Jobs to Communities

Theardis Martino is a green construction consultant training to become a LEED Green Associate in Syracuse, New York, who felt inspired to share the skills of his field with members of the community. Through his own initiative, he started Matawon Group, which offers a 30-day training program to inner-city residents, who graduate with certificates in lead encapsulation and Occupational Safety & Health. This month-long curriculum places a heavy focus on life skills, with a work-simulated schedule that requires strict promptness and compliance with a dress code. Training in interview and resume crafting skills is also provided. Trainees learn the carbon impacts of their individual behavior, as well as methods for reducing waste and pollution on the job.

Matawon has had outstanding success with limited resources. Seventy-four percent of its graduates find work and 63% are still on the job after 90 days. Many of the participants are beneficiaries of other social services, job support programs, and were previously incarcerated. Local construction is the biggest industry for graduates to work in; others include manufacturing, retail, and warehouses. This training program gives individuals with a high school or GED level education the skills to find good work and help their communities.

Theardis has been working with average class sizes of 10 each. The program recently won a Pathways Out of Poverty Grant from the state of New York, which Theardis hopes will allow the program to expand in size and to have more hands-on-training added to the curriculum. Matawon is an example of how a community's need for environmental improvements can be met while also bringing individuals out of poverty and into a meaningful career.



Green Building

Environmentally sound building is central to local sustainability. Each building material has its own history of energy and water use, raw material extraction and possibly even environmental pollution. The selection of environmentally sound recycled and raw materials can substantially reduce both on-site and off-site environmental impacts of construction.

The U.S. Green Building Council estimates that the construction of buildings currently accounts for 30 percent of all raw materials used in the U.S. A 1996 study, found that disposal of used building materials comprises 60 percent of non-industrial U.S. waste. It also found that 20 to 30 percent of building debris was already being recovered for recycling yet more opportunities exist to divert C&D waste from landfills.

A recent boom in green building has brought with it a wealth of new resources. Green building products, services and information are more accessible than ever before. The cost of green building has become cheaper too. The cost gap between green and conventional building is closing. Long-term cost savings far outweigh any additional upfront costs; relative cost is actually related to project design and management, and not necessarily because of green building practice.

The U.S. Green Building Council lists government initiatives as the primary factor driving recent green building sector growth, and anticipates a 62 percent growth in public sector green building projects. Larger cities such as Boston, Chicago, Dallas, New York, Portland (OR), San Francisco, San Jose (CA), Seattle, and Washington, DC have already created mandatory green building requirements for all municipal buildings, as have smaller cities such as Chula Vista (CA), Greensburg (KS), Pleasanton (CA), Scottsdale (AZ), and West Hollywood (CA).

Best Practices and Solutions

EPA and partners such as the U.S. Green Building Council developed extensive guidance and resources for green building and locating green building materials that are accessible through Web sites and publications. EPA outlined major elements of green building:

- energy efficiency and renewable energy
- water stewardship
- environmentally preferable building materials and specifications
- waste reduction
- toxics
- indoor environment
- smart growth and sustainable development

While there are multiple rating systems, the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Green Building Rating System has become the most commonly used standard for green building.

Strategies to increase green building in your community:

- consider mandating all city-owned or financed buildings meet LEED criteria
- offer expedited review for permits and zoning applications for buildings meeting green building criteria, such as LEED
- offer incentives (FAR or other) for green building components such as green roofs, bike racks and electric car recharging areas
- establish a building material reuse facility for wood, windows, doors and paint recycling
- offer green building training to construction industry members and building operators

- develop a local directory of green building businesses and services
- designate a district with tax incentives to encourage the development of local businesses that specialize in green building materials and supplies

TIP: Shop for ideas from other cities for green building ordinances:

http://ag.ca.gov/globalwarming/pdf/green_building.pdf

Measuring Success

Success is measured in numerous ways in the field of green building, although the most typical measures focus on efficiency savings for energy and water or renewable energy generated. Indicators of success might include:

- usage of green materials in local new construction and renovations
- local availability of green building materials
- number of local LEED certified buildings and accredited professionals
- number of people employed and overall economic growth of local green construction-related industries
- amount of construction waste being diverted, or measureable decreases in construction-related waste production
- attendance ratings at green buildings like schools or businesses
- employee satisfaction and retention rates compared to industry standards
- amount of renewable energy generated by green buildings
- cost per square foot of public green building projects and savings in annual operations costs

Harder to measure, but equally important, are more subjective indicators of success, such as perceived local quality of life, health and well-being of building occupants, aesthetic contributions of green buildings and community pride.

The sustainability of building materials, and even whole buildings, can also be quantitatively measured through “life-cycle assessment.” Life-cycle assessment

is an analytical process through which a product, in this case a building material, is evaluated throughout its entire life for its environmental impact. This includes the natural resources used, pollution generated and any environmental degradation involved in its production, shipment, use and eventual disposal.

Fortunately, simplified models and computer-based systems have been developed to assist in this process, and life-cycle assessments have already been completed for many construction products. Similar tools exist for calculating specific impacts, such as greenhouse gas contributions, and can easily be located through Web sites such as the U.S. Green Building Council’s “Resources” page.

Recommended Resources:

EPA information on green building
<http://www.epa.gov/greenbuilding/>

U.S. Green Building Council
www.usgbc.org/resources
www.usgbc.org/DisplayPage.aspx?CMSPageID=1779

A Green Playbook for Local Governments
www.greenplaybook.org/

California Sustainable Building Toolkit
www.ciwmb.ca.gov/Greenbuilding/Toolkit.htm

A Sourcebook for Green and Sustainable Building
www.greenbuilder.com/sourcebook/

Field Guide for Sustainable Construction
www.p2pays.org/ref/41/40904.pdf

Building Design and Construction Network
www.bdcnetwork.com/

Green Building Forum
www.greenbuildingtalk.com/



Greener Buildings
www.greenerbuildings.com/

Materials and Products

EPA Comprehensive Buildings and Construction Resources Page
www.epa.gov/epp/pubs/products/construction.htm

GreenSpec®-listed green building products
www.buildinggreen.com/menus/index.cfm

Building Materials Reuse Association National Directory
www.bmra.org

EPA Comprehensive Procurement Guidelines material supplier database
http://cpg.epa.tms.icfi.com/user/cpg_search.cfm

Green Building Pages, an online resources and green product locator
www.greenbuildingpages.com/

Forest Stewardship Council sustainable forest products/ green building Web site
www.fscus.org/green_building/

The ENERGY STAR qualified products directory lists energy efficient building technologies (e.g., heating, cooling, electrical, insulation and windows).
www.energystar.gov

Greenguard Environmental Institute's Greenguard Product Guide
www.greenguard.org/Default.aspx?tabid=12

Green Seal's lists of environmentally certified products (windows and doors)
www.greenseal.org/findaproduct/index.cfm

EPA's WaterSense Program Web site has a directory of water efficient products.
www.epa.gov/watersense/

The South Coast Air Quality Management District's green solvent database has information on non-toxic substances (e.g., solvents and adhesives).
www.aqmd.gov/rules/cas/prolist.html

EPA offers life-cycle assessment resources, including the Life-Cycle Assessment 101 tool.
www.epa.gov/ORD/NRMRL/lcaccess/lca101.html
www.epa.gov/ORD/NRMRL/lcaccess/resources.html#EPA%20Documents



Green Building Case Study: Portland, Oregon Green Building Campaign Reaps Rewards

Portland has established itself as a national leader in green building. With 36 LEED certified buildings, Portland currently ranks with cities such as Chicago and Seattle, which are known for their leadership in green building and distinguished by the large numbers of green buildings they contain.

In 2001, Portland adopted a resolution mandating LEED certification for all city-funded construction and major renovation projects. This policy also formalized the efforts of Portland's newly formed Office of Sustainable Development, prescribing proactive engagement with the public and green building stewardship. Also developed was the "Green Investment Fund," to provide grants for green building projects.

In 2005, Portland adopted another resolution to strengthen the previous policy, increasing the requirement for new city construction projects to LEED Gold certification, and also requiring existing city buildings to be brought up to LEED Silver certification.

Portland has a comprehensive outreach program, and offers free technical assistance to those interested in participating in its booming green building economy. Through its Office of Sustainable Development and its Web site, the city offers an abundance of information and organizes regular outreach efforts.

Green building owners have reported lower energy bills and, in many cases, reduced operation and maintenance costs. Portland is now reaping the fruits of its bustling green construction economy, with the infrastructure firmly in place for continued success in efforts toward sustainable development.

For further information on Portland's green building program, go to:

www.portlandonline.com/OSD/index.cfm?c=ebeib

LEED Projects: www.usgbc.org/LEED/Project/CertifiedProjectList.aspx?CMSPageID=247





Green Construction

Clean construction practices and strategies are essential to creating healthier, more sustainable communities. Construction is integral in the development, improvement, and restoration of homes and buildings, as well as the maintenance and expansion of the country's infrastructure.

Air and water are two environmental resources affected by construction. Impacts to air from construction are due mainly to diesel-powered equipment, which is responsible for large amounts of diesel emissions and contributes to unhealthy levels of particulate matter (PM), oxides of nitrogen (NOx), and other toxic air pollutants. Additional pollutants resulting from construction activities, such as dust and noise, also have the potential to pose environmental health risks to residents within the communities that surround construction sites, and to contribute to climate change.

Exposure to diesel particulate matter is associated with increased risk of several respiratory ailments including asthma, emphysema and bronchitis, in addition to other adverse health effects. Long-term exposure has been linked to heart problems, lung cancer and premature death. Children are particularly susceptible to the harmful effects of diesel air pollution.

The construction sector utilizes more diesel engines than any other sector across the nation, including freight, transit, municipal, and ports. Construction equipment is notorious for staying in commission for very long periods, in some cases as long as three decades. Of the two million diesel engines currently being used for construction equipment in the United States, 31% were manufactured prior to the introduction of diesel emissions regulations. These pieces of equipment are responsible for 32% of the NOx and 37% of the particulate matter emissions from all vehicles and engines annually. Whether a community owns its construction equipment or hires outside vendors for construction projects, it can mitigate the environmental impact of those projects.

In addition to air pollution, construction sites are among the largest contributors of pollutants to streams, lakes, and other surface waters. Effects on those waters arise from two separate but interrelated processes called "erosion and sedimentation." Erosion is the process by which the land surface, including soils, rocks, and other materials, is worn away. Erosion from construction sites can be between seven and 500 times greater than erosion from undisturbed natural areas. Along with sediment, as water flows over a site it can pick up debris, chemicals, fertilizers, pesticides, oil, concrete products, sealers, paints, and other pollutants. Sedimentation occurs when particles are deposited elsewhere, whether on the land or in ponds, lakes, wetlands, and reservoirs. Erosion and sedimentation can have several negative impacts, including:

- blocking light needed by aquatic plants and smothering or choking aquatic animals
- contributing to the accumulation of pollutants
- clogging ditches, culverts, and storm sewers, increasing flooding
- dirtying clear waterways, decreasing recreational value; and
- filling in ponds, lakes, and reservoirs with sediment, which can reduce the life of dams that provide flood control, recreation, or municipal drinking water

Best Practices and Solutions

Air

Communities can use the following strategies to minimize the harmful impacts of diesel emissions and other

forms of pollution. Local governments can apply these strategies in their own fleets or by including them in specifications for construction contracts with outside vendors:

- replace older equipment with newer, cleaner models
- repower older engines with newer, cleaner models
- retrofit equipment with emissions reduction technologies such as particulate filters and oxidation catalysts verified by the EPA
- implement an idling-reduction policy
- keep equipment running efficiently through preventative maintenance and repair
- use cleaner fuels such as ultra low sulfur diesel, biodiesel and compressed natural gas
- control dust pollution by spraying down equipment entering and departing construction sites
- keep stockpiles of materials covered with plastic tarps to prevent dust
- hang noise dampening blankets around construction sites
- when possible, avoid using loud equipment (pile drivers, jackhammers, etc.) during noise sensitive hours (10 p.m. – 7 a.m.)

A common, easily implemented strategy used at the local level to mitigate the effects of construction activities is to require diesel emission controls in construction project contract specifications. Specifications can require:

- the highest level of emission controls available
- idling-reduction and engine shut-off policies
- the use of ultra low sulfur or alternative fuel

Erosion and Sedimentation

The Clean Water Act specifically addresses the permitting of non-point source stormwater discharges (see p. 42-43 for a description of non-point source pollution), including construction site runoff. Although construction managers are required to institute “best management practices” for any site that disturbs one acre or more of land, communities can go beyond requirements and institute additional safeguards.

For example, local governments can use ordinances to require green construction in their communities. Ordinances are only effective if they are implemented and enforced, so local governments should support regular inspections and clearly specify penalties for violations. In particular, ordinances can mandate that developers write control plans prior to construction that describe how a developer will address erosion and sedimentation.

Careful scheduling can be one of the most effective safeguards against sediment pollution; it minimizes the amount of time land is exposed, and can ensure that land-disturbing activities align properly with erosion and sedimentation controls, which range from sediment traps and barriers to dikes and runoff diversions. A range of erosion and sedimentation controls can be found in EPA’s Menu of Stormwater Best Management Practices (http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=4).

Additionally, communities can:

- preserve natural vegetation and install additional plants, especially around the perimeter of sites
- minimize clearing and grading of soil
- build concrete washouts, which are used to contain and consolidate concrete and liquid waste when concrete equipment

is rinsed, to avoid disposal down storm drains

- disconnect any drains from any other processing areas that lead to storm sewers
- minimize the application and generation of pollutants, including chemicals
- properly dispose of building materials and other construction wastes, while preventing spills and recycling when possible
- provide education and training opportunities for construction personnel

Measuring Success

A community's progress can be evaluated in several ways when examining clean construction. For air, EPA's Diesel Emissions Quantifier (<http://cfpub.epa.gov/quantifier/>) can be used to quantify emission reductions from retrofitting, replacing and repowering older equipment as well as switching to cleaner fuels. To track success, a community might:

- quantify the tons of emissions reduced
- calculate the cost per ton of emissions reduced
- document community satisfaction with pollution reduction, including noise
- count the number of local projects using emission control devices/alternative fuels at active construction sites
- document the number of local projects with clean diesel specifications in construction contracts.

The "Protecting Water Quality and Ensuring Future Supply" chapter in this guide lists several measures of a healthy watershed (p. 43) – such as chemical and physical water quality – that also apply to green construction. In addition to those, other measures include the amount of:

- construction projects that develop a pre-construction erosion and sedimentation reduction plan

- sediment kept on-site, as opposed to the amount eroded by poorer construction practices
- chemicals and other hazardous products eliminated from use at a site
- materials recycled during waste disposal

Recommended Resources:

EPA's "Breathing Clean by Building Green: Clean Diesel Construction." Free DVD copies of this video are available from the National Service Center for Environmental Publications (NSCEP) or at 1-800-490-9198. Please use item number EPA902V07001 for ordering. The video can also be viewed at the following web location:

<http://www.northeastdiesel.org/construction.htm>

Information on the EPA's National Clean Diesel Campaign

<http://www.epa.gov/diesel>

EPA information on clean construction
<http://www.epa.gov/diesel/construction/index.htm>

EPA's Diesel Emissions Quantifier
<http://cfpub.epa.gov/quantifier/>

Verified retrofitting construction equipment list

<http://www.epa.gov/oms/retrofit/verified-list.htm>

Sample contract specifications for inclusion of clean construction strategies
<http://www.northeastdiesel.org/pdf/NEDC-Construction-Contract-Spec.pdf>

Retrofitting diesel engines in the construction sector

<http://www.mass.gov/dep/air/diesel/conetro.pdf>

Low-cost ways to clean construction

<http://www.epa.gov/otaq/diesel/documents/420f08008.pdf>

Low-cost ways to reduce emissions from construction equipment

<http://www.southeastdiesel.org/constructionsector.html>

IEPA's National Pollutant Discharge Elimination System - permit requirements, as well as example E&S municipal ordinances and best practices.

<http://cfpub.epa.gov/npdes/stormwater/const.cfm>

Examples of Stormwater Pollution Prevention Plans and view a guide for creating one

<http://cfpub.epa.gov/npdes/stormwater/swppp.cfm>

The Construction Industry Compliance Assistance Center

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

Extensive guidance on ways to reduce non-point source pollution, including a guide for construction

http://www.epa.gov/nps/urbanmm/pdf/urban_ch08.pdf

EPA's Menu of Stormwater Best Management Practices

http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=4



Clean Construction Case Study: Westchester County, New York Clean Construction Contract Specifications

Westchester County can be viewed as a leader in clean construction practices. In 2006, the Westchester Healthy Air Task Force voted in favor of a bill that would reduce diesel emissions by requiring the use of the “best-available” clean diesel technology and cleaner diesel fuel. All vehicles, both those owned and operated on behalf of the county, including construction equipment, must comply with the bill.

The county's Department of Public Works' bid solicitation includes several provisions to ensure compliance with the county law. Contractors must equip all 2003 and older model year pieces of equipment with an EPA verified clean diesel technology. Also vehicles performing county work must be powered by ultra-low sulfur diesel, containing 15 parts per million of sulfur or less. The contractors are required to log and submit reports regarding the quality and vendor of the fuel.

Other provisions include dust control, stormwater management, and other water quality regulations. A violation of the contract could result in a fine of \$20,000 or more. In taking these steps, Westchester County has greatly reduced the impact of all county construction activities on both the environment and the surrounding communities.

Further information is available online:
www.westchestergov.com





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Anna Escobedo Cabral
Treasurer of the United States.

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Green Procurement

The U.S. has the largest and most technologically powerful economy in the world, with a per capita GDP of \$46,000. The ability for local governments to influence the economy through purchasing decisions is enormous.

Green procurement – buying environmentally friendly products whenever possible – is one of the easiest strategies to implement at the local level. It can be done incrementally as equipment or supplies are purchased and contracts are renewed. A key advantage of green procurement is that the principles are applicable at almost every level of commercial activity, from a single-person household to the largest organization in the world. In 1993, EPA introduced the Environmentally Preferable Purchasing (EPP) Program, helping federal agencies to “use sustainable practices when buying products and services.” Procurement choices happen at almost every aspect of an organization: transportation, energy supply, water use, packaging, office materials and waste management to name but a few.

Green procurement is a sound strategy and a good initial step toward sustainability. It is:

- easy to initiate and grow over time
- relatively inexpensive and can often lead to net savings
- a market stimulus for environmentally preferable products
- a way to improve employee health and performance
- a method to reduce existing and potential liabilities

Measuring Success

Some specific indicators of successful green procurement are:

- amount of post-consumer recycled products used (e.g., office supplies, bags supplied by vendors, etc.)
- number and volume of cleaning products purchased from an approved green supplier
- use of non-toxic carpets, paints and sealants
- percentage of energy-efficient lighting, equipment and heating/air conditioning systems
- percentage of water-efficient fixtures
- services rendered for green events and purchases from green food suppliers

Recommended Resources:

EPA's EPP Web site

www.epa.gov/epp/tools/index.htm

EPA's Comprehensive Procurement Guidelines Supplier Database

http://cpg.epa.tms.icfi.com/user/cpg_search.cfm

EPA's "EPP Assistant"

<http://pie.earthster.org/>

The GSA's "General Services Administration's SmartPay® Purchase Card Training"

www.fss.gsa.gov/webtraining/trainingdocs/smartpaytraining/

The "Federal Green Construction Guide for Specifiers"

www.wbdg.org/design/greenspec.php

The U.S. Department of Energy - tool to educate consumers about fuel economy

<http://fueleconomy.gov>

U.S. Department of Energy Alternative Fuels and Advanced Vehicles Data Center

www.afdc.energy.gov/afdc

The Paper Calculator

www.edf.org/papercalculator/



4

Conclusion: Moving Beyond Planning to Action

Regardless of budget, population or demographics, the development of plans for a sustainable future, or the update of existing plans, is just the first step in a much larger process. Your success will rely on your ability to follow through.

The implementation of the elements in any sustainability plan will rely on the education, commitment and action of not only the government, but residents, businesses and civic organizations alike. Strong cross communication will create feedback loops, best practices and help to ensure increased buy-in, participation and, ultimately, the success of your sustainability plan. This is not a surprising finding, but it emphasizes the importance of outreach and community education throughout the process of plan development and through implementation.

Change can be difficult to sell, so it's important to identify the interests and concerns that will drive support for your local plan. Plans for change may be driven by the community, the government or start one way and end up another, but the most important ingredient for success is engagement. The following are some actual examples of actions or activities that drove support for sustainability plans in various locations:

- concerns about climate change, air pollution and a host of other environmental issues spurred community members in Westchester County, New York to push for a more comprehensive approach to planning
- community interest in greening the town on a small scale led to a conference in Chequamegon, Wisconsin that created much broader local interest. Town Hall meetings proved to be an effective venue for raising and discussing issues in Burl-

ington, Vermont and Greensburg, Kansas

- in Cleveland, Ohio, key players working together in the government water department started thinking about how they could make improvements

- Lancaster, Pennsylvania took a top-down approach to priority setting, demonstrating that decisions can be made by the mayor or city council to make sustainability a priority, hire consultants, look at energy efficiency, conduct cost-benefit analyses of programming options or to establish a task force

- Ann Arbor, Michigan started with a pilot project approach, tackling energy efficiency, which generally pays for itself, and realized other ways to save money

- Ann Arbor was successful in hiring a new energy policy staff member despite overall cuts, when it demonstrated that the person's activities could save them one percent of its annual energy costs and fully cover the salary for that position. The savings were easily accomplished and exceeded in the first year.

- the interest in sustainability on the part of one member of the local government in Ann Arbor ultimately expanded into a whole new department. The strategic planning department has members from all sectors, and although it might not brand itself as such, it has become the "policy center" for the government

- Bowling Green, Ohio found an intern from a local university to look at current practices and make recommendations.

- Brownsville, Texas surveyed its primary businesses and performed a needs assessment. When businesses believe their needs will be addressed by a sustainability plan, they may be more likely to participate and support the endeavor.

Goal Setting, Targets and Performance Measurement Strategies

The old adage, “If you can’t measure it, you can’t manage it” holds true for sustainability planning. Once your plan begins implementation, it is important to gauge whether or not efficient and effective progress is being made towards its goals. This can be achieved through benchmarking.

Each section of this guide provides metrics to emphasize that careful tracking is essential to the success of any program. Metrics and goals should not only be established for each element of your plan, but taking a holistic approach is recommended to link all governmental activities to the goal of sustainability. Once some overarching goals have been set, a series of measurement tools can be employed to establish baselines (e.g., a greenhouse gas inventory) and future assessments can ensure that targets are being met. From the baseline metric, all governmental and community programs and sectors can and should be active participants in the sustainability process.

Targets are more difficult to establish, so in some cases it is important to begin by tracking data. In Ann Arbor, Michigan, its annual “State of Our Environment Report” highlights the direction in which the city’s indicators are heading. Burlington, Vermont started its planning process in 2000, setting a 10 percent greenhouse gas reduction by 2005, and established goals based on this over-arching target. It’s a good idea to record targets in a matrix for easy reference. Ultimately, goals, targets and indicators are important to creating accountability and public support.

Wrapping Up and Moving Forward

The challenges you face at the local level – from ensuring that daily critical services are provided to anticipating future threats – are substantial. We hope this guide has shown that ideas, approaches and resources that foster sustainability are plentiful. There is no magic bullet or single solution for how to best plan for a sustainable future, but there are a growing array of approaches that have worked for communities of every size and shape.

Although the approaches are diverse, the best plans take comprehensive views that aim to simultaneously improve efficiency, lower costs, protect the environment and provide a healthy future for generations to come.

Every city, town and county faces its own set of challenges and opportunities. Every community has a unique mix of resources, talent and ideas with which to create solutions. By learning from good examples, you can create and implement a plan unique to your community that will lead to a sustainable future.

Preparing the Guide

This planning guide is based on reports prepared for EPA by the Columbia University School of International and Public Affairs. One report compared and analyzed information from fourteen sustainability plans developed by municipalities around the country, and a second assessed information obtained from interviews with planners and officials from sixteen local governments that had no prepared sustainability plans. The researchers selected localities in all 10 EPA regions as well as places ranging in population from small towns to large cities.

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