

Cool Trends



10 things cities are doing now
to reduce greenhouse gases



**The world's leading professional association
of sustainability practitioners**

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Introduction

What is ISSP

The International Society of Sustainability Professionals (ISSP) is a new, global professional association supporting sustainability practitioners. We offer networking opportunities, a databank of useful resources, and professional development primarily via user-friendly webtools. With the growth of this industry is a burgeoning and passionate group of people doing the work. ISSP is dedicated to maximizing their effectiveness:

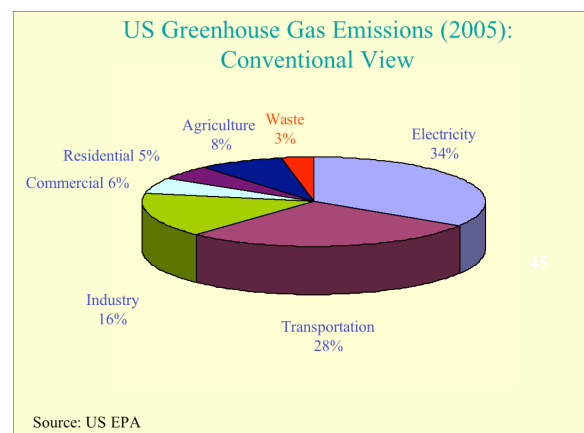
- Stop reinventing the wheel! Members can find best practices and samples on our website.
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How this report was written

During the summer of 2008 we set out to answer this question for our members:

What strategies can communities and municipalities in the developed world implement now to reduce greenhouse gases that can be easily retrofitted into an existing community (i.e., not require major redevelopment) that offer multiple benefits (social, economic and environmental)?

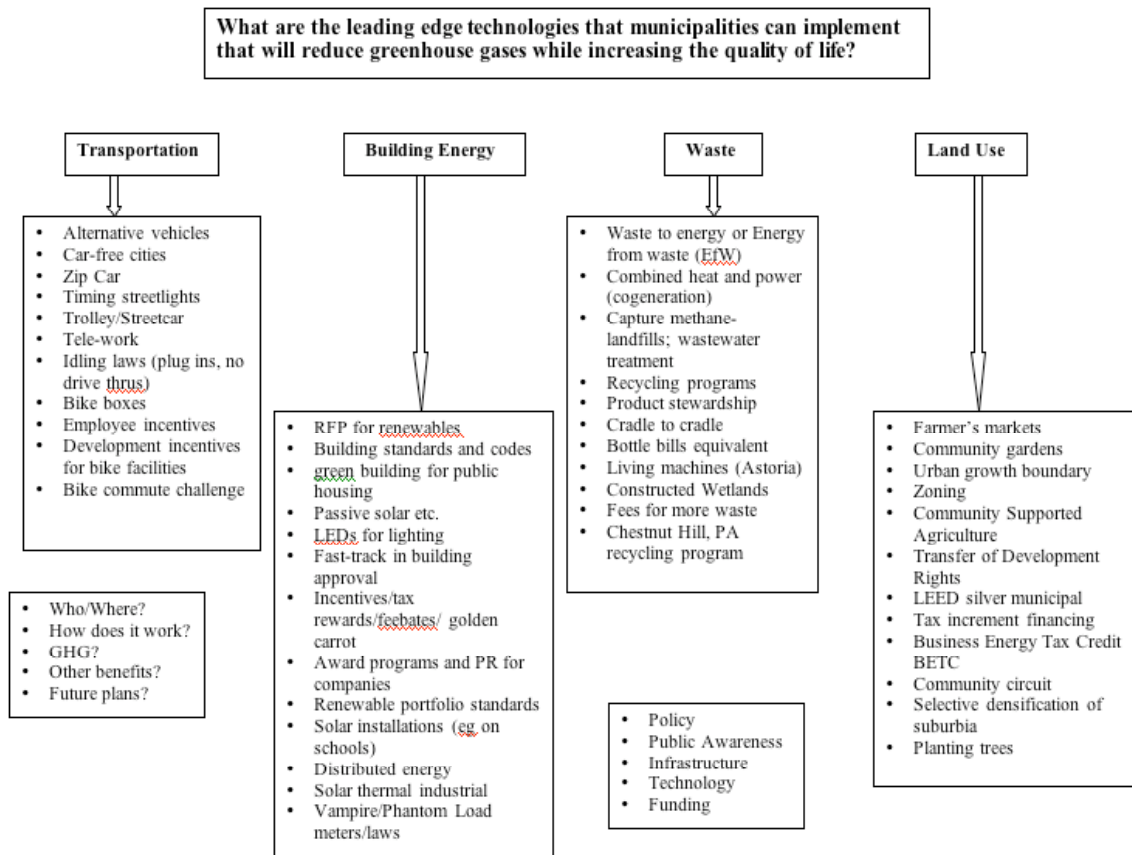
Through a combination of research and interviews with experts in the field, ten strategies emerged. These are not the only strategies that are possible but instead are ones that seemed to be the most widely applicable while yielding significant carbon savings. We focused on energy, transportation and waste as major sources of greenhouse gases. Issues related to larger system issues like land use are implied but not addressed specifically. Please see the table on the next page for the strategies we considered.



This research is in no way intended to be a prescription for a single path that all municipalities should take, but rather a simple toolbox filled with strategies that have worked for others and might just work in your city. This toolbox is primarily meant for municipalities, but can also be valuable to business leaders, sustainability professionals, or interested individuals. Many of the following suggestions benefit from the participation of all of these parties.

It is also important to note that this report is neither the first nor the only report of its kind, and has no intention of asserting that it is more valuable or comprehensive than any other. Instead, it provides another set of tools and advocates for a more central, comprehensive, easily accessible database for such tools. Once a community decides that it is time for a change (and time for sustainability), such information must be readily available so they can take action.

Figure 1—Sources of Greenhouse Gases and Common Strategies



This research is broken into three sets of strategies: transportation, energy, and waste. These three areas have very significant greenhouse gas effects, and are also areas in which municipal decisions can make an enormous difference. Within each section are three or four basic suggestions for what a municipality can do to reduce greenhouse gases. Most pages have a section with several underlying or related strategies. See the chart under Triple Bottom Line Benefits (near the end of the report) to learn about the other social, economic and environmental benefits of each strategy. For each strategy, we provide an exceptional case example or important emerging technology.

Acknowledgements

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Transportation

Transportation accounts for about 15% of greenhouse emissions (by sector) in the world, though in the US this number jumps drastically to about 30%. Transportation is a large part of our climate change problem. In fact, these numbers tend to “hide” the energy involved with the production of vehicles, so the percentages may even be higher.

In the developed world, people have become accustomed to traveling long distances to visit family, go on vacation, and drive to work. Partly because of sprawling suburbs, and partly because cars are fast, easy, and conveniently located in our driveways, people also drive to many places that they could easily get to via other means.



*Street Car in Portland, Oregon, the home of ISSP.
Photo courtesy of Portland Development Commission*

Changing the transportation system is most effective when paired with smart urban planning. When homes are located thirty miles from grocery stores and offices, there is little hope of getting most citizens out of their cars. Often the idea behind planning roads and developments is to reduce congestion, but this can be harmful. It is essential to think about what the community should look like in twenty years, or in fifty, and plan toward that (even if it means traffic congestion now). Trends in technology are leading toward vehicles that are “better” for the environment, like hybrid and electric cars. Yet technology will not be enough to remove the transportation slice from the greenhouse gas pie chart. Only a change in mindset can do that.

This change in mindset typically occurs in a sequence. Most people do not give away their gas-guzzlers one day and then decide to bike everywhere the next. Instead, people tend to follow this sequence:

1. They begin to use public transportation for some trips, and then see options for other trips as well.
2. Some people then tire of waiting for the bus, and seek out bike routes that might reduce their commuting time (for all or part of their commute).
3. Once these citizens realize they can bike to work and other scheduled appointments, they begin to think of their bicycles as a way to get to the grocery store, the dentist, and the library.

This section of our report will focus on working with this chain of events (rather than against it) to change the car-centered mindset and reduce greenhouse gases. First we will look at car sharing as a way to get people out of their own cars, then how to create incentives for public transit, and finally how to create a bike friendly infrastructure.

Facilitate vehicle sharing

There are a number of different ways that municipalities can facilitate the sharing of vehicles, from carpooling, ride-sharing, car-sharing. Paris and some other cities also have sophisticated systems for renting bicycles for point-to-point trips downtown. All these strategies reduce the need for each person to own a car and when people need to think twice about driving, they tend to drive less.

As convenient as bicycling and public transit may be for most trips, some excursions are more feasible by car. Yet owning a car often means that owners will drive even when they don't need to. Several municipalities and companies have begun supporting car-sharing programs where customers can rent a car by the hour. While some people may stop owning cars at all, even more may be able to eliminate one car from the household. In the United States alone there are several companies offering these services. See the table below.

Austin CarShare — Austin, TX City CarShare — San Francisco, Oakland, Berkeley, CA City Wheels — Cleveland, OH Community Car — Madison, WI	HOURCAR — Minneapolis-St. Paul, MN I-GO — Chicago, IL PhillyCarShare — Philadelphia, PA Zipcar — (includes Flexcar), Atlanta, Boston, New York City, Pittsburgh, Portland (OR), Seattle, Washington, D.C., and many others
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With most of these programs, insurance is covered and fuel is included in the price of rental. These can save drivers a bundle over owning their own car. Car-sharing has been shown to reduce overall miles people drive in part because it converts a fixed cost (the cost of the car and insurance) to a variable cost (by the hour or mile).

For best results, consider these tips:

- **Choose locations wisely**— Help companies place vehicles (bikes or cars) in locations accessible to many people (by public transit or by foot).
- **Tell the world**— Let residents know about the program so they will use it.
- **Run errands**— Use car-sharing to get your employees to meetings and personal errands to reduce their need to drive to work.
- **Change the mindset**— Using a car-sharing program can help drivers rely less on their own vehicles, and potentially give them up over time. According to Zipcar, over 40% of their



Portland State University partnered with Zipcar to provide faculty and students with vehicles. Free Zipcar parking is located conveniently on campus, while parking for commuter vehicles is much further away. Faculty can use Zipcar for free (subsidized by the university) for business trips, and at a low rate for personal errands.



clients either give up one of their cars or decide not to buy a new one. Remember, car-sharing doesn't necessarily mean that households don't own a car at all but perhaps they don't need two or three in the garage!

- **Facilitate car-pooling**— Pat Murphy, author of *Plan C*, suggests we use the Internet, cell phones and GPS technologies to provide a “smart jitney” system for rides around town and across the country.

Encourage alternative transportation

Local governments and businesses can use incentives to encourage public transportation or biking while using disincentives to discourage driving single occupancy vehicles. Common examples of incentives and disincentives are listed in the table below. Sometimes you need a carrot *and* the stick!

Incentives	Disincentives
Subsidized bus passes	Parking fees
Carpool parking places	Reduced parking spaces
Transportation savings accounts (pre-tax)	Road congestion
Pay to ride or bike	Tolls
Insurance by the mile	

For best results, consider these tips:

- **Encourage biking as well as public transportation**—Since biking/walking is better for the environment than transit, be sure to provide incentives for biking and walking, not just transit. For example, you can pay employees who bike the same amount you would pay to subsidize their bus passes.
- **Think of your customers/suppliers, not just employees**— Instead of (or in addition to) paying for parking, give discounts to those who arrive at your business by bike/walking or hand out bus tickets to those who arrive by public transit.
- **Build the infrastructure**— Incentives are only effective when public transit or bicycling is convenient. Build the infrastructure so people have the option, and get public transit systems built quickly! Curitiba, Brazil, for example, has a world-class bus rapid transit system that takes advantage of existing streets but acts like light-rail at a fraction of the initial cost.
- **Use savings to help fund the program**—Calculate the cost of a parking space, including the missed opportunity for more office space. Buy transit passes in bulk for discounts. Investigate energy related tax credits/carbon offsets. Consider potential savings in health insurance from the exercise people get biking/walking or even walking to bus stops.
- **Reach out**— Find out what individuals want from their public transit/bicycling system, and work toward building that.

In Clark County, WA, employees have an innovative incentive to use public transit: time off. When employees use alternative transportation (mass transit, biking, walking, carpooling) for 12 round trips in a month, they can earn two hours of bonus vacation time. Some worried that this would lead to a decrease in productivity, but these workers are able to get their work done in time for their two hours out of the office. This bonus time off is seen as compensation for time spent on alternative travel—waiting for the bus or a carpool buddy, or even the extra time to ride a bike.

Develop bicycle facilities/infrastructure

For those who live within a few miles of work or the grocery store, bicycling can be a great way to get around. Yet even a few miles can seem too much when the roads are dangerous, and many people don't want to show up to work in spandex shorts. Some simple facilities can make bicycling seem like a great alternative to driving.

Safety while riding	Convenience at the end of the line
Bike Lanes—to keep bikers safe when riding on busy roads	Bike Racks—provide a place to put bikes; they can also be artistic
Bike Boxes—special pavement markings to keep bikers safe at dangerous intersections	Bike Lockers—provide storage for bikes, clothing, and other equipment; safe from weather or vandalism
Laws and outreach—laws should protect cars and bicyclists, and outreach should inform people about these policies	Facilities with showers—see sidebar. No one wants to be sweaty at work all day!

For best results, consider these tips:

- **Make like lanes safe**— In Europe, some bike lanes are built between parked cars and the sidewalk to protect bikers.
- **Sponsor a CarFree day**— On a weekend, block off a circuit of streets and encourage people to ride. Remembering, “I have a bike!” is the first step toward riding instead of driving.
- **Connect the dots**— Having a bike path is not enough. Paths must be continuous to be useful, and should intersect with public transportation so people can opt to ride part of the way.
- **Teach a man to bike**— Citizens will be more likely to bicycle if they are aware of bike safety and maintenance. You can offer classes, perhaps through local bike shops, to teach these subjects.
- **Have fun with them**—Make bike facilities feel like a part of the community and landscape. You can even have a design competition where local artists can create beautiful bike racks.
- **Change the goal**—Rather than reducing congestion, make carbon neutrality the goal. Creating more multi-lane roads may reduce congestion now, but it encourages more driving and pushes us further from a sustainable future.

In 2004, Chicago opened the Millennium Park parking garage, which features two stories for the McDonald's Cycle Center. The facility provides free parking for several hundred bicycles, as well as showers and lockers for bicyclists. The Bicycle Station also features a snack bar and bicycle rental and repair. For more information, go to www.chicagobikestation.com



Energy

In this section we focus on non-transportation related energy, that used in buildings and industrial processes. Globally, this is responsible for at least 30-35% of greenhouse gas emissions, making it the largest slice on the pie chart.

The future of energy takes several paths:

- **Conservation**—Another path lies in efficiency, whereby people can profit from energy savings and require less large-scale production. Additionally, energy sharing can have huge impacts, as “waste” energy is used for another purpose.
- **Renewables**—Companies and governments across the globe are seeking ways to make electricity without producing greenhouse gases, by using renewable energy rather than coal or natural gas.
- **Distributed Generation**—They are also looking into smaller energy sources in dense areas that can provide power locally without line loss or wasted heat.

In this section, we will start with efficiency as this strategy makes the others more viable. Updating lighting (in buildings and on streets) can greatly reduce the amount of energy required. This reduction in consumption means fewer power plants must be built in the future, and also saves municipalities and businesses money. Using green building standards can also improve energy efficiency in many areas (lighting, heating/cooling, materials) and urge people to think about the large impacts of even a small building. Then we will look at smart energy techniques that use energy to its full potential, using “waste” energy for other applications. Finally we consider ways to support renewable energy production.



*Wind Farm in France near TGV Rail Lines.
Photo courtesy of Darcy Hitchcock.*

Update your lighting

Lighting a city can require a lot of energy, but it shouldn't have to. There are several ways to reduce energy costs and help reduce greenhouse gas emissions. Here are a few below.

Update bulbs—replace old, inefficient bulbs with energy savers

Daylighting—use natural light to illuminate spaces

De-lamping—identify areas that are over-lit and remove unnecessary fixtures or bulbs

Sensors—use lighting only when needed by installing motion sensors and lighting sensors

One new technology that has great potential in this area is the Light Emitting Diode, or LED. LEDs have long lifetimes and very high efficiency, because they do not emit as much heat as incandescent or fluorescent bulbs. LEDs exist in several forms and colors, and can be utilized in street lights, traffic lights, and parking garages. Because they last longer, they can reduce maintenance costs and so are particularly appropriate for emergency signage (e.g., exit signs). Further innovations are bringing LEDs more and more into interior lighting as well.

According to the U.S. Department of energy, if LEDs were rapidly adopted by the U.S., in the next 20 years we could eliminate almost 260 million metric tons of carbon emissions and avoid building over 130 new power plants.

For best results, consider these tips:

- **Watch for emerging technology**—As technologies like LEDs become more popular, they will get cheaper and more diverse. More variations of efficient lighting will continue to emerge.
- **Spend now, save later**—Updating lighting with efficient bulbs and fixtures can be expensive at first, but the savings in energy and replacements are massive.
- **Save now, save later**—Many areas are over-lit. Identify areas that have more light than they need and remove bulbs (referred to as de-lamping) or switch to task lighting that is used only when necessary.

Raleigh, North Carolina was the first city in 2007 to become a part of the “LED City” program, installing LEDs in municipal parking garages. In addition to a 40 percent reduction of energy costs, 76 percent more people surveyed said they felt “very safe” in the garage due to the new bright white lighting. Raleigh used LEDs manufactured by CREE Lighting Science Group. After Raleigh came Toronto, Canada, Ann Arbor, Michigan, and Austin, Texas in the US, as well as the Tianjin Economic Development Area in China and most recently Torraca, Italy in May 2008. In Ann Arbor, Michigan, replacing 1,000 streetlights with LEDs will reduce carbon dioxide emissions by almost 2,500 tons annually according to ledcity.org. This amount compares to removing 400 cars from the road for that entire year.

These cities are all working toward 100 percent LED use in municipal lighting (e.g., streets, traffic lights and garages) through the “LED city” program, while many cities are beginning to use LEDs outside of this program.



Use green building regulations & codes

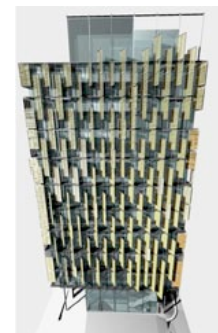
Creating green building codes and policies can improve the efficiency and sustainability of buildings, but the way you use such standards can have a great effect as well. See the table below for some examples.

<p>LEED— Specify a certain green building standard like LEED for new construction and major renovations for any project using public funds.</p> <p>Parking Reduction— Change the zoning laws for parking to create fewer spaces in dense areas to encourage people to use mass transit or bike.</p> <p>Request for Proposals— Contract with developers that employ high green building standards.</p>	<p>Municipal Buildings— Create inspiring demonstration projects that meet high green building standards</p> <p>Fast Tracking—Develop a system where certified “green” buildings can cut through the red tape in the approval process.</p> <p>Tax Credits—With a system like Oregon’s Business Energy Tax Credits, offset some of the cost for energy conserving projects.</p>
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For best results, consider these tips:

- **Use your leverage**—As a municipality, you have many buildings with needs for electricity and energy-using devices. Influence the market for efficient buildings and renewable energy.
- **Adopt a standard**—Choose a green building standard and promote it. Clark County, Washington is testing its building codes against hypothetical Living Building Challenge projects to find barriers to building green.
- **Take the lead**—Create inspiring demonstration projects by building municipal buildings according to strict standards. For example, new municipal buildings in Portland, Oregon are being built at least to the LEED Gold standard (according to www.dsire.org).
- **Give an incentive**— If you cannot make the building codes greener, use incentives like tax credits to encourage contractors and developers to build green. Significant incentives (up to 50% of project costs in Oregon, for example) can make green buildings desirable and affordable.
- **Rethink parking ratios**—Adapt the laws to require less parking for buildings, which will discourage driving and owning cars.

In Melbourne, Australia, the new City Council House building boldly advocates green building design. Exterior panels trap and release heat based on the temperature and time of day, and the building has a wastewater treatment plant on site. Ducts on the south side of Council House bring fresh air into the building, and solar cells power some of these “green” features and heat water. High thermal mass ceilings help air to circulate, and there are 80 parking spaces for bicycles as compared to only 21 for cars.



http://www.c40cities.org/bestpractices/buildings/melbourne_eco.jsp

Create a smart energy system

In order for energy conservation and alternative energy to be effective, the local energy system must be cohesive and supportive. You can use some of the following techniques to avoid problems inherent with large power plants today.

Combined heat and power— Most power plants produce large amounts of steam and heat, and most of this is currently wasted and released into the atmosphere. Combined heat and power, also called cogeneration, uses this excess steam to heat nearby buildings. This steam can even be used to run condensers, which can cool buildings in summer. Some industrial processes can make their own energy from cogeneration as well.

Eco-Industrial Parks— We all know that one person's trash is another's treasure, and industrial ecology allows industries to trade their waste products and their waste energy. By finding symbiotic or complementary needs and waste energy streams, multiple businesses can save money and reduce the amount of wasted and produced energy.

Distributed Energy— Large power plants are often far from the people they provide to, making district heating (using the heat from cogeneration to heat the surrounding buildings and homes) implausible. This also results in line losses as energy is transported over long distances. By building smaller power generators closer to the users, energy can be efficiently managed. Multiple fuel sources also help to increase energy security and reliability. (If the sun isn't shining, maybe the wind is blowing.)

For best results, consider these tips:

- **Develop a smart grid**—Energy companies are installing new buildings with computerized meters, which make monitoring consumption much easier. In the future, this technology could allow power companies to handle peak loads by reducing power to buildings or appliances that do not need it, thus reducing the need for additional power plants to supply power only at peaks during the day. See the sidebar to the right.
- **Empower the homeowner**—Provide homeowners energy meters that allow them to monitor their own energy consumption in real time (preferably translating usage into cost). Fast feedback leads to better decision making.
- **Remember the electric car**—Austin Energy has been advocating for plug-in locations for hybrid cars in places like parking garages. The batteries could then be used as storage devices so that they could provide energy to the grid during peak demand.
- **Give and take**—Set up a comprehensive net metering system for people to sell energy back to the grid from local energy sources such as solar panels.

Enel, a utility company in Italy, switched about 30 million of its customers to using smart energy meters. These automated readers allow the company to monitor energy usage without sending a meter reader around town, and also allow households to get direct feedback about their own energy usage. The meters can provide the information necessary to adjust energy prices based on loads. By increasing the price of energy at peak hours, people are motivated to conserve. Since the number of necessary power plants is dependent on this peak load, a reduction at peak hours can mean less power plants being built. Smart meters can even be used to cut or reduce power to households, especially during peak hours. Enel says that the meters will pay for themselves in energy savings in about 4-5 years.

Invest in renewable energy

With oil prices skyrocketing, renewable energy continues to gain more attention. There are many types of renewable energy, and many ways to encourage it. See the examples in the table below.

Renewable Energy Sources	Supportive Policy
Solar—passive, thermal (for hot water) or photovoltaics Wind Geothermal Low-impact hydro Biofuels	Set a renewable portfolio standard— Mandate the increase of renewable energy generated by utilities Buy green power—Green power (electricity) is now available in many communities. Some natural gas utilities also are following suit. Provide energy tax credits— Grant tax credits for companies who use renewable energy in new or old buildings. Set up a system of selling credits so that non-profits can also participate in the system (e.g., Oregon’s BETC.)

For best results, consider these tips:

- **Carbon return on investment**— Invest in technologies that fit your location and population best. Promoting hybrid cars in rainy Pacific Northwest and solar in the sunny Southwest might make the most sense than the reverse.
- **Get the facts, not the hype**—Don’t advocate a technology because everyone’s raving about it. Look at the research and see how it fits your view of the future. Consider the unintended side effects as the technology is scaled up. Can we grow enough biofuels, for example, without making food unaffordable?
- **Be demanding**— The City of Portland, Oregon issued a request for proposal seeking wind power for all City operations. The catch? They wouldn’t pay a cent more than their current bills. Finding energy providers willing to serve them hasn’t been a problem.

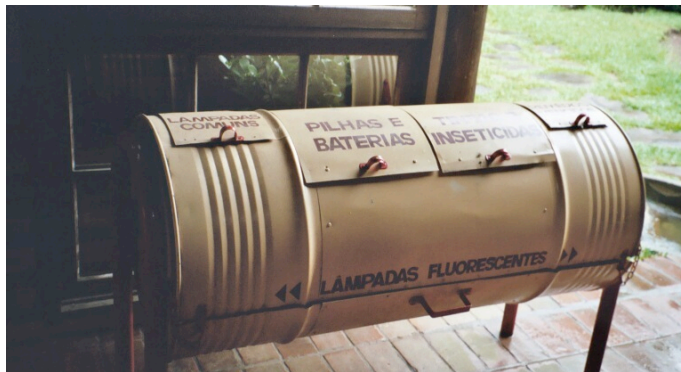
On July 2, 2008, Massachusetts authorized the Green Communities Act that promotes renewable energy as well as energy efficiency. The bill requires that utility companies form contracts (for at least 10 years) with renewable energy companies that need the monetary support. Those with wind or solar generators will now be able to provide up to 2 MW of electricity back to the grid (the former limit was 60kW). The bill also doubled the rate at which Massachusetts power companies have to increase their percentage of renewable power each year (from .5% to 1%).

<http://www.renewableenergyworld.com/rea/news/story?id=52974>



Waste

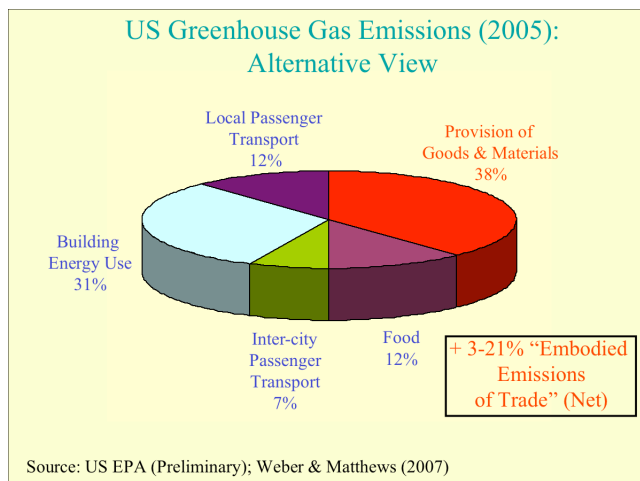
Although waste only accounts for 4% of the greenhouse gas emissions pie chart for the world, it can have a very significant effect. This statistic hides the fact that when we put materials into landfills, new products must usually be made to replace them. Making new products, especially from virgin materials, requires vast amounts of energy. According to the United States EPA, it takes more than 40 times as much to make an aluminum can from virgin than recycled materials, so each aluminum can put in a landfill leads to more emissions for production of the next can.



Household hazardous waste drop-off container, Curitiba, Brazil. Photo courtesy of Darcy Hitchcock

Another often-overlooked impact of waste is the potent methane emissions from organic materials in landfills. When organic materials decompose in an anaerobic environment, they create methane, a much more powerful greenhouse gas than carbon dioxide, which they would create if composted instead.

Focusing on waste tends also to hide the production of the materials in the first place. How you segment the pie chart matters. Compare the chart at the right with the traditional view in the Introduction. If you assign greenhouse gases to the products, suddenly ‘stuff’ becomes a key source of greenhouse gases. So we must use less. It is fruitless to focus on “waste reduction” without focusing on “product reduction.” This may mean a shift toward services rather than goods in some cases.



You recall the old maxim: reduce, reuse, recycle (in that order). In this section we will start by looking at product stewardship and ways to make “better” products rather than more. Then we will discuss some innovative recycling techniques that can make recycling more effective. Finally, you may be able to use the little that is left as a fuel for a waste-to-energy facility.

Encourage product stewardship

Even with extensive recycling programs in place, materials are often squandered because they are passed from the manufacturer to the customer without hope of return. Product stewardship (also known as Extended Producer Responsibility or Extended Product Responsibility) makes the manufacturer (and in some cases, other stakeholders) responsible for their product for the whole life cycle: manufacture, use, and end of life. This is often manifested as product take-back but it affects the design of products as well. Some manufactures convert products to services (e.g., Interface leasing instead of selling carpet.) While the pie charts we often see focus on transportation and energy, they “hide” the process of production, which has serious greenhouse gas implications. See the table below for a few stewardship strategies.

Cradle to Cradle— Instead of ‘cradle to grave,’ this concept envisions the manufacturing as a cycle, not a one way trip toward the landfill. Products at the end of their useful life should be valuable for something new; that the end should be a new and useful beginning. Everything either returns safely to nature (biodegrades) or returns to the technical cycle to be made back into product. Products can be certified under this system.

Take-back programs— A method where old products are returned to their manufacturers at the end of life. The materials should then be re-used for new products. British Columbia, for example, has product stewardship regulations requiring take-back of a wide variety of products including paint, pharmaceuticals, and batteries. Europe has even broader standards.

Increased product longevity— In our throw-away, disposable culture, many products are designed to be used once and tossed. Others build in functional obsolescence so they will quickly be replaced with new models. In the interest of resource conservation and greenhouse gas reduction, pushing for longer lifetimes is key. Look for ways to take advantage of newer, more efficient technologies without scrapping the whole product.

For best results, consider these tips:

- **Make it a high priority**— Preliminary evidence from the Oregon Department of Environmental Quality suggests that materials and manufacturing have more of an impact on greenhouse gas emissions than buildings! Reducing production and consumption is essential for a climate neutral future.
- **Use what you can re-use**— Encourage companies to use parts and materials that can be re-used in other future products. Xerox, for example, has saved billions of dollars ‘up-cycling’ product components from one generation of copier to the next. Often, to get

EPEAT, the Electronic Product Environmental Assessment Tool, was born out of the Zero Waste Alliance funded by a US EPA grant. It has transformed the electronics industry by creating a sustainability label for computers, monitors and other electronics, creating incentives for product stewardship without legislating it. The assessment tool, used for commercial purposes, has eight sets of criteria including materials selection, design for end of life, and product longevity. Products must meet all 23 of the required criteria, and receive certification (bronze, silver, or gold) based on how many additional criteria they meet.

The United States Federal Acquisition Regulations compelled all federal agencies to use 95% or more electronics certified by EPEAT. A recent report from the Green Electronics Council in Portland, Oregon reports “enormous impact[s]” from EPEAT certified computer purchasing in 2007.

www.EPEAT.net

companies to do this either requires legislation or a compelling product standard to drive this behavior. Government can play a useful role in both. (See sidebar on EPEAT.)

- **Live longer**—When buying products, give preference to those that have a long, useful lifespan, can easily be upgraded, and that can be recycled or returned to the manufacturer.
- **Make it official**— Create standards for minimum lifetimes and acceptable manufacturing practices for stewardship. For example, in 2003 the European Union developed the WEEE Directive (Waste Electrical and Electronic Equipment Directive), which makes the manufacturer responsible for their products at the end of life.

Use innovative recycling techniques

Recycling in general is not a leading edge strategy anymore, yet some particular methods break the mold. The strategies and examples below are a few of many interesting innovations.

Supplement the weekly pickup—See example in sidebar.

Develop incentives for recycling—For example, weighing recyclables and receiving vouchers based on weight. The Recycle Bank is one such system that uses electronics to weigh the recycling bin and then provides rewards to homeowners.

Identify and create a waste exchange—Compare resource and waste materials for businesses and find matches.

Create take-back programs—Adopt product stewardship practices, making products that they can take back and reuse or recycle (such as electronics).

For best results, consider these tips:

- **Make it easy**—For some, separating recyclables into several bins and lugging them up a steep driveway is enough to make recycling feel like a burden. In such cases, using an “everything goes,” rolling bin (as in Portland, Oregon) can make recycling feel easy. However, be aware that these large bins may make monitoring much more difficult and can lead to more non-recyclable waste going to recycling plants.
- **Get the incentives right**—Some incentive programs like the Recycle Bank reward people when they have more recycling. But don't you ultimately want less waste over all?
- **Make it fool-proof**—Put the garbage can last in a series of containers and invest in special containers that make it hard to put the wrong material in them to reduce contamination. One firm gave employees a cookie if they'd turn in their garbage can for a recycle bin in their office.
- **Ban organics/recyclables from landfills**—Make it unlawful to dump organic waste or recyclables into landfills, and enforce these laws. Instead, set up systems for composting. (The carbon dioxide from composting is much less harmful as a greenhouse gas than the methane from landfills.)

In Chestnut Hill, PA, a neighborhood outside of Philadelphia, the weekly recycling program left something to be desired. The residents found that they had many recyclables piling up that were not accepted in the generic program, and sought out a nearby recycling center that would process such materials. The only catch: the recyclables had to be delivered to the center. The community now rents a truck one Saturday each month to bring these goods to the center and collects the compensation from the center. This money is used for community development projects such as creating green spaces and parks in town.

- **Promote industrial ecology practices**—Identifying waste streams and input materials can be a direct or “pure” form of recycling. Kalundborg, Denmark is a famous example of what can be accomplished with eco-industrial parks, saving energy and resources. You don’t have to start from scratch; this eco-industrial park evolved over time as businesses sought to reduce costs. Sometimes you can simply create an online waste exchange for businesses in the same general area; think of it as a Craig’s List for industry.

Create energy from waste

Despite current efforts to reduce, reuse and recycle, massive quantities of solid waste are being shipped to landfills. Seattle, Washington, for example, is reportedly shipping a mile-long train of garbage to eastern Oregon every day! Instead of dumping it into a landfill, you may be able to turn it into energy.

Energy from Waste (EfW) facilities (also known as “waste to energy”) can process this waste, using it as fuel. Beware, though, that this process is controversial. Past facilities have not adequately controlled pollution or removed heavy metals from the waste, and zero waste advocates in particular worry that such facilities might undermine a dedication to recycling. Do your homework.

For best results, consider these tips:

- **Seek the next best use**—Energy from waste facilities should be used only when burning the materials is the next best use. Set up systems to recycle high-value materials and toxics from the waste stream first (for example, mercury in switches in hair dryers and thermostats).
- **Watch for Put-or-Pay**—Some waste treatment plants have a put-or-pay agreement in place, so a certain amount of waste must be diverted to the plant or the city pays a fine. You want to avoid creating disincentives to zero waste and recycling strategies.
- **Use the last 10%**—Engineers are developing ways to remove heavy metals or harmful materials from the leftover ash (about 10% of the mass of the incoming waste). At the Port of Hamburg in Germany, 80% of this ash is being used to build roads and large foundations.
- **Keep it clean**— Demand high standards for pollution control and prevention and for the removal of toxics and heavy metals.
- **Kill two birds**—An average coal plant produces 2,460 kWh per ton, while the average EfW plant only produces about 520kWh per ton. Yet EfW turns waste into fuel, and coal plants deplete a natural resource. If you use the best available technologies, the emissions may be clean enough so you can site the plant in urban areas where it can be a combined heat and power facility, making good use of the excess heat. This is becoming common in Europe.



At Covanta Energy’s Resource Recovery facility in Montgomery County, Maryland, approximately 1,500 tons of solid waste is processed each day. The waste is brought to the facility on train cars. The waste is then used to produce up to 55 megawatts of energy. This is enough to power about 40,000 residences in the area. Operating since 1995, this plant is fully stocked with control systems for nitrogen oxides, mercury, and any other possible emissions. The above photo can be found at www.covantaholding.com.

Triple bottom line benefits

All of the strategies included in this report reduce greenhouse gases, of course. The following chart summarizes the additional synergistic benefits you can also expect from each strategy.

Strategy	Environmental	Social	Economic
Vehicle Sharing	Reduces pollution because it tends to reduce driving and may involve newer cars	People who cannot afford a car or car payments can rent one when needed	People in the community save money (car payments, insurance, fuel, up-keep)
Alternative Transportation	Reduces air pollution Encourages density	Improves health/ promotes exercise Familiarizes people with alternative transit might use it for other trips	Allows conversion of parking lots into higher value uses May reduce health insurance costs
Bike Infrastructure	Less pollution May require less asphalt to make bike trails than roads	Increased exercise leads to better health Awareness of surrounding community	Building bike infrastructure is much cheaper than building public transit
Updated Lighting	More efficient and fewer bulbs mean less production and waste	Improved lighting can increase feelings of safety	More efficient bulbs pay for themselves in a matter of several years due to low energy costs and savings in maintenance
Green Building	Green buildings use less toxic materials, and may use less material over all. Building footprint and landscape also may have a lighter impact.	“Green” buildings can be beautiful places to live and work. They are also healthier because of improved air quality and access to natural light.	Lower energy costs can be significant. Research shows people in green buildings are more productive.
Smart Grid	Reduces other pollutants related to fossil fuels (e.g., mercury from coal plants).	Encourages interdependence if houses supply to grid Forces homeowners to monitor their usage	More efficient use of resources to produce a unit of power. Reduced prices for power at off-peak times

Strategy	Environmental	Social	Economic
Renewable Energy	No pollution/smog from solar/wind etc.	Contributes to energy independence, which may reduce conflicts in unstable areas of the world. Often provides disadvantaged rural areas additional sources of income.	Eliminates the fuel cost as a factor in energy production (e.g., gyrations in oil and gas). May provide economic development opportunities (e.g., green collar jobs, wind farms as additional sources of income for farmers/ranchers)
Product Stewardship	Less goes into landfills Natural resources are conserved	Products that people can trust to last and function well	Cheaper to re-use parts/materials than harvest new ones Creates incentives for better, more environmentally friendly design of products.
Recycling	Reduces amount of waste in landfills Reduces use of raw materials	Facilitates awareness of individual consumption. Provides an easy way for people to make a difference, a stepping stone to more difficult behavior changes	Reuse and recycling can often be less expensive than manufacturing from scratch.
Energy From Waste	Reduces amount of waste in landfills by 90% Recapture of metals Very strict standards for emissions and pollutants	Reinforces the mindset that 'waste is food' (a resource)	Renewable energy source that can function 24hrs/day, unlike solar or wind

Themes to keep in mind

In the process of researching this topic, the experts shared important insights that did not fit neatly within the structure of the report. We wanted to summarize them here.

If you don't know where you're going, any road will get you there—We need better methods for knowing where we want to go and where we are on the journey. Mark Anielski spoke of the need for a genuine progress indicator (rather than a statistic like the GDP which counts every economic transaction as positive and ignores unpaid work). His Genuine Wealth Assessment allows communities to determine how well they are doing compared to their set of values, identifying holes that need to be patched. We need inspiring visions of the future, perhaps using the backcasting method suggested by the Natural Step. When identifying possible solutions, ask yourself “Is this something I want to be in my community 50 years from now? Or does it at least push us toward that goal?” This can clarify whether investments now will really be useful in the long run.

It's the system, stupid—There is a lot of media attention, popularity, and hype around what some are calling the “green revolution.” (Ironically, this term originally was used decades ago to refer to the use of artificial pesticides and fertilizers to boost agricultural production.) This interest can be a great asset, as outreach and education convince increasing numbers of businesses, governments and individuals to do something to stop global warming. Now more than ever, people are excited and looking for ways to get involved. Outreach programs can give people this opportunity. But beware the quick fix. We're already seeing problems with the rush to biofuels. We have to think through all the unintended side-effects.

Use less—No matter how efficient we make our processes, and no matter how well we deal with waste, we cannot reach carbon neutrality without reducing our resource consumption. The colorful pie charts we look at to assess the responsibility for greenhouse gases are imperfect, and there is much they cannot show. For example, many assessments consider the final energy consumer to be responsible for the emissions from production. Therefore, if a power plant in New York is providing energy to residences in New Jersey, the New York area is not seen as responsible for the plant's emissions. So why should New York change anything? As in any complicated assessment, such decisions about where the credit goes are inevitable. However, knowledge of this very serious omission should affect the way governments read the charts. When looking at the production of materials, the pie charts can again be misleading. According to David Allaway at the Oregon Department of Environmental Quality, instead of a “waste sliver” the pie charts could instead feature a “materials chunk,” showing significant greenhouse gas impacts. Rather than promoting more technologies and more products as the answer to economic development, consider marketing green jobs and services.

Collaborate and consolidate—For those striving to “do the right thing” and reduce greenhouse gas emissions, finding the right path can be difficult. No one can do this alone. There are many organizations and websites with various types of information, and the wealth of sources can be overwhelming. Several experts spoke of the need for a clearinghouse and a “champion,” a site or organization where municipalities (or other groups) can get the information they need. For municipalities, a great example of such an organization is ICLEI- Local

Governments for Sustainability. This international organization helps local governments to become more sustainable. Another such example is the ISSP for any professional who uses sustainability for a large part of their work. Many other examples exist. Please see our favorite resources listed on the next page.

The best things often come in small packages—Finally, the experts spoke of the many small solutions to the problem of greenhouse gases, rather than large ones. Diversity is nature’s insurance policy and it should be an important principle for us as well. As Terry Tamminen, the former Secretary of the California Environmental Protection Agency who has consulted with several Governors and Canadian Premiers on climate and energy policy said, “There is no silver bullet—only silver buckshot.”

Recommended Resources

Climate change and energy policy:

- “Bike-Sharing Gets Smart”, TIME, June 23, 2008
- “Switzerland and the 2000-Watt Society”, Sustainability Journal of Record, February 2008
- *Heat* by George Monbiot (explores how we can reduce greenhouse gases by 90% and still preserve much of our lifestyle)
- ICLEI’s Cities for Climate Protection Campaign
- Intergovernmental Panel on Climate Change (the UN sponsored body to study climate change)
- *Plan C: Community Survival Strategies for Peak Oil and Climate Change* by Pat Murphy
- *Post Carbon Cities* by Daniel Lerch
- *Weather Makers* by Tim Flannery (an excellent overview of the current science)

Sustainable community development (general):

- “America’s 50 Greenest Cities” Popular Science, March 2008
- American Planning Association Policy Guides
- *Economic Renewal Guide* by Rocky Mountain Institute
- *Superbia!* by Chiras and Wann
- *Toward Sustainable Communities* by Mark Roseland (excellent overview of all elements including transportation, waste, etc.)
- Smart Growth America
- Urban Land Institute

Energy from waste:

- “Waste not, want not” Sustainable Industries, July 2008
- GAIA, the Global Alliance for Incinerator Alternatives <http://no-burn.org/> (for the case against incineration)
- Stop Trashing the Climate <http://www.stoptrashingthecolimate.org/> (for the case against incineration)

For information on the International Society of Sustainability Professionals please see www.sustainabilityprofessionals.org.

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