"JUST PLAIN GOOD BUSINESS"

The Economic and Environmental Benefits of Sustainability as Exemplified by One Hundred Sixty Case Examples

---

Prepared by:

Bob Doppelt and Lisa Watson
Center for Watershed and Community Health
Mark O. Hatfield School of Government
Portland State University
Portland, Oregon 97207
(503) 725-8101
E-mail: cwch@pdx.edu
Website: www.upa.pdx.edu/CWCH/

Background and Acknowledgments

As we enter the new millennium, the citizens of Washington and Oregon face a number of important environmental challenges. For example, they know that a majority of streams fail to meet water quality standards and that many salmon stocks are listed as threatened or endangered regionwide. In addition, the recently published Oregon State of the Environment Report identified a number of areas where Oregonians can expect continued problems under current policies and programs including: poor water quality, especially in urban and agricultural areas, inadequate water supplies, loss of wetlands, degraded riparian areas, depleted fish stocks, invasion of exotic species, diminished biodiversity, and waste and toxic releases. Similar problems are sure to exist in Washington State.

These types of environmental issues threaten to constrain the economy and quality-of-life of communities throughout the Pacific Northwest. The public and decision makers want to take appropriate steps to resolve these problems, but often hesitate because they fear the economic consequences will be too severe.

In the spring of 1999, The Center for Watershed and Community Health (CWCH), a non-profit research institute affiliated with the Mark O. Hatfield School of Government at Portland State University, initiated a project to help decision makers throughout the region better understand the economic issues and facts associated with developing a more environmentally sustainable economy. The CWCH's aims is to provide accurate, objective, and easy-to-understand information about the potential costs and benefits associated with adopting practices and policies that can resolve pressing problems such as endangered salmon and lead to a more environmentally efficient economy. The CWCH has developed collaborative research partnerships with a number of academic institutions in Washington and Oregon, provides grants to a number of leading economists, and completes its own research, to accomplish this goal. This assessment is one in a series of reports to be produced as a result of this effort. The project is an integral part of PSU CWCH's focus on developing new, more effective and efficient approaches to environmental governance.

AUTHORS

Bob Doppelt, director of The Center For Watershed and Community Health, Mark O. Hatfield School of Government at Portland State University, developed this report. We are grateful to Lisa Watson, PSU graduate student, for her exemplary research assistance in gathering and organizing the case studies in the appendix.

ACKNOWLEDGMENTS

The CWCH gratefully acknowledges the financial support of the Ford Foundation, Brainerd Foundation, Lazar Foundation, and Harder Foundation for this project. The authors are solely responsible for the content.

Table of Contents

"JUST PLAIN GOOD BUSINESS"
The Economic and Environmental Benefits of Sustainability as Exemplified by One Hundred Sixty Case Examples

Introduction and Purpose of This Document

The struggles over how to conserve the environment while growing the economy in the Pacific Northwest seem daunting. There is great concern, especially with the recent ESA listing of endangered salmon, that action to reduce environmental impacts on streams, water quality, and other ecological systems will have major economic costs to companies, communities and government. However, over the last few years, a growing number of businesses and organizations in Oregon and Washington have steadily been adopting practices and programs that *save* money while at the same time helping to conserve and restore the environment.

This report describes how over 160 companies and organizations have adopted practices and programs that generated savings of over $55 million annually while dramatically reducing their environment impacts. It follows the release of an earlier report, *Saving Salmon, Saving Money: Innovative Business Leadership in the Pacific Northwest* (Goodstein, Doppelt and Sable, 1999), which found data on 137 firms that had saved over $42 million from 1992-1999 taking steps to improve their environmental management. *Saving Salmon, Saving Money* was an analytical report that provided few actual descriptions of what the137 firms did to achieve the cost savings and environmental benefits. Since its release, we have continually received requests for actual case examples of how firms and organizations save money while improving the environment. This report is intended to fill this need.

By describing how organizations save money while reducing their environmental impacts, we hope this report inspires action by many additional firms and organizations to apply similar measures. We also hope this document stimulates action by government to institute policies and programs to foster and support efforts by the private sector and communities to adopt measures that lead to more environmentally and economically sustainable paths.

What is Sustainable Development?

Across the globe, governments, communities and industry are increasingly responding to complex, interconnected economic, social and environmental problems using an approach called "sustainable development." The short form of this term is often "sustainability." The term was developed by the 1987 U.N. World Commission on Environment and Development (The so-called Bruntland Commission) as: "meeting the needs of the present generation without compromising the ability of future generations to meet their own needs." Key objectives included: "reviving economic growth, but in a new form (less material and energy intensive…); meeting essential needs for jobs, food, water, energy and sanitation; conserving and enhancing the natural resource base; and merging ecological and economic considerations in decision making."

Said differently, achieving sustainable development or sustainability means passing along to future generations ample stocks of environmental capital such as productive, uncontaminated topsoil, clean water, clean air, predictable climate, intact ozone layers, fertile forests, estuaries and oceans, and abundant and genetically diverse biodiversity including fish, wildlife and plant species. To achieve this requires changes in the way our economies and communities function.

Sustainability Measures Are Not the Same As Regulatory Responses

Sustainability measures are fundamentally different from traditional environmental compliance programs. Though government can play important roles in providing the governance structures, policies and programs needed to foster these efforts, sustainability measures are typically adopted voluntarily by a firm or organization because they believe the practices will provide added value. The measures should help a firm or organization continually identify and improve its environmental, economic and social performance, no matter what the existing minimum standards may be. An effective sustainability program should build upon, enhance and ultimately be integrated into existing profit enhancement, environmental compliance, quality control, human resource and other internal programs of a firm or organization.

Sustainable Development Goals and Principles

To achieve the goal of sustainable development firms and organizations tend to focus on one or more of the following (adapted from The Natural Step, principles of *Industrial Ecology*, Allenby, 1999; and other sustainability programs):

1. *Conserving, protecting, and where needed, restoring the productivity and diversity of nature (ecological processes and structure) to levels necessary to maintain ecological health (with special focus on key areas such as riparian areas, floodplains, wetlands, native plant habitats etc).*

Why? Because ecosystem science shows that human health and prosperity depends on the ability of nature to produce a continued supply of physical goods (wood, water, fish) and ecological services (e.g. clean air and water) and on nature's ability to assimilate human waste and turn them into new resources. Today, many resources and ecosystems in the Northwest are below the levels needed to provide these goods and services in perpetuity.

2. *Reducing the use and emission into nature of toxic minerals, metals and fossil fuels and synthetic, persistent toxic materials and substances, and enhancing the use of renewable energy and non-toxic materials and substances in processes, goods and services.*

Why? Because the first and second laws of thermodynamics show that to maintain ecological health toxic materials must not be discharged into nature faster than nature can break them down and reintegrate them into natural cycles. Today, we are emitting toxic materials and substances faster than nature can assimilate them (which causes pollution).

3. *Eliminating waste through reduction at the source and enhanced reuse, remanufacturing and recycling internally within and externally between agencies, institutions and business.*

Why? Because to meet the first two principles, materials and substances must be used as efficiently as possible to prevent the overharvest of natural resources and to reduce the discharge of waste and pollution into nature faster than nature can assimilate them.

4. *Increasing the efficiency by which natural resources and energy are extracted, processed and used.*

Why? Because to meet the first two principles materials and substances must be used as efficiently as possible to prevent the overharvest of natural resources and to reduce the discharge of waste and pollution into nature faster than nature can assimilate it.

5. *Enhancing business development, economic competitiveness, job creation, and fairness in the distribution of resources to meet basic human needs, public safety, health care, and education consistent with the principles above.*

Why? Because to meet all the principles above, the region must have health economies and communities which benefit all citizens. Everyone must be included in the region's prosperity to ensure social equity and cooperation, which will lead to better support for and involvement in sustainability programs.

Sample Sustainability Practices and Strategies

Achieving the goals described above involves looking for potential savings and new business and job opportunities in these and other activities:

- *Energy and Material Efficient Design* – designing out environmental impacts in new manufacturing processes, products, services, building and construction practices; and properly redesigning existing ones.

- *New Technologies* – purchasing equipment that requires less energy, water and raw materials, and that can remanufacture products with reused and recycled materials.

- *New Control Systems* – applying more sophisticated control systems; most factories in the world still use simple, gross scale optimization controls.

- *More Sophisticated Management* -- turning companies into learning organizations to continually reduce the environmental impacts of processes, products and services.

- *New Production Processes* – manufacturing more efficiently, reducing unneeded steps.

- *Material Savings* -- using less material of better quality and durability and less impact.

- *Non-toxic Materials and Substances* – using naturally occurring, non-toxic materials and substances.

- *Use of Services versus Products* – leasing or renting products such as cars and copies rather than promoting their purchase by every consumer.

Research Indicates that Sustainability is Often "Just Plain Good Business"

The appendix of this report contains over 160 case studies of firms and organizations in Oregon and Washington (as well as national and international examples) that have applied one or more of the sustainability measures described above. While financial data is available for only 108 of the case examples, these projects resulted in a *total annual savings of $55,661,523.* Available data shows that the projects paid for themselves in an average of less than 2 years.

Total Annual Financial Savings of 108 Case Examples: $55,661,523
Average Payback Period: 1.9 Years

These savings demonstrate that the adoption of environmentally sustainable practices is often *just a plain good business decision.* This should not be a surprise. A growing pool of research shows that in most cases, good environmental management is good for the bottom-line.

Traditionally, environmental investments have been viewed as simply a cost of complying with environmental regulations. As a result, they have been typically end-of-the-pipe types of investments. Add-on and clean-up technologies are applied at the "downstream" end of the economic value-chain. Consequently, end-of-the-pipe controls rarely pay for themselves.

By contrast, the adoption of sustainability practices involves a much more expansive approach. Sustainability measures place the focus of environmental measures "upstream" in company, community and government operations - to design out environmental impacts before they occur. This means looking for ways to phase-in sustainable process and product designs or redesigns, the use of naturally occurring non-toxic materials and substances, the production of goods and services using process oriented abatement technologies, and the re-circulation of end-of-life materials and products into new processes and products through increased reuse and recycling.

Although they may require initial investments, these activities usually pay for themselves through lower costs and improved competitiveness of new product or service specifications. Hence, as this report found, many investments in sustainability result in *cost savings,* increased productivity and market share.

For example, as previously discussed, *Saving Salmon, Saving Money: Innovative Business Leadership in the Pacific Northwest* assessed data provided to ten public agencies by businesses and organizations representing 9 industry sectors in Washington and Oregon. Data on cost

savings was available from 137 firms, which reported a combined minimum gross savings of over $42 million from 1992-1999, with most savings coming in the last three years. Returns on investment averaged 4.04 years for private firms and 8.79 years for public organizations. This report describes the actual practices of many of the firms whose financial data were analyzed in *Saving Salmon, Saving Money*.

This information has been reinforced by a recent study by Michael Russo of the University of Oregon Lundquist School of Business. He analyzed the economic and environmental performance of 243 Fortune 500 companies over a two-year period and found that companies with superior environmental performance had higher returns on investment compared to their competitors - even after accounting for sales growth and market position. The study was published in the "Academy of Management Journal" after a rigorous peer review process and won a prestigious Moskowitz award as a result. Russo concluded that contrary to the mistaken belief that environmentally responsible practices represent costs without benefits, "when you actually crunch the numbers, it turns out that good environmental citizenship is great for the bottom-line."

Almost As a Side Benefit, Sustainability Generates Significant Environmental Returns

In addition to cost savings, by adopting environmental sustainability measures, the firms and organizations described in this report have substantially reduced inputs of raw material, water, energy and hazardous materials, and outputs such as waste and pollution. Specific savings include: over one billion gallons of water per year; 18-million kilowatt-hours, 175,200 million BTU's and 5.4 million therms of energy per year; 183-thousand gallons of gasoline and diesel fuel annually; 21,000 tons of reduced carbon dioxide emissions annually; 14,225 tons of solid waste, including steel, aluminum and plastic, 714-thousand pounds of food, 560-thousand pounds of paper/packaging and hundreds of thousands of moving boxes, as well as 194,600 polystyrene cups and bowls and 600 pounds of polystyrene "peanuts" were diverted from landfills; and 157,000 pounds of hazardous/toxic waste and 300 gallons of antifreeze and thinner were prevented from entering the waste stream.

These actions generate multiple environmental benefits. For example, improved water efficiency leaves more water instream for fish and other aquatic organisms; moreover, energy use is reduced since less water needs to be treated before use, pumped to sources, and retreated after use. Energy efficiency reduces the need for power from hydroelectric dams, allowing more water to be spilled to promote fish passage. It also reduces CO2 emissions. Reducing the use and discharge of hazardous substances and toxic materials reduces the contamination of surface and groundwater, soils and the atmosphere. This saves businesses and taxpayers the cost of future clean-up. Reducing, reusing and recycling physical waste reduces the need for virgin feedstocks, relieves pressure on landfills, and reduces the leaching of toxic substances from landfills into streams and groundwater. Constructing buildings with environmentally sustainable practices and materials preserves land and provides numerous other environmental benefits. Table 1 summarizes the environmental benefits achieved by the firms described in this report.

TABLE 1

RESOURCE SAVINGS	
No. of Cased Examples with Data Available	**85**
Resource/Waste	**Annual Savings/Reduction**
Water	**1,071,384,870 gallons of water**
Toxic/Hazardous Waste	**100 gallons of antifreeze**
	39,936 lb reduction in hazardous waste generation
	117,000 lb reduction in toxic material use
	200 gallons of thinner/year
Energy	**175,200 million BTUs**
	3 organizations cut energy use by an average of 43%
	18,156,397 kWh
	5,416,145 therms
Fuel	**183,706 gallons of fuel (diesel and gasoline)**
Carbon Dioxide	**21,000 tons of CO_2**
Food Waste	**714,305 pounds of food waste**
Paper/Packaging	**560,508 pounds of paper/packaging**
	Hundreds of thousands of moving boxes
Polystyrene	**194,600 cups & bowls; 600 pounds of polystyrene peanuts**
Garbage Can Liners	**25 lbs of garbage can liners**
Solid Waste	**14,225 tons of solid waste, including steel, aluminum and plastic**
	One organization cut landfill waste by 2,000 ft3
	One organization cut landfill waste by 70% (1,600 tons)

More Comprehensive and Widespread Effort Will Yield Even More Impressive Results

The organizations described in the appendix have demonstrated that taking steps to restore environmental quality can produce significant economic benefits—not major costs—to companies, communities and government. Thus, these firms and organizations are at the leading edge of the movement to place Oregon and Washington on a more environmentally and economically sustainable path.

However, it should be noted that while the organizations described here have taken impressive steps, few have implemented comprehensive sustainability programs (such as the adoption of complete sustainability-based Environmental Management Systems). Instead, the adoption of sustainability measures can best be characterized as somewhat haphazard, with a scattered set of projects driven more by media specific regulatory pressures or enlightened CEO's and employees than strong, consistent company policies and programs. This raises the question of what the potential economic, social and environmental benefits could be if the firms and organizations assessed in this report adopted comprehensive sustainability programs, addressing all environmental-economic issues through a systematic, integrated approach? It also raises the question of what the potential benefits could be if sustainability measures were more widely adopted by firms and organizations throughout the region?

The report *Saving Salmon, Saving Money* determined that only about 1% of the firms in each of the nine manufacturing, service and retail sectors represented by the 137 firms assessed were actively adopting sustainability measures. The authors therefore projected that if just 25% of the firms in each of the nine sectors follow the lead of the early movers, businesses in the two states could realize savings *greater than $1.1 billion* while simultaneously taking significant steps to protect water quality, salmon habitat and the environment (Goodstein, Doppelt and Sable, 1999).

A recent report on the cost savings potential of sustainable building practices found that "by incorporating green building practices, Washingtonians and Oregonians could save more than *$90 million each year* in energy, water and construction-related costs" benefiting builders, homeowners, businesses, taxpayers and ratepayers while reducing impacts to salmon, water quality, forests and other environmental goods (*Saving Salmon and Money Through Green Building Practices*, ECONorthwest, September 2000).

Another report projected that the application of sustainable agricultural practices to just 25% to cropland in Oregon and Washington could stand to save farmers *up to $23 million annually*. The report further suggests that if the agricultural industry marketed these efforts effectively and increased returns by just 2% through price premiums and increased market share in the growing sustainable foods market, it stood to potentially *gain $174 annually* (*Saving Salmon, Sustaining Agriculture*, Sable and Doppelt, October 2000).

These financial projections suggest that Northwest firms and organizations will benefit from giving greater attention to the need, opportunity and benefits of company, community and

regionwide application of sustainability measures. They also raise questions about the potential role public policy can play in fostering and supporting these activities.

Conclusions

The financial savings and associated benefits to the environment described in the appendix of this report clearly indicate that the adoption of sustainability measures can be good for the bottom-line and the environment. We hope this information serves to inspire similar and more widespread applications of these measures by many firms, organizations and government throughout the Pacific Northwest.

Next Steps: Please Send Additional Case Studies and Information

We believe it is important to continue to document the economic and environmental costs and benefits of sustainability measures. For that reason we intend to continually update and expand this database of case examples. We encourage readers to send us new examples of firms or organizations that have implemented sustainability practices and programs. Please send information to the PSU CWCH at the address provided.

APPENDIX

Overview To The Appendix

The case studies described in this appendix were obtained from numerous sources, including local, state and federal agencies and other organizations. Each case study is described in the following manner:

Firm/Organization identifies the name of the firm or organization **.**
Issue means the type of environmental media the measure addresses.
Location identifies the city or state of the firm or organization.
Industry describes the type of business the firm represents.
Costs are the investment capital needed to complete the project.
Payback Period means the time it took to pay back the initial investment.
Annual Financial Savings means the total annual savings the investment generated.
Resource Savings means the reductions in water, energy, toxic materials, waste and pollution created by the measure.
Total Financial Savings means the total amount of money saved over the life of the investment.
Source of Case Study identifies where we found information about the case study.
Contact means an individual that may have additional information about the case example.
Contact Phone is the phone number of the contact person.
Project Summary is a short explanation of the actions the firm or organization took to generate their economic and environmental savings.

Please note that there are overlaps in resource categories and numerous data gaps in the case studies. We described what we could given the information we could obtain. As data gathering related to sustainable development increases and improves in the region, we expect to generate more and better data.

SECTION 1: ENERGY EFFICIENCY

Introduction

The production of energy is a major business in the Pacific Northwest. Energy consumption is a fundamental driver of our entire economy, fueling all forms of transportation, heating, cooling and lighting our commercial and residential buildings, and powering our manufacturing processes. Yet, many traditional forms of energy production generate significant environmental impacts. Americans consume more energy per capita that any other nation on earth. The environmental impacts of traditional energy production and consumption includes depletion of the ozone layer, smog, and climate change as well as many other forms of pollution and environmental degradation. Americans excessive use of traditional energy sources also leads to excessive heating, cooling and lighting in buildings, excessive power use and cost-inefficiencies in manufacturing equipment, and consequently to excessive and unneeded taxes to support the entire system.

Reducing the consumption of energy is almost always more cost-effective than expanding supply. This can be achieved by designing more energy efficient commercial and residential buildings and retrofitting exiting ones, and by adopting energy efficiency and conservation measures within every aspect of industry, business, communities and government.

For most manufacturers, electricity consumption by motors is their biggest source of carbon dioxide emissions (the exceptions are companies whose electricity utility does not get most of its power from fossil fuels or those in the major process industries, such as chemicals, pulp and paper, and metals). In the U.S., motors consume about half of all electricity and almost 70 percent of industrial electricity. An inefficient motor can use five times its capital cost in electricity each year. A typical 75-hp motor costs $4,000 and running at full load for 6,000 hours a year consumes $18,000 worth of electricity (at $o.05 per kWh). High-efficiency motors, new control systems, and systematic process redesign provides tremendous opportunity for savings (J. Romm).

The following companies have taken significant steps to reduce their energy consumption, saving money and the environment along the way.

Firm/Organization	Blue Cross & Blue Shield of Oregon
Issue	Energy Efficiency
Location	Portland, Oregon
Industry	Insurance
Costs	
Payback Period	
Annual Financial Savings	$100,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Blue Cross-Blue Shield cut energy use at 100 Market St. in half. They installed double-pane windows, more efficient lighting, and updated the heating and cooling system to make it more effective.

Firm/Organization	Ash Grove Cement Company
Issue	Energy Efficiency
Location	Portland, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$2,000,000
Resource Savings	5.4 million therms / year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Gary Wright, Plant Manager
Contact Phone	(503) 286-1677
Project Summary	

Ash Grove Cement's Rivergate Lime Plant is located 1_ miles from the former St. John's landfill. Through a unique public-private partnership, Metro has joined forces with Ash Grove and Palmer Capital to install a 9,400 foot pipeline connecting the two sites. A compressor station has been installed to deliver landfill gas to the lime plant. The gas generated by the landfill is now being used to fuel three lime kilns that operate around the clock, significantly reducing Ash Grove's reliance on natural gas or other fossil fuels. Prior to this project, the gas generated by the landfill was flared on-site, providing no useful benefit. Using landfill gas for commercial purposes will save fuel and reduce air emissions. The landfill generates more than 17,000 therms per day. That's about as much gas as would be used to heat 13,000 Portland-area homes for a year. Quote: "How clever! To take a source of energy, previously wasted at the expense of the air shed, and use it to provide useful, productive work. It's uncommon in business to encounter many win-win situations. But this project has certainly been one of them. It takes a lot of energy to fire our kilns. We will use everything the landfill generates and we could actually use more if it were available." ~Gary Wright, Plant Manager.

Firm/Organization	Anheuser-Busch
Issue	Energy Efficiency
Location	
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$40,000,000
Resource Savings	20,000 tons of carbon dioxide
Total Financial Savings	
Source of Case Study	
Contact	
Contact Phone	
Project Summary	

Anheuser-Busch developed a system for bio-energy recover to treat the wastewater from its brewing operations. Bacteria consume organic compounds in a tank of water, releasing bio-gas (mostly methane) that bubbles to the top. The system simultaneously reduces solid waste and generates fuel. This system has both a lower capital cost and lower operating expenses than building and running another conventional treatment facility. This bio-energy recovery system uses 80 percent less electricity--generating 80 percent less greenhouse gases--than a conventional system. At the same time, it produces a renewable source of energy that supplies up to 15-percent of a brewery's fuel needs. In addition, solid waste is reduced 50 percent, which fees up capacity at municipal treatment plants and increased brewery capacity. The company plans to use the bio-energy recovery system in eight of its facilities, saving more than $40 million annually and 20,000 tons of carbon dioxide.

Firm/Organization	A Fruit Storage Company
Issue	Energy Efficiency
Location	Washington State
Industry	Fruit Storage
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	Productivity gains
Total Financial Savings	
Source of Case Study	
Contact	
Contact Phone	
Project Summary	

This (unnamed) Washington State fruit storage company found that by shutting fan motors down 75 percent of the time and installing computer controls they could achieve productivity gains that exceeded the energy savings by a factor of ten.

Firm/Organization	Boeing
Issue	Energy Efficiency
Location	Portland, Oregon
Industry	Manufacturing
Costs	$180,000.00
Payback Period	two years
Annual Financial Savings	$92,000
Resource Savings	2.3 million kWh/year
Total Financial Savings	
Source of Case Study	Joseph Romm
Contact	
Contact Phone	
Project Summary	

Boeing Commercial Airplane Group reduced air-compressor energy use by 50 percent at its three-building campus in Portland, Oregon. A $180,000 upgrade cut energy use from 4.5 million kWh down to just 2.2 million kWh, saving $92,000 a year, a two-year payback. In addition to these energy savings, the company saves $9,500 in equipment depreciation and $8,500 on maintenance, parts, and labor each year. Also, the local utility provided a $40,000 incentive. Improving air compression systems dramatically increases airflow to existing equipment and tools, allowing a manufacturer to avoid or delay the capital costs of purchasing a new compressor as demand for air grows; this factor alone can double the return on investment. Some system upgrades improve product quality and increase productivity. Because virtually all of the energy used for compressing air is electricity, upgrades achieve significant carbon dioxide savings.

Firm/Organization	Boeing Commercial Airplane Group
Issue	Energy Efficiency
Location	Oregon
Industry	Manufacturing
Costs	$180,000.00
Payback Period	less than 2 years
Annual Financial Savings	$92,000
Resource Savings	2.3 million KWh per year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Boeing connected independent compressed air systems in their three main production buildings. This allows them to shut off one or two of the compressors on second and third shifts and weekends while providing the needed compressed air with only one (or two) compressors. They're saving 2.3 million kWh/year; about half of what they used to use. The underground trenching and controls cost $180,000 with an annual return of $92,000/yr not including the fact that this extends the life of the air compressors too.

Firm/Organization	Lamb's Thriftway
Issue	Energy Efficiency
Location	Portland, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$65,000
Resource Savings	1.3 million KWh per year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

This grocery store is saving over 1.3 million kWh/year (worth about $65,000/yr) through a comprehensive package of renovations to their 1981 store. This was done at the same time they were expanding their floor space by about 80 percent. They have upgraded their refrigeration systems, the store lighting, and heating and air conditioning control systems. The annual energy savings are equal to what Lamb's net income increase would be if they boosted their grocery sales by $8.7 million a year.

Firm/Organization	Columbia Gorge Veterinary Clinic
Issue	Energy Efficiency
Location	Hood River, Oregon
Industry	Veterinary Medicine
Costs	
Payback Period	
Annual Financial Savings	$400
Resource Savings	
Total Financial Savings	
Source of Case Study	Green Smart For Hood River Communities
Contact	Call Hood River Green Smart for extended case
Contact Phone	(541) 386-2000
Project Summary	

A ventilation system reduces the need for air conditioning, saving 25-30% of electricity use with a 2 yr. payback Upgraded lighting, lighting controls and insulating the water heater reduces electricity use by 15-20% saving $225/yr.

Firm/Organization	Evanite Fiber Corporation
Issue	Energy Efficiency
Location	Corvallis, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$40,000
Resource Savings	900,000 KWh per year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Oregon Department of Environmental Quality
Contact Phone	(503) 229-5913
Project Summary	

Evanite Fiber Corporation has three manufacturing facilities at its Corvallis campus: hardboard (wood interior panels), glass fibers, and battery separator material. Faced with an air compressor system that was not performing well enough, Evanite reconfigured and repaired leaks in the compressor system. Financial Savings: $36,000/year in electric bills, plus an avoided capital cost of $27,000 to replace the compressor system. Resource Savings: 900,000 kWh/year (estimated).

When Evanite closed one if its plants, a purchasing agent chose to list 34 items needing removal as "available" materials in the Industrial Materials Exchange (IMEX). Within two months, Evanite had found users ranging from Portland to New Jersey for 12 of these listings, including various types of plastics and organic chemicals. Financial Savings: at least $3,500 in avoided disposal costs. The market value of materials re-used is over $11,500.

Firm/Organization	Henningsen Cold Storage
Issue	Energy Efficiency
Location	Gresham, Oregon
Industry	Cold Storage
Costs	
Payback Period	
Annual Financial Savings	$60,000
Resource Savings	58% of prior energy use
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Paul Henningsen
Contact Phone	644-2800

Project Summary

A cold storage facility in Gresham performed a comprehensive upgrade of its existing facility. Upgraded the building's lighting, insulation, fan motors, and refrigeration systems. They also used rebates from PGE and the states Business Energy Tax Credit (BETC) to effectively reduce their investment and increase their cash flow.

Firm/Organization	Hood River Electric Cooperative
Issue	Energy Efficiency
Location	Hood River, Oregon
Industry	Utility
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	32,000 KWh/yr
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Hood River Green Smart for extended case stud
Contact Phone	(541) 386-2000

Project Summary

This organization reduced energy use approximately 30%. T-12 fluorescent lamps and magnetic ballasts were replaced with T-8 lamps and electronic ballasts in all areas where the lights are used on a regular basis. Incandescent bulbs were replaced with compact fluorescents in other high-use areas, such as the entryway and restrooms. Installed a ground-source heat pump, which warms and cools the building by pumping heat from or to the soil. This system replaced electric resistance heating and a separate air conditioning unit in the ducts of the air handling system. Connecting a standard electric water heater into a heat exchanger circuit with the heat pump compressor further supplies most of the building's hot water. Controls further reduce energy use when the equipment is not in use. This includes a programmable thermostat for the heat pump system, and low-power/"sleep" modes for computers, printers, and the photocopier. Resource Savings: 32,000 kWh/year. They also improved their irrigation system by replacing "rain bird" type impulse sprinklers with drip emitters and "micro-sprinklers" to use less water. Placement of mulch around landscaping also conserves water by reducing evaporation. The shop floor is now swept rather than hosed down, further saving water. The electric cooperative is switching to a longer-lasting electric cable that reduces material use (replacement) and labor costs. Although the longer-lasting cable costs more up-front, it is expected to reduce overall costs from anywhere between 19% and 57% after replacement costs (including labor) are factored in. The office reuses file folders, cuts old paper into notepads, and purchased a duplexing unit as an option when replacing an older copy machine to allow two-sided copying.

Firm/Organization	Marco's Cafe & Espresso Bar
Issue	Energy Efficiency
Location	Portland, Oregon
Industry	Food Service
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

"Free" Energy Shines at Marco's Cafe Marco's Cafe & Espresso Bar installed a solar hot water system, an air conditioning waste heat recovery system, and more efficient hot water system. Marco's shows that even small businesses can benefit from changes that save energy.

Firm/Organization	Norm Thompson Outfitters
Issue	Energy Efficiency
Location	Hillsboro, Oregon
Industry	Office Building
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	40% of prior energy use
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Jan Hogue
Contact Phone	(503) 614-4572
Project Summary	

This local retailer and mail order company built an energy efficient new corporate headquarters building. They oriented the building to take advantage of the sun in the winter and shading in the summer. They have energy efficient windows designed to take advantage of natural daylighting. Their heating, cooling and ventilation system incorporates sophisticated controls for comfort and energy efficiency. Together, their efforts cut the buildings' energy use by about 40%. They found that energy- (and other resource-) efficient construction doesn't need to cost more; this building was built at a cost of $67 per square foot. The energy-saving measures will pay for themselves in about 4 years. Other Details: Norm Thompson’s building was certified as "Earth Smart" by PGE. In addition to being energy efficient, they also used recycled building materials and self-sustaining landscape. They were one of the first Oregon companies to sign a "Climate Wise" pledge when that program was made available last year, in 1996.

Firm/Organization	Oregon Shakespeare Festival
Issue	Energy Efficiency
Location	Ashland, Oregon
Industry	Arts
Costs	
Payback Period	
Annual Financial Savings	$5,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Oregon Office of Energy
Contact Phone	1-800-221-8035
Project Summary	

This organization replaced two water heaters with higher efficiency models. They also reduced thermostat settings for both water and space heating systems. They installed energy-efficient lights and controls. They expect to save around $5,000/year as a result of these three changes.

Firm/Organization	Portland Art Museum
Issue	Energy Efficiency
Location	Portland, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

International exhibits like the Imperial Tombs of China often require museums to control for temperature and humidity. Meeting those needs in the Museum's 1931 building could have used a lot of energy, but the Museum invested in state-of-the-art energy efficiency measures during their recent renovation, saving money and improving comfort.

Firm/Organization	Portland General Electric
Issue	Energy Efficiency
Location	Portland, Oregon
Industry	Utility
Costs	
Payback Period	
Annual Financial Savings	$50,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Janice Peterson
Contact Phone	(503) 464-8407
Project Summary	

In 1998, PGE replaced a large facility in Beaverton with three smaller line crew centers. The relocation brought their utility crews closer to their work, speeding response time and cutting transportation costs. And, compared to the old facility, the building energy use has been cut by $50,000 per year. These were built to standards that resulted in energy savings of 43 percent above similar buildings built just to code. For $25,000 in added construction costs, energy efficiency features such as daylighting with electronic dimming ballasts, using dual-fuel heat pumps -- with natural gas auxiliary heat, higher levels of insulation, higher efficiency windows, and outside air economizers. Other environmental features include low-toxicity building materials and water efficient fixtures, recycled construction debris, and built-in storm water runoff retention ponds. At the new Beaverton facility, PGE teamed up with the Tualatin Hills Parks and Recreation Department to create a wetland – providing habitat for the Northern Red-Legged frog, a species of concern. The "tadpole ponds" are not only popular with the frogs; they've become so popular with people, that they're planning to add a nature trail.

Quote: "Portland General Electric is committed to energy efficiency, not only in our customer's facilities, but also in our own. PGGE followed the same EarthSmart new construction program that we offer to our commercial and industrial customers, and we are very pleased with the results. Anytime you can lower operating costs, use natural resources more efficiently, and make a positive impact on the environment, it's a win-win for business and the environment." ~ Shelley Martin, Manager, Commercial/Industrial Programs

---

Firm/Organization	The Corvallis City Shop
Issue	Energy Efficiency
Location	Corvallis, Oregon
Industry	Government
Costs	
Payback Period	
Annual Financial Savings	$2,500
Resource Savings	1,180 therms; 4,400 gallons of water
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

The Corvallis City Shop is heated by a boiler. The water is circulated through a series of fans (blowers) located throughout the building. The City discovered that the boiler had been disconnected from its time clock, and was running around the clock. The City reconnected the boiler to the time clock so that the boiler only runs during occupied hours. In addition, the City installed a thermometer and control device to decrease the boiler temperature as the outside temperature increases. These measures cut natural gas use at the City Shop by more than 50%. Financial Savings: $2,500/year. Resource Savings: 1,180 therms/year (natural gas). Repaired a leak in a shop sink. Financial Savings: $12/year. Resource Savings: 4,400 gallons/year.

Firm/Organization	The Mill End Store
Issue	Energy Efficiency
Location	Milwaukie, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$4,000
Resource Savings	Cut lighting costs by 30%
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

The Mill End Store installed a daylighting system at their Milwaukie store. The innovative skylights -- one is from Israel -- earned them an "Energy Smart" award from PGE. With the skylights and automatic lighting controls, they cut their lighting costs by 30 percent. Adding skylights and a lighting/temperature control system to the store saved $4,000 a year in energy costs. They also filter all the phosphates and other pollutants from their storm water runoff using on-site bio-swales before it drains to Johnson Creek.

Firm/Organization	University of Portland - Swindells Hall
Issue	Energy Efficiency
Location	Portland, Oregon
Industry	Education
Costs	
Payback Period	
Annual Financial Savings	$51,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Roy Heynderickx
Contact Phone	(503) 943-7507
Project Summary	

University of Portland won for an energy-efficient new building, Swindells Hall. Swindells Hall is a 41,000 square foot laboratory building. It was built to be 50% more efficient than Oregon's energy code and, among other things, features highly efficient lighting, heating, cooling, and controls. As you might expect from a building at a university with an engineering program, they have some innovative mechanical systems built into this building. It features indirect evaporative cooling, variable air volume exhaust controls, a heat recovery system, and high-efficiency condensing boilers for the rest of their heating needs.

The application of indirect evaporative cooling is a first for the Portland area. This simple but efficient cooling system is more frequently used in dryer desert climates. They also used low-toxicity building materials to ensure healthier indoor air. They recycled construction waste during the building process and specified numerous recycled-content building materials. They installed cabinets faced with veneer from certified sustainable forests and native landscaping that is resistant to pests and diseases and requires no supplemental irrigation. The University of Portland achieved a Gold level Earth Smart award from PGE.

Firm/Organization	Office Buildings
Issue	Energy Efficiency
Location	Portland, Oregon
Industry	Office
Costs	$3,400,000
Payback Period	7.4 years
Annual Financial Savings	$460,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland Energy Office
Contact	Curt Nichols, Senior Energy Program Manager
Contact Phone	(503) 823-7418

Project Summary

Two office buildings in Portland's Central Eastside upgraded their lighting fixtures, heating units and air conditioning units to save energy. The total cost for both buildings was $3.4 million. Projected total savings are $460,000 annually, or a rate equal to 13.4% return on their investment.

Firm/Organization	Walter Wells & Sons, Viewmont Orchards
Issue	Energy Efficiency
Location	Hood River, Oregon
Industry	Agriculture
Costs	
Payback Period	
Annual Financial Savings	$55,000
Resource Savings	2,586 gallons of diesel/yr
Total Financial Savings	
Source of Case Study	Green Smart For Hood River Communities
Contact	
Contact Phone	

Project Summary

This farm replaced an oil pressure heating system with a propane frost fan saving 71% on fuel costs and 2,586 gallons of diesel per yr. New capacitors and control circuitry reduce electricity usage, saving $1,186.00/yr.

Firm/Organization	Wieden & Kennedy
Issue	Energy Efficiency
Location	Portland, Oregon
Industry	Advertising
Costs	
Payback Period	
Annual Financial Savings	$21,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Dennis Wilde, Gerding/Edlen Development Co
Contact Phone	(503) 299-6000

Project Summary

Wieden & Kennedy won an energy efficiency award for their new headquarters facility. They worked with Gerding/Edlen Development to renovate a former five-story cold storage warehouse in the Pearl District and turn it into high-end office and retail space. Wieden + Kennedy moved into the 185,000 square feet building earlier this year and now are an integral part of a quickly redeveloping part of town.

In addition to saving a historic building, the project featured many sustainable design elements. Many of the former buildings structural timbers were reused for seating in the atrium that runs through all five floors of the building. In total, over 100,000 board feet of lumber was either recycled back into the building or re-used elsewhere. They also have a number of parking spaces reserved for carpoolers and bike riders. The most innovative energy-saving feature may be their unique underfloor ventilation system. This system results in reduced fan energy, lower chiller load, more individual work space temperature controls, and improved air quality. The building design gets significant daylighting through the atrium and uses it with efficient and task-oriented lighting. The lighting system uses only 84% of the lighting power density allowed by the Oregon Energy Code. They expect to have energy bills that are about $21,000 a year lower for their efforts. They'll have lower tax bills too; they've received a 35% Business Energy Tax Credit to help offset the additional cost for these energy-saving measures.

SECTION 2: ALTERNATIVE ENERGY SOURCES

Introduction

While it is always cheaper to reduce consumption than to expand supply, when more energy is needed renewable energy sources such as photovoltaic (solar), wind, cogeneration and biomass are environmentally sustainable sources. The following firms are engaged in the production of sustainable energy.

Firm/Organization	Trace Engineering
Issue	Alternative Energy Sources
Location	Arlington, Washington
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	EPA Region 10
Contact	
Contact Phone	
Project Summary	

This Washington-based company started with its three owners working out of an Arlington garage. Since that time, it has grown to employ approximately 400 employees at sites in Arlington, Washington, California and Spain, with annual revenues of over $50 million.

Trace manufactures a wide variety of inverter/chargers, charge controllers, and accessories for the solar and renewable energy markets. One of its products is called an inverter/charger. Sine wave inverters produce electricity that is believed to be cleaner and more reliable than utility-generated power.

Trace is in the business of making a product that produces a "greener" form of electricity. In addition, it practices "green" manufacturing practices. By using electrostatic powder coating instead of anodizing or painting, Trace has reduced its toxic by-products. Trace also uses water-based coatings, and unbleached packaging cardboard. Internal paper recycling is standard procedure. Trace also extends its environmental responsibilities to reviewing the manufacturing processes of its suppliers. This ensures that Trace's upstream suppliers meet its environmental requirements. All of these activities ensure that Trace will continue to be a leader in developing more environmentally friendly techniques and grow successfully as a business in the process.

Firm/Organization	Applied Power
Issue	Alternative Energy Sources
Location	Lacey, Washington
Industry	Power
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	EPA Region 10
Contact	
Contact Phone	

Project Summary

The first thing a visitor notices about the Applied Power Corporation offices in Lacey, Washington is the company's own grid connected solar electric system. The company is using solar technology itself, not just talking about it. Applied Power was started in 1981 and now employs nearly 110 people in offices around the U.S. Annual revenues in 1997 for the company were $8 million, which will nearly triple by 1999. Recently the success of this venture led to a partnership between Applied Power and the Idaho Power Company. This infusion of capital will allow Applied Power to continue to grow into its expanding markets.

It takes products manufactured by companies like Siemens Solar, Trace Engineering and Heart Interface, and assembles them into problem-solving systems packages. The list of systems integrated include larger scale photovoltaic hybrid systems, water pumping, telecommunication, village electrification for developing countries, and rooftop systems for the United States.

Applied Power's mission statement commits the firm to sustainability and a transition from fossil fuels to renewable energy. Its commitment to sustainability means that recycling is standard procedure as part of its processes. Shipping pallets are reused. Job site disposal of packing material is a part of the planning process. Its commitment to sustainability means that Applied Power can help a client reduce its energy needs as well as provide a renewable alternative power source as part of the system design and engineering process.

Solar energy currently provides less than 1 percent of world energy needs. Recent projections, however, show that by the year 2030, one fifth of the world's energy supply will be from the sun. By 2050, fully half of the world's energy could be solar. The sustainable practices adopted by these companies will clearly be an advantage in the years to come.

SECTION 3: WASTE REDUCTION, REUSE AND RECYCLING

Introduction

Almost all forms of waste are growing at or above the rate of population and economic growth in the Pacific Northwest. This trend is certain to lead to increased environmental impacts through contamination of water and soils at landfill sites and increased pollution through incineration. The generation of waste also causes increased environmental impacts on natural systems as more virgin metals, minerals, wood, water and other raw materials, as well as more energy, is required to produce goods and services.

Part of the reason for the excessive amounts of waste geing generated in the Northwest is our traditional end-of-the-pipe approach to the problem, such as landfilling and incineration. These simply seek to clean-up or cover-up waste rather than preventing it. Another part of the problem is a lack of strategic focus on source reduction, reuse and recycling strategies.

Source reduction options are available in all aspects of the waste stream including municipal solid waste, industrial hazardous and non-hazardous waste, mining, oil, gas and other forms of energy production, forest products, construction and demolition, agriculture and others. Source reduction can save government and taxpayers money by reducing the costs of municipal waste management. Source reduction can also save private firms and organizations money by reducing excessive raw material costs and avoiding disposal costs.

Reuse and recycling strategies are also available within almost all aspects of the waste stream. They save firms and organizations money by avoiding the costs of purchase of new feedstocks. They can also generate a significant number of new jobs and businesses. The following firms and organizations have taken steps to improve their waste reduction, reuse and recycling.

Firm/Organization	A grocery store
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Food Service
Costs	
Payback Period	
Annual Financial Savings	$23,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This independent grocery store features an on-site bakery. Staff tracked how many of each type of baked good were not sold at the end of the day, and found that certain items were consistently being over-produced. By changing the quantities of each item baked to better reflect customer demand, the bakery reduced "shrink" (unsold product) by roughly 50%. Financial Savings: $23,000/year. Resource Savings: 13,000 pounds of baked goods/year.

Firm/Organization	Oregon Arena Corporation
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Construction
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Oregon Arena Corporation won an award for their arena project. One of the largest, most comprehensive construction waste management & recycling efforts in the country. And, one of the more successful too. Less than one percent of construction waste has been landfilled.

Firm/Organization	Alcan Cable
Issue	Waste Reduction/Recycling
Location	Roseburg, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	recycles 2 million lbs of aluminum scrap and 26 tons of plastic scrap
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Alcan Cable works with customers to reduce the amount of packaging material required. For example, Alcan Cable no longer wraps certain products in plastic wrap prior to shipment. Gaylord containers and pallets are reused or sold for reuse. Alcan Cable recycles office paper, newsprint, and cardboard, and virtually 100% of the 2 million pounds of aluminum scrap produced each year. The company recently began recycling 26 tons per year of plastic scrap resulting from insulation coating around the cable.

Firm/Organization	Mentor Graphics Corporation
Issue	Waste Reduction/Recycling
Location	Wilsonville, Oregon
Industry	Office
Costs	
Payback Period	
Annual Financial Savings	$137,100
Resource Savings	35,000 pounds of paper per year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Metro for extended case study
Contact Phone	(503) 234-3000

Project Summary

Mentor Graphics Corporation creates electronic design automation software used by engineers and designers in high-technology industries. Eliminated, consolidated, or computerized some printed forms. Between 1992 and 1993, the number of pre-printed forms dropped from 556,000 (134 different types of forms) to 399,000 (91 different types of forms). Financial Savings: $55,000/year. Resource Savings: more than 2,000 pounds/year. "Save Our Supplies" Program to consolidate and redeploy reusable office supplies. Financial Savings: $45,900. Double-sided copying. All copies at on-site copy center are made double-sided unless specifically requested. Posters above walk-up copiers remind employees to copy on both sides. Financial Savings: $15,500/year. Resource Savings: 32,500 pounds/year. Guarantee return postage for undeliverable direct mail; delete names from mailing lists. Periodic telemarketing campaigns to "clean up" mailing lists; remove or change obsolete addresses. Financial Savings: $7,000/year. Replacing printed documentation with electronic media (CD-ROM). Recycles cardboard, office paper, magazines, newspapers, aluminum, and glass.

Firm/Organization	Belmont Dairy (The Belmont Limited Partnership)
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Housing
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	$166,000
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Doug Obletz
Contact Phone	(503) 242-0084

Project Summary

This project essentially recycled half of the former Carnation Dairy plant (an unused industrial building) into a mixed-use facility featuring both mixed-income housing and retail. The developers saved and reused about 40,000 square feet of the 70-year old dairy processing facility and created an innovative blend of affordable, resource- and energy-efficient housing, market-rate lofts, and street level retail. During the demolition and construction process they recycled over 2,200 tons of wood concrete and metal wastes -- 90% of these wastes -- saving about $166,000 on their waste disposal costs.

Many people say this project represents the future of urban infill housing and an example of responsible growth management. It was certified as "Earth Smart" by PGE because they specified recycled content building materials and built the facility to be 10% more energy-efficient than called for in Oregon's energy code.

Firm/Organization	Bend Memorial Clinic
Issue	Waste Reduction/Recycling
Location	Bend, Oregon
Industry	Medical
Costs	
Payback Period	
Annual Financial Savings	$1,550
Resource Savings	3,550 lbs of paper/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This clinic identified examples of unnecessary packaging of medical products and sent letters to vendors requesting more resource efficient packaging. A clinic-wide paper waste prevention program reduced per-employee use of paper by 12% in one year. Employees were asked to make double-sided copies, reuse paper that had already been used on one side, and reprogram printers and fax machines to eliminate printing of unneeded fax transmission reports and blank pages between print jobs. Financial Savings: $1,550/year (paper costs only; printing and labor savings not included). Resource Savings: 65 cases (3,250 pounds) of paper/year . Changed from printing timesheets on large greenbar paper to a smaller (8? x 11") paper. Resource Savings: 300 pounds of paper/year.

Firm/Organization	Bergen Brunswig Medical
Issue	Waste Reduction/Recycling
Location	Tigard, Oregon
Industry	Office
Costs	
Payback Period	
Annual Financial Savings	$64,200
Resource Savings	141 tons of paper/boxes per year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Call Metro for extended case study
Contact Phone	(503) 234-3000
Project Summary	

Bergen Brunswig Medical's Tigard office and warehouse provides medical and surgical supplies to more than 1,000 hospitals, clinics, nursing homes, and medical offices. Reuses vendor supply boxes to ship orders to customers. Empty supply boxes are stored near the product re-packing area for convenient reuse. This has reduced the purchase of new shipping boxes by two-thirds. Financial Savings: $22,500/year, plus reduced staff time for assembling new boxes and recycling. Resource Savings: 30,000 pounds of paper boxes/year. Eliminated the purchase of polystyrene packing "peanuts" and paper dunnage for packing. Shipping boxes are packed with shredded paper from the accounting office and newspaper supplied by employees. Any "peanuts" received are reused. Financial Savings: $5,000/year. Resource Savings: 12,000 pounds of paper/year, plus "peanuts". Two-thirds of all pallets received are reused for large-volume orders. Other pallets are sold to a company that repairs and resells them. Financial Savings: $36,700/year. Resource Savings: 120+ tons/year. Recycles office paper and purchases green-bar computer paper made with recycled content.

Firm/Organization	Busch Collision
Issue	Waste Reduction/Recycling
Location	Issaquah, Washington
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	200 gallons of thinner/year, 100 gallons of antifreeze, scrap metal, cardboard, waste
Total Financial Savings	
Source of Case Study	EPA Region 10
Contact	
Contact Phone	
Project Summary	

Early on, owner Jim Busch realized that his shop generated multiple regulated waste streams. Some of the waste streams involved paints, solvents, degreasers, antifreeze and small amounts of engine oil. He actively looked for ways to prevent pollution and thus reduce his waste stream. His efforts have successfully maintained its 'small quantity generator' status and provided a safer working environment for its employees.

New paint is ordered on an "as needed" basis, eliminating the amount and storage of leftover paint. A computerized paint mixing system allows employees to accurately mix only the amount of paint necessary for each job. On-site lacquer thinner recycling and the use of paint gun washers has reduced Busch's disposal of used thinner from 55 gallons per quarter to just five gallons per quarter, a 90% reduction of the waste stream. The shop also purchases recycled thinner through the Industrial Materials Exchange Program at a rate of less than 30 gallons per year. Using start-of-the-art technology, ethylene glycol-based antifreeze is recycled through an in-shop process that removes all impurities, additives and dyes; this process prevents disposal of approximately 100 gallons of waste antifreeze per year; The company provides cash incentive awards to its employees for recycling activities. Recycling takes many forms at Busch Collision: antifreeze, Freon and other chlorofluorocarbons are recovered and recycled by certified on-site technicians; and 100% of all scrap metal, cardboard, waste paper, batteries, tires and waste oil are recycled as well.

For all of these efforts, Busch Collision received the 1997 Governor's Award for Pollution Prevention, the 1998 EPA Evergreen Award for Pollution Prevention and received a five-star rating from the King County EnviroStars program.

Firm/Organization	Calbag Metals Co
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Recycling
Costs	
Payback Period	
Annual Financial Savings	$122,000
Resource Savings	cut landfill waste by 70% (1,600 tons/year)
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

As part of their copper and aluminum wire recycling process, Calbag Metals creates as much as 1,800 tons per year of waste installation material. Prior to 1997, this was landfilled. Then they started working with a Tualatin company to provide this waste insulation as a feed product for floor mats they make for factories, playgrounds, and horse stables. This is blended with tire shred and has been found to create an even better product. Another local manufacturer has started using this recycled waste in truck mud flaps they make. Together, they reduced the wire insulation waste landfilled by about 70 percent equal to 1,600 tons per year (worth about $122,000/yr). A new rubberized speed bump product will soon use the rest.

Firm/Organization	Cameron Graphics
Issue	Waste Reduction/Recycling
Location	Beaverton, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Cameron Graphics prints materials for customers in the Portland area. Emphasizing employee training in waste prevention and efficiency measures has decreased purchasing costs 5 percent and increased salable product from 90 percent to 99 percent of the average print job. The amount of paper allocated to each print job was gradually reduced and employees were challenged to identify methods to maintain quality output while using less paper. Opportunities for waste reduction are discussed and tracked at quarterly review meetings. Previously discarded margin waste paper is now reused during job setup prior to recycling. During job setup, a density reading is used to measure the correct quantity of ink applied to the paper. Meter readings are recorded and used to efficiently duplicate job setup, saving time, paper and ink.

Firm/Organization	Cascade General, Inc
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Shipyard Operations
Costs	
Payback Period	
Annual Financial Savings	$1,380,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Cascade, the operator of the Portland Shipyard, has implemented a solid waste reduction and recycling program that has cut their waste stream by nearly 70 percent. They have cut their garbage disposal cost by $380,000/yr, they have recovered recylables which bring them an additional $240,000/yr worth of revenue. This income covers their labor for sorting and separating recyclables. And, if that isn't enough, they have recovered their own tools and equipment which otherwise would have been lost. This equipment recovery alone is worth another $1

Firm/Organization Cascade Pest Control
Issue Waste Reduction/Recycling
Location Bellevue, Washington
Industry Service
Costs
Payback Period
Annual Financial Savings
Resource Savings
Total Financial Savings
Source of Case Study EPA Region 10
Contact
Contact Phone
Project Summary

This is a small, family-owned business providing environmentally sensitive pest control services for businesses and residential properties. For almost twenty years, Cascade Pest Control has successfully incorporated Integrated Pest Management (IPM) techniques to reduce the overall application of toxic chemicals to the environment. IPM uses biological, mechanical, and cultural pest control methods alone, or in combination with, the least toxic chemical control method. For instance, Cascade Pest Control uses a citrus-based product to control fleas, which is far less toxic than Dursban, the industry standard. Other pollution prevention efforts include:

Purchasing chemicals with a nearly unlimited shelf-life to eliminate hazardous waste disposal. Triple-rinsing pesticide containers and reusing the rinse water as applicable dilution. Using a computerized system to track each technician's use of pesticides, creating awareness and minimizing chemical use. Replacing all 50-gallon bulk tanks with one- and four-gallon hand pump sprayers, helping to protect against leaks and spills. Recycling vehicle products where possible, including motor oil, transmission fluid, batteries and antifreeze. Washing trucks with biodegradable detergents over grass, in accordance with the City of Bellevue's Business Partners for Clean Water guidance.

Cascade's philosophy maintains that the actions of just one person can contaminate the soil, a stream or a home. Cascade Pest Control routinely holds weekly hour-long staff meetings to discuss pesticide laws, safety principles, the applications of IPM, accident prevention, chemical drift, water quality protection and recycling office waste. In addition, Cascade has exhibited Environmental Leadership in many ways. It's "Statement of Environmental Commitment" has been adopted by the Washington State Pest Control Trade Association. The owner of Cascade Pest Control also serves on the King County Pesticide Advisory Board with the Seattle-King County Health Department. Cascade was the first recipient of the Western Washington Better Business Bureau's Ethics in Business Award and was one of twelve finalist companies for the national Better Business Bureau's Torch Award. In 1998, Cascade received EPA Region 10's Evergreen award for Pollution Prevention.

Firm/Organization Chown Hardware
Issue Waste Reduction/Recycling
Location Portland, Oregon
Industry Retail
Costs
Payback Period
Annual Financial Savings
Resource Savings
Total Financial Savings
Source of Case Study City of Portland, Oregon Energy Office
Contact
Contact Phone
Project Summary

This 116-year-old Oregon company has reduced its solid waste by 50 percent. By reusing materials, they no longer need to purchase any shipping cartons.

Firm/Organization	Clackamas Income Tax
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This firm reduces paper, envelope, and printer cartridge use by filing tax returns electronically. This saves an estimated $105 for every 1,500 pages sent electronically. Most of the savings are in printer cartridge replacement.

Firm/Organization	Willamette Falls Immediate Care
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Medical
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	24,000 sheets of paper/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This firm changed a 4-page NCR (carbonless) patient chart form to a 2-page form. Resource Savings: 24,000 sheets of paper per year.

Firm/Organization	Consumer Credit Counseling of Central Oregon
Issue	Waste Reduction/Recycling
Location	Bend, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	$200
Resource Savings	260 lbs of paper/yr
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This firm switched to multi-fold paper towels in a dispenser from kitchen-style roll paper towels (not in a dispenser). The multi-fold towels are smaller and easier to use; staff believe they result in less towel waste. Financial Savings: $43/year. Resource Savings: 60 pounds of paper towels/year. Using the automatic "duplex" feature on the copy machine to make double-sided copies has reduced paper use at least 10%. Financial Savings: $140/year. Resource Savings: 200 pounds of paper/year (4 cases).

Firm/Organization	Corvallis Area Chamber of Commerce
Issue	Waste Reduction/Recycling
Location	Corvallis, Oregon
Industry	Government
Costs	
Payback Period	
Annual Financial Savings	$2,374
Resource Savings	8,750 KWh/yr; 26 therms/yr; 6,300 gals water/yr; 594 lbs paper
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

The Chamber mails monthly newsletters to members without a manila envelope ("self-mailer"). Financial Savings: $2,100/year. Resource Savings: 520 pounds of envelopes/year. Staff have been educated to turn computers off at night and monitors off when not in use. Financial Savings: $380/year. Resource Savings: 6,900 kWh/year. Staff have also been educated to turn off lights when they leave the room. Financial Savings: $53/year. Resource Savings: 850 kWh/year. Aerators were installed on bathroom faucets to reduce water use and the energy to heat it. Financial Savings: $61/year. Resource Savings: 26 therms (gas) and 6,300 gallons (water)/year. Programmable, 24-hour, 7-day thermostats were installed to automatically reduce heating and cooling during unoccupied times. Ceramic mugs are provided at meetings for guests who don't want to use disposables. The mugs are then washed in the on-site dishwasher. Financial Savings: $24/year. Resource Savings: 15 pounds of disposable cups/year. In over-lit offices, some light bulbs were removed to save energy and reduce the lighting to comfortable levels. Financial Savings: $62/year. Resource Savings: 1,000 kWh/year, plus light bulbs. Employees have been educated how to use paper more efficiently in the printers (such as reducing margins and line spacing), how to copy on both sides of the page, and alternatives to full page fax cover sheets. Financial Savings: $74/year. Resource Savings: 74 pounds of paper/year (about 1-1/2 cases).

Firm/Organization	Corvallis Hardware/ True Value
Issue	Waste Reduction/Recycling
Location	Corvallis, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$21,300
Resource Savings	22.5 tons of paper/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call DEQ for extended case study
Contact Phone	(503) 229-5913
Project Summary	

Corvallis Hardware purchases the large majority of its products from Cotter & Company. Deliveries from the Portland distribution center are shipped in reusable plastic totes. Empty totes from the previous week are picked up for reuse when new merchandise is dropped off. Cotter & Company also redesigned its billing statement; invoices are now sent every two weeks rather than weekly. Financial Savings: more than $20,000/year (Cotter & Company). Resource Savings: 22.5 tons of paper/year (Cotter & Company). Corvallis Hardware is also retrofitting magnetic ballasts and T-12 fluorescent lamps with electronic ballasts and T-8 lamps as old lamps and ballasts burn out. This will eventually reduce electricity bills by about $1,300/year.

Firm/Organization	Davis Wright Tremaine LLP
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Office
Costs	
Payback Period	
Annual Financial Savings	$18,000
Resource Savings	5,000 lbs of paper/year;
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Metro for extended case study
Contact Phone	(503) 234-3000
Project Summary	

This firm reduced use of copy and printer paper by 10 percent by: Using laser-printed stationery. This eliminates the need to print and stock new letterhead each time an office is added. Using a fax transmission "macro" that prints a small box with the outgoing fax number and number of pages on the first page of the document, in place of cover pages. Eliminating the unused second page of two-part "copy request" and "scan request" forms. Forms are now printed in-house since carbonless paper is no longer needed. Eliminating blank pages between print jobs by reprogramming computers. Office policy requires that all internal documents are copied on both sides of the paper. Financial Savings: more than $6,000/year (including some but not all of the resulting labor savings). Resource Savings: more than 100 cases of paper (5,000 pounds)/year. Remanufactured toner cartridges and used in laser printers and fax machines. The firm recommends that other companies interview vendors to determine what services are provided, and ask for customer references. Remanufactured cartridges occasionally require early replacement, but a good service company will replace them at no cost. Financial Savings: $12,000/year. Approximately 60 percent of the firm's paper purchases contain some recycled content. Every employee has a desk-side box for recycling office paper and office paper and newspaper containers are located on every floor.

Firm/Organization	Delta Engineering and Manufacturing
Issue	Waste Reduction/Recycling
Location	Tualatin, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$50,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Metro for extended case study
Contact Phone	(503) 234-3000
Project Summary	

Delta Engineering manufactures and assembles precision custom sheet metal parts for its customers. They created a "closed-loop system" for some transport packaging. By convincing a customer to use a local vendor for an interim manufacturing step, Delta Engineering was able to create custom packaging to ship sheet metal parts. The second vendor inserts additional components, then ships the completed assembly to the end customer. The durable cardboard packaging is returned to Delta Engineering and is reused at least 10 times before being recycled. Financial Savings: more than $50,000/year. Modular wheeled metal racks are used for parts delivery to a local customer. Large parts are loaded onto multi-layered racks, covered with reusable protectors and secured with flexible cords. Racks are delivered directly to the customer's assembly area and empty racks are brought back to Delta Engineering. The closure for a specific cardboard box was changed from tape and staples to Velcro. The improved carton is returned to Delta Engineering and reused for two to three years before being recycled. Delta Engineering designed and built reusable containers to ship one of its products to a customer. After shipment, the customized containers are returned to Delta Engineering. The cardboard and wood containers are reused as many as 130 times. Manufacturing areas that have the highest cleanliness requirements receive new cardboard sheets used to separate and protect parts during manufacturing. Slightly used separators are passed on to other work areas with decreasing requirements for cleanliness. Foam pads, similar to the cardboard sheets, are also used several times, including shipments to customers. Pads are returned to Delta Engineering when possible. Pallets are reused on site and returned to suppliers for reuse when possible.

Firm/Organization	Detlefsen Law Office PC
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	$420
Resource Savings	50 lbs of paper
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Metro for extended case study
Contact Phone	(503) 234-3000
Project Summary	

This firm reduced use of copy and printer paper by 10 percent by: Reformatting billing worksheets to fit more text on each page. Reducing the number of copies of final invoices from three to two. Reusing the back of paper for internal copies of invoices and draft documents. Using a fax stamp rather than a cover sheet for non-confidential document. Financial Savings: more than $200/year. Resource Savings: more than 50 pounds/year (1 case of paper). Reuses mailing envelopes. Eliminated duplicate CLE announcements. Uses remanufactured toner cartridges. Financial Savings: $220/year. Recycles almost everything (reduced garbage disposal by 80%) and uses paper containing post-consumer recycled content for both stationery and copy and printer paper.

Firm/Organization	Epson Portland Inc
Issue	Waste Reduction/Recycling
Location	Salem, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$300,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	George Lundberg
Contact Phone	(503) 617-5607

Project Summary

Epson Portland Inc (EPI) is a distinguished BRAG member, a Climate Wise participant, and the 4th company in Oregon to achieve ISO 14001 certification. EPI is being recognized for significant waste reduction and recycling efforts. They received a Stratospheric Ozone Protection Award from EPA in 1997. Since then they have continued their efforts to lower air impacts by further reducing volatile organic compound (VOC) emissions by more than 75%. EPI has also reduced hazardous waste generation by nearly 40%.

For the waste production they couldn't prevent, they've found partners to help re-use and recycle it. They partnered with a company to take their polystyrene waste and make a wood-like product good for interior building trim. They also partnered with another company that takes their baled plastic film, mixes it with wood waste and makes a wood alternative for outside building materials. In total, over 5.8 million pounds of paper, cardboard, plastic and metal materials were recycled in 1999. Their actions are paying off; the disposal savings and recycling revenues are worth more than $300,000 a year. More recently, EPI reached another milestone. Through yet another partnership, they are now sending zero waste to the landfill. Instead this waste is used to create electricity at a facility near Salem.

Quote: "EPI has been involved in waste reduction and recycling efforts for years, 1999 saw a significant increase in this area. EPI began recycling more types of materials than ever before in 1999. We had our highest recycling rate ever when in December, 89% of EPI's waste was completely diverted from the landfill. We're proud of our environmental achievements at EPI and truly appreciate the recognition we are receiving by winning a BEST Business award." ~ George Lundberg, Environmental Engineer.

Firm/Organization	Hershey Studios
Issue	Waste Reduction/Recycling
Location	Cannon Beach, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$556
Resource Savings	190 lbs paper products/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	

Project Summary

Hershey Studios creates fine art cards and sells them in its own store and through other stationery and gift stores. Several times a year, a text sheet is sent to retail customers, showing the cards currently available. It was redesigned to be folded, taped and mailed without an envelope. Financial Savings: $488/year. Resource Savings: 150 pounds /year. To clean up spills of ink and paint, the studio obtained discarded rags from a local hotel, eliminating the use of disposable paper towels. Financial Savings: $69/year. Resource Savings: 40 pounds of paper towels/year.

Firm/Organization	Haystack Motel
Issue	Waste Reduction/Recycling
Location	Cannon Beach, Oregon
Industry	Hotel
Costs	
Payback Period	
Annual Financial Savings	$934
Resource Savings	2,570 lbs of paper/yr;
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

All guests at this motel used to be provided with a complimentary newspaper every morning. Now, guests are asked at check-in if they want a daily newspaper. Approximately 21% of guests say "no". Financial Savings: $759/year. Resource Savings: 2,500 pounds/year. Switched the motel newsletter to a format that can be mailed without an envelope. Financial Savings: $162/year. Resource Savings: 50 pounds of envelopes/year. Landscaping is watered in the early morning, when less water evaporates. At least every 6 months, staff make a point to vacuum all refrigerator coils, check and adjust all refrigerator temperatures, and check toilets for leaks. As towels wear out, they will be replaced with colored towels. Colored towels can be washed at a lower temperature, thus saving energy. The motel makes very few photocopies. When documents longer than one page are being copied, staff try to use a different copier that has an automatic double-sided copying feature. This copier is located at the management office (down the street) of the company that owns the motel, so no extra trips are typically required. Financial Savings: $13/year. Resource Savings: 21 pounds/year (about 4 reams).

Firm/Organization	Holographics Inc.
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	$1,200
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Metro for extended case study
Contact Phone	
Contact Phone	(503) 234-3000
Project Summary	

Holographics Inc. is a four-person company that develops interactive marketing and communications tools for businesses. Employees have reduced office supply expenditures by more than 57 percent annually by: Extensive use of e-mail to handle phone messages, internal correspondence, and inter-office communications, including document transfers to clients. Computer-generated faxes. Canceling hard-copy subscriptions in favor of referencing magazines via the Internet. Copying and printing is double-sided whenever possible. Printing faxes, drafts, and other preliminary documents is done on the blank side of previously used paper. A printing company hired by Holographics assembles notepads from partially used paper. File folders are labeled with removable tape so they can be reused. Once folders are unusable, they are trimmed to serve as tab separators within files. New versions of software are downloaded via the Internet whenever possible, eliminating the disks, manuals and packaging normally associated with software purchases. Financial Savings: $1,200/year (all activities).

Firm/Organization	Hood River County Chamber of Commerce
Issue	Waste Reduction/Recycling
Location	Hood River, Oregon
Industry	Government
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

The chamber began duplexing copies and using single-sided documents to print draft documents and for notepads. Since instituting these changes, paper consumption has been cut by nearly 40%.

Firm/Organization	John L. Scott Realty
Issue	Waste Reduction/Recycling
Location	Gresham, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	$400
Resource Savings	130 lbs of paper/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Metro for case study brochure
Contact Phone	(503) 234-3000
Project Summary	

At this firm information such as new listings and schedules for continuing education classes are shared with all agents using voice mail, rather than printed notices. Financial Savings: $300 to $500/year. Resource Savings: 130 pounds of paper/year. Cardboard boxes such as copy paper boxes are saved and given to clients for moving. This reduces waste and provides a valuable customer service.

Firm/Organization	Kaiser Permanente
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Medical
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	Avoids use of 16,000 polystyrene cups per month
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

At their two medical centers and more than 30 medical/dental facilities in and around Portland, Kaiser Permanente trains all employees to recycle office paper. Their purchasing agents work with vendors to reduce excess packaging or to switch to more environmentally friendly products. Kaiser gave each employee a reusable thermal mug - made, of course, from recycled plastic - and replaced pitchers and cups given to patients with a sip bottle they take home when they leave. As a result, 16,000 fewer polystyrene cups are used each month -- a reduction of more than 40 percent. Kaiser also uses biodegradable bedpans, mulching lawn mowers, and a chipper to produce their own barkdust.

Firm/Organization	Legacy Health Systems
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Office
Costs	
Payback Period	
Annual Financial Savings	$253,500
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This organization replaced disposable foam mattresses with reusables. Financial Savings: $81,527/year. Resource Savings: 16,350 pounds/year. Switched from buying juice in 32-oz glass container to 60-oz plastic container (containers are recycled; larger containers use less material). Financial Savings: $125/year. Resource Savings: 2,500 pounds/year. Eliminated rarely-used items from custom packs of surgical supplies. Financial Savings: more than $30,000/year. Resource Savings: 11,000 pounds/year. Consolidated duplicative admitting kits for maternity patients. Financial Savings: more than $3,500/year. Resource Savings: 2,700 pounds/year. Reduces photocopying by keeping originals in shared files. Financial Savings: more than $128,000/year. Resource Savings: 2,100 pounds/year. Customized the distribution of reports and newsletters; periodically checks distribution lists and only sends reports and newsletters to departments and individuals who request them. Financial Savings: more than $10,000/year. Resource Savings: 4,100 pounds/year. Consolidated seven different patient forms into a single flow sheet. Financial Savings: $158/year. Resource Savings: 300 pounds/year. Eliminated unused third page of three-part carbonless form. Financial Savings: $199/year. Resource Savings: 60 pounds/year. Recycles cardboard, office paper, glass bottles, metal cans, and several resins of plastics.

Firm/Organization	Legacy Health Systems
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Medical
Costs	
Payback Period	
Annual Financial Savings	$436,509
Resource Savings	eliminated 48,900 lbs from waste stream; 6,560 lbs of paper
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Mark at MKidd@lhs.org
Contact Phone	
Project Summary	

This organization created an organizational policy to eliminate mercury--the first hospital in Oregon to do so and among the first 200 hospitals in the U.S. Replaced disposable foam mattresses with reusables. Financial Savings: $81,527/year. Resource Savings: 16,350 pounds/year. Switched from buying juice in 32-oz glass container to 60-oz plastic container (containers are recycled; larger containers use less material). Financial Savings: $125/year. Resource Savings: 2,500 pounds/year. Eliminated rarely-used items from custom packs of surgical supplies. Financial Savings: more than $30,000/year. Resource Savings: 11,000 pounds/year. Consolidated duplicative admitting kits for maternity patients. Financial Savings: more than $3,500/year. Resource Savings: 2,700 pounds/year. Switched from disposable gowns & drapes to reuseable ones. Financial Savings: $100,000/year. (For one surgergy unit only, Legacy is trying to do this organization-wide). Reduces photocopying by keeping originals in shared files. Financial Savings: more than $128,000/year. Resource Savings: 2,100 pounds/year. Customized the distribution of reports and newsletters; periodically checks distribution lists and only sends reports and newsletters to departments and individuals who request them. Financial Savings: more than $10,000/year. Resource Savings: 4,100 pounds/year. Consolidated seven different patient forms into a single flow sheet. Financial Savings: $158/year. Resource Savings: 300 pounds/year. Eliminated unused third page of three-part carbonless form. Financial Savings: $199/year. Resource Savings: 60 pounds/year. In 1999, Recycled cardboard, 1.1 million pounds of office paper, 72,000 pounds of glass bottles, 54,000 pounds of metal, and 92,000 pounds of several resins of plastics. Financial Savings: $83,000/year. Recycled 1 ton of lead-acid and Ni-Cd batteries in 1999.

Firm/Organization	Legacy Hospitals
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Medical
Costs	
Payback Period	
Annual Financial Savings	$325,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Legacy reduced waste by switching to reusable foam mattresses, using reusable batteries, and consolidating multiple forms. The resulting savings at Good Samaritan and Emanuel hospitals exceed $325,000 per year.

Firm/Organization	Local Scoop
Issue	Waste Reduction/Recycling
Location	Cannon Beach, Oregon
Industry	Food Service
Costs	
Payback Period	
Annual Financial Savings	$4,500
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

The Local Scoop restaurant serves a bag of potato chips with most sandwiches. By watching "plate waste", it discovered that its portions of potato chips were generally too large, and a lot of chips were being thrown out. The restaurant switched to a slightly smaller bag of chips. Financial Savings: more than $4,500/year.

Firm/Organization	Lynch Wood Elementary School
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Education
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Students at this school eliminated the use of straws, individual food wrappers, and single serving food containers in the cafeteria. The school reuses polystyrene packing peanuts and packing foam, and also recycles paper, plastic, glass, tin, crayons, batteries, and cooking oil.

Firm/Organization	Me & Company
Issue	Waste Reduction/Recycling
Location	Winston, Oregon
Industry	Arts
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Me & Company is a stained glass studio, including retail sales of stained glass supplies and space for classes and workshops. All scrap glass generated in the studio is saved for use in smaller projects or donated to the art teacher at Douglas High School for student projects. Broken window glass is accepted from the public for use in teaching students how to cut glass. Through classes, they teach the skill of recovering lead from leaded stained glass projects and waste solder. Polystyrene packing peanuts, office paper, and paper towels used to clean glass pieces are reused. Work tables are made from scrap lumber or old kitchen cabinets. Scrap glass bins are old kitchen cabinet drawers. They also recycle cardboard, yard waste, and beverage containers.

Firm/Organization	Moving Boxes
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Service & Sales
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	hundreds of thousands of moving boxes/year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Moving Boxes, a small family-owned company, is a company specifically designed to encourage the reuse of moving boxes. They collect moving boxes from people who have moved in the area and offer those once-used boxes to other people that are moving. They offer a percentage refund as an incentive to return the boxes for another use. These pre-used boxes save consumers about 70% off purchasing new. Their boxes have become quite popular. Their efforts have resulted in the re-use of hundreds of thousands of moving boxes and their business is growing at about 30% a year. They've found a way to make money for themselves, save money for their clients, and help preserve the environment for all of us - a truly win-win-win scheme.

Quote: "I've always wanted to make a difference, to help this planet in some small way. And, I suppose this may be it for the moment. Think about a clothing wardrobe box. It's tall, sturdy, double-walled with a metal bar to support clothes hangers. This box will hold clothing for a few hours or days at most. Is it worth just a single use or can we use it again? I am, of course, very pleased to help reduce waste, but great satisfaction comes also in hearing the expressions of gratitude from people who have found us." Gretti Peterson, Owner

Firm/Organization	Mt Scott Family Dental
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Dentistry
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Randi Zochert
Contact Phone	(503) 353-9000
Project Summary	

Mt Scott Family Dental shows us that 'small' is all in how you look at it. Sure they're a small firm, but they've made very big strides in waste reduction. When you look at it from a relative standpoint, they couldn't be any larger. They've added equipment that allows them to claim a 100% reduction in a couple waste products common to dentists. They use a mercury separator - the only one in the Portland area - to eliminate that potentially problematic pollutant from their wastewater. They've also eliminated the lead and silver wastes they used to produce. This is done by using digital dental x-rays instead of the older, more common x-ray technology other dental offices use. As another benefit from this change, their patients - and employees - have a marked decrease in radiation exposure.

Quote: "Hopefully we can serve as a role model for other dental offices in the city - reducing or eliminating hazardous waste. It is the right thing to do." ~ Dr. Craig A. Howe, DDS (Owner)

Firm/Organization	Murray Hill Thriftway
Issue	Waste Reduction/Recycling
Location	Beaverton, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$6,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Metro for extended case study
Contact Phone	(503) 234-3000
Project Summary	

This store purchases cleaning supplies from a company that takes back empty cleaning fluid bottles and refills them. Unsold produce is set aside for Centro Cultural, a center for migrant farm workers. The program benefits the needy and saves the store about $6,000/year in disposal bills while also providing a tax deduction.

Firm/Organization	NIKE, Inc.
Issue	Waste Reduction/Recycling
Location	Beaverton, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Old NIKE shoes no longer have to go out with the trash. Instead of being landfilled, they will be turned into playground pads, track surfaces, and basketball courts. You can see one of the basketball courts at Morningstar Baptist Church in NE Portland. There's also a resurfaced running track at Dunniway Park. They ground up and reused over a million pairs of shoes last year.

Firm/Organization	North Plains Elementary School
Issue	Waste Reduction/Recycling
Location	North Plains, Oregon
Industry	Education
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

North Plains Elementary School implemented a "food choice" program in the school cafeteria. Previously, all hot-lunch eaters were given a tray with the same food. The school made four significant changes:
Provided two or three entrees to choose from each day. Introduced child-size "self service bars" stocked with uncooked fruits and vegetables and bread products. Allowed students to accept or decline other hot foods (cooked vegetables). Observed foods thrown out and revised ordering and production amounts.
Average participation in the meal program increased from 61% to 73% while the average cost of food per meal dropped from .85 to .71. Food discarded per tray dropped 47%, and consumption of fresh fruits and vegetables increased significantly.

Firm/Organization	OECO Corporation
Issue	Waste Reduction/Recycling
Location	Milwaukie, Oregon
Industry	Office
Costs	
Payback Period	
Annual Financial Savings	$2,100
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

OECO Corporation, a manufacturing firm, used to duplicate and distribute policy, procedure, health and safety, and other manual updates to each department. Now, manuals are updated on the computer and one master (printed) copy is kept. Financial Savings: $2,100/year.

Firm/Organization	Oregon Independent Federal Credit Union
Issue	Waste Reduction/Recycling
Location	Oregon City, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	$85
Resource Savings	6,000 sheets of paper/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This organization stopped printing certain internal reports; people now view the reports directly on their computer screens. The first report that was converted will save around 500 sheets of paper per month. Financial Savings: about $85/year (one report only, not including printing or storage space).

Firm/Organization	Oregon Photo Supply
Issue	Waste Reduction/Recycling
Location	Oregon City, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$600
Resource Savings	44,000 sheets of paper/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Oregon Photo Supply's Oregon City store replaced a three-part carbonless (NCR) sales form with a simple cash register receipt. That saves about 44,000 sheets of paper, not to mention storage and filing space. Financial Savings: $600 a year.

Firm/Organization	Oregon Soil Corporation
Issue	Waste Reduction/Recycling
Location	Oregon
Industry	
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	300 to 400 tons of food waste per year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Oregon Soil Corp. has joined with Gatto's Salad Company, Fred Meyer, and the Orther Family Farm for a unique vermiculture project that turns food waste into compost. Oregon Soil collects 100 tons of produce trimmings and other food waste each week. Gatto's Salad Co. avoids disposing of 300 to 400 tons of food waste annually. Fred Meyer, which contributes food waste from ten stores, turns around and sells the packaged compost in their stores. Space for a "worm farm" where worms turn the waste into compost was donated by the Orther Farm.

Firm/Organization	PED Manufacturing, Ltd.
Issue	Waste Reduction/Recycling
Location	Oregon City, Oregon
Industry	Manufacturing
Costs	$100,000.00
Payback Period	1.2 years
Annual Financial Savings	$81,000
Resource Savings	300,000 gallons of water per day
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Marge Wilson
Contact Phone	(503) 656-9653
Project Summary	

This is a steel investment casting company. PED spent $100,000 to install a ventilation system to collect and classify metal dust generated from the abrasion processes. Approximately 10 tons per year of metal dust is no longer being landfilled with their other wastes. At current solid waste tipping fees, that saves about $1,000 per year. In addition, they're collecting dust and shavings that they resold last year for $80,000 -- for a total annual savings of $81,000. Other Details: PED installed a closed-loop water system that resulted in a water savings of 300,000 gallons per day. Their recycling efforts were recognized by Clackamas County as a distinguished member of BRAG (Business Recycling Awards Group).

Firm /Organization	Periwinkle
Issue	Waste Reduction/Recycling
Location	Bend, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$410
Resource Savings	1,000 lbs of packaging/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This retailer of home furniture and furnishings began setting aside packaging materials for reuse. Some of the store's extra polystyrene packing "peanuts" are now picked up by a local manufacturer of scientific equipment, who no longer has to buy new "peanuts" to pack their goods in. Other packaging materials, such as boxes, are often picked up by people who are moving or need mailing boxes. Financial Savings: $410/year in reduced garbage and recycling fees. Resource Savings: approximately 1,000 pounds of packaging reused/year.

Firm/Organization	RBD Enterprises
Issue	Waste Reduction/Recycling
Location	Bend, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$638
Resource Savings	600 lbs of polystyrene "peanuts"/year; 50 lbs of paper towels/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

RBD Enterprises repairs and sells used electron microscopes and other imaging equipment used by research laboratories. RBD uses polystyrene packing "peanuts" to protect some of the sensitive equipment during shipping. Through participation in a local resource efficiency program, the company learned that another local business, Periwinkle (a retailer) had polystyrene "peanuts" from its suppliers that it was tossing out. Periwinkle now saves its waste packaging for RBD, who no longer has to purchase new "peanuts". Financial Savings: $600/year (to RBD Enterprises). Resource Savings: 600 pounds/year. Switched from folded paper towels to cloth towels in employee restrooms. Financial Savings: $38/year. Resource Savings: 50 pounds of paper towels/year.

Firm/Organization	Rim Co.
Issue	Waste Reduction/Recycling
Location	Oregon
Industry	Construction
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	12,000 tons of concrete, 200 tons of steel
Total Financial Savings	$100,000
Source of Case Study	City of Portland Energy Office
Contact	Curt Nichols, Senior Energy Program Manager
Contact Phone	
Contact Phone	(503) 823-7418
Project Summary	

Rim Co, in building a new shopping complex, crushed demolished concrete into gravel to be used as fill. 12,000 tons of concrete were diverted from the landfill and 200 tons of steel was recycled in the process, saving at least $100,000.

Firm/Organization	Rogue Wave Software
Issue	Waste Reduction/Recycling
Location	Corvallis, Oregon
Industry	Software
Costs	
Payback Period	
Annual Financial Savings	$21,000
Resource Savings	26,200 lbs of packaging/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call DEQ for extended case study
Contact Phone	(503) 229-5913

Project Summary

Rogue Wave Software develops, markets, and ships computer software products that support software libraries for computer programmers and math experts. The company has implemented several efficiencies in its product packaging: Previously, each product (which might consist of several disks and manuals) was packed in a small corrugated cardboard box. Since many of Rogue Wave's customers order more than one product at a time, these small boxes were then consolidated into one or more larger boxes. Under the new system, manuals and disks are shrink-wrapped together, eliminating the smaller boxes. This has reduced the weight of packaging sent to customers by an estimated 68% and significantly reduces staff time. FINANCIAL SAVINGS (packaging only): $21,000/year. Resource Savings: 26,200 pounds of packaging/year. All manual sizes have been standardized, eliminating the guesswork which was previously involved in trying to find the most efficient way to place manuals in the shipping boxes. A "box sizer" is used to adjust box height to fit the content, eliminating the need to stuff the tops of boxes with protective packaging. The purchase agreement for each program is printed directly onto the envelope used to protect the disk, eliminating the need for a separate piece of paper. Some boxes received from the company's printer are reused to ship large orders of manuals.

Firm/Organization	Stan Wiley Inc., Realtors, Metro Branch
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	1,860 pounds of paper/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	

Project Summary

At this firm packets of fliers used to be distribute to every agent from other real estate companies, mortgage and title companies, appraisers, and other companies. Historically, every agent in the Metro Branch received their own set of approximately 80 flyers each week. Agents decided to maintain one complete set of flyers next to the copy machine for all agents to browse through. 37 of the 38 agents agreed to forgo receiving their own sets of flyers. The office administrator communicated this new policy to the flyer companies both in person and with a letter. Instead of 38 packets of flyers per week, the office now receives two packets. This significantly reduces clutter and paper waste. Resource Savings: 1,860 pounds of paper/year (abut 38 cases).

Firm/Organization	State Farm Insurance Companies
Issue	Waste Reduction/Recycling
Location	Salem, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

State Farm Insurance has more than 3,600 employees and agents who receive regular communications about company information. Many of these communications have been converted to e-mails. Changing just 10 items from paper to e-mail saves about 360,000 sheets of paper. State Farm averages about 28 e-mails a month, substantially reducing the amount of paper used.

Firm/Organization	Steve Martin Management
Issue	Waste Reduction/Recycling
Location	Cannon Beach, Oregon
Industry	Hotel
Costs	
Payback Period	
Annual Financial Savings	$1,300
Resource Savings	100 lbs of paper/yr
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Steve Martin Management owns and manages hotels and other vacation properties on the Oregon Coast. The headquarters office is located in Cannon Beach. Reduced the number of promotional newsletter mailings from 4 to 3 per year. Financial Savings: $1,000/year (not including production time). Resource Savings: 75 pounds of paper/year. Purchased "post-it notes" for fax transmissions when no message is required on the cover page, rather than using full pages. Financial Savings: $280/year (including reduced long-distance charges due to shorter fax transmissions). Resource Savings: 24 pounds of paper/year.

Firm/Organization	Super King Sentry Market
Issue	Waste Reduction/Recycling
Location	Milwaukie, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$2,067
Resource Savings	680 lbs of newspaper/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Like most grocery stores, Super King Sentry Market places a stack of extra sales flyers at the store doors. Watching these in-store copies revealed that about 3/4 weren't picked up. The number of flyers purchased was reduced, saving paper, labor, and clutter. Financial Savings: $2,067/year. Resource Savings: 680 pounds of newsprint/year.

Firm/Organization	The ReBuilding Center
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Deconstruction & Building Materials
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Alisa Kane
Contact Phone	(503) 221-3193
Project Summary	

The ReBuilding Center is a non-profit outlet for reusable building materials. Their primary goal is to divert residential and commercial building and remodeling materials from the landfill. They started up less than two years ago and now offer a place for do-it-yourselfers and construction companies to divert any reusable materials. The donor avoids paying a material dumping fee and gets a tax deduction for their donation. Nearly everything from floor to ceiling - in fact, roof to foundation - can be reused. The ReBuilding Center's inventory ranges from doors to windows, from light fixtures to bathtubs. In fact, it even includes kitchen sinks! These materials are then sold at cost back to the local community. Or delivered elsewhere where more appropriate. Many single pane windows that no longer meet Oregon's energy code are being sent to Honduras where the climate's much more temperate. In their first year of operation, The ReBuilding Center diverted over 300 tons of material - which's nearly one ton for every day they were open.

Quote: "The ReBuilding Center is pleased to offer Portland an alternative to landfilling still-usable building and remodeling materials. We encourage everyone to take a second look at what's going into the waste stream and to remember - 'Don't Dump It, Donate It'." Shane Endicott, Director

Firm/Organization	The Village Baker
Issue	Waste Reduction/Recycling
Location	Bend, Oregon
Industry	Food Service
Costs	
Payback Period	
Annual Financial Savings	$156
Resource Savings	290 lbs of paper packaging/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This store added a smaller bag for individual baked goods. Each small bag uses less materials and costs less money than a larger bag. Financial Savings: $156/year. Resource Savings: 290 pounds of bags/year. Changed shape of one specialty bread to fit in existing, smaller bag. Provides permanentware mugs for customers to use instead of paper cups for in-house purchases of coffee, other hot drinks. Financial Savings: $181/year. Resource Savings: 210 pounds of disposable cups/year.

Firm/Organization	Tualatin High School
Issue	Waste Reduction/Recycling
Location	Tualatin, Oregon
Industry	Education
Costs	
Payback Period	
Annual Financial Savings	$48,220
Resource Savings	see Project Summary
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Metro for extended case study
Contact Phone	(503) 234-3000
Project Summary	

This school encourage teachers and students to copy, print, and write on both sides of the page. Eliminated print overruns of the school newspaper. Financial Savings: $1,260/year. Resource Savings: 260 pounds/year. Use a posting policy to discourage excess posters; install more bulletin boards, reduce number of posters. This reduces high custodial costs repainting damaged walls. Classroom garbage can liners are no longer changed every night unless obviously soiled. Lunchroom garbage can liners are only pulled between lunches if more than half full. Replaced paper food trays for a la carte items with wax tissue pickups. Financial Savings: $458/year. Resource Savings: 320 pounds/year. A mulching mower is used everywhere except the football field and baseball diamond. This saves mowing time, hauling expenses, and garbage bags. It also returns nitrogen and other nutrients to the soil, reducing lawn fertilizer needs. Financial Savings: more than $10,000/year. Resource Savings: 37,800 pounds/year. Purchase cleaning solutions in concentrate. A dispenser unit is used to mix the concentrates with water at the correct ratio. Financial Savings: $300/year. Resource Savings: 350 pounds/year. Purchase remanufactured laser printer cartridges rather than new cartridges. Financial Savings: $1,200/year. Resource Savings: 72 pounds/year Built in 1991, the school features glazed and double-paned windows, electronic ballasts, advanced fluorescent lights, and computer controlled heating and cooling. As a result of these design features, Tualatin High School uses 36% less energy per square foot of building space than the district's other high school. Financial Savings: approximately $35,000/year.

Firm/Organization	U S WEST
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	140,000 lbs of paper
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

US WEST redesigned its residential phone bill. The bill was reformatted and a larger page was used. 70 percent of residential customers now receive a one-page bill, rather than four pages. Resource Savings: in Oregon alone, that saves more than 140,000 pounds of paper a year.

Firm/Organization	U.S. Post Office
Issue	Waste Reduction/Recycling
Location	Cannon Beach
Industry	Government
Costs	
Payback Period	
Annual Financial Savings	$20
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

The District Office in Portland now consolidates multiple internal mailings into a single envelope. Previously, each document was sent in its own envelope. This change was implemented throughout the Portland District at the request of the Cannon Beach Postmaster. This eliminated the printing of blank sheets by the laser printer at the start of each print job. Changed to carbonless forms, where allowed. The United States Postal Service requires the use of carbon (for copies) in certain register books so local staff can't change them; however, they do reuse the carbon slips. A student volunteer makes scratch pads from paper pulled from the recycling bin. Installed faucet aerators on sinks to reduce water and energy costs. Financial Savings: $20/year.

Firm/Organization	United Grocers
Issue	Waste Reduction/Recycling
Location	Portland, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Metro for extended case study
Contact Phone	(503) 234-3000
Project Summary	

Member stores of the United Grocers cooperative routinely return unsold produce to the warehouse. Most is edible. The warehouse used to pay a hefty bill to landfill this material until the produce manager invited restaurant buyers to bargain for it each morning. The result: big savings for United Grocers and the restaurants. Whole pallets have always been sent to a repair service for reconditioning. Pieces of pallets are placed in wood waste totes placed around the warehouse. The scrap wood is then consolidated in a drop box which is collected by a private company who uses the wood scraps to repair other pallets.

Firm/Organization	Western Cascade Credit Union
Issue	Waste Reduction/Recycling
Location	Roseburg, Oregon
Industry	Banking
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Western Cascade Credit Union's data processing system produces a large quantity of paper that is printed on one side of the page and does not need to be kept. This paper is reused in the copy machine for interoffice use. The credit union's Board of Directors has also agreed to receive their monthly reports on the reused paper. The credit union also recycles all office papers, including shredded paper. An employee transports the paper to a local recycling center.

SECTION 4: HAZARDOUS WASTE REDUCTION

Introduction

Toxic materials and substances affect the quality of the life they touch. They contaminate and degrade air, water, soil, plants, animals and human health. Point and non-point toxic pollution are significant problems. Almost every business, organization, vehicle, household contributes to these problems if they use toxic materials, substances or energy.

The following firms and organizations have taken steps to reduce the amount or type of hazardous waste they generate.

Firm/Organization	Auto Hounds
Issue	Hazardous Waste Reduction
Location	Lake Union, Oregon
Industry	Service / Autobody
Costs	
Payback Period	
Annual Financial Savings	$1,500
Resource Savings	
Total Financial Savings	
Source of Case Study	King County, WA Department of Natural Resource Hazard Waste Management Program
Contact	
Contact Phone	
Project Summary	

The auto body and paint business runs a clean, green shop in an industry once known for its polluting activities. Dee and Wiesje Baskerville started Auto Hound in 1993 near Lake Union. From the beginning, they planned to run a safe, environmentally friendly shop. Dee had worked in the auto repair business for many years and felt strongly about creating a clean environment for employees. Managing hazardous materials properly has been one key strategy. Auto Hound staff receive yearly training in hazardous materials management and in health and safety issues. The Lake union shop has a separate mixing and holding room for paint and other hazardous materials. Auto Hound uses noncorrosive, water-based products rather than more toxic degreasers and floor cleaners to reduce solid waste, they replaced plastic car covers with a water-based spray. The shop tests alternatives and considers safer options for all the products it uses. Recycling is an important way to cut waste. Auto Hound recycles paper, bumpers, scrap metal, paint thinner, antifreeze, batteries and freon (from cars' air conditioning systems. Workers even use old soup cans and paint cans for mixing clear primers, saving about $25 per month on the cost of containers. The spray paint booth (used to paint cars) offered another chance to trim waste. Staff clean the paint spray gun washer every eight weeks rather than every four weeks. They clean the booth floor every four jobs instead of every time. The shop saves $100 a month from such changes. Naturally, Auto Hound is a member of Green Works, a King County program to reduce solid waste and promote use of recycled products. The Baskervilles talk about safety and pollution prevention to customers and to their peers within the automotive industry. http://www.metrokc.gov/hazwaste/estars/esbizind.html

Firm/Organization	Continental Brass
Issue	Hazardous Waste Reduction
Location	Oregon
Industry	Manufacturing
Costs	$115,000.00
Payback Period	10 months
Annual Financial Savings	$140,000
Resource Savings	117,000 lb reduction in toxic material use
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Continental Brass has eliminated the use of all degreasing solvents, nickel and chromium plating, and more. Continental Brass reduced toxic use by over 117,000 pounds from 1990 to 1991 while increasing production. By 1992 their product to waste ratio was more than double their 1990 levels. Their waste reduction efforts save over $140,000 each year. The investment paid for itself in about 10 months.

Firm/Organization	K2 Corporation
Issue	Hazardous Waste Reduction
Location	Seattle, Washington
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$115,000
Resource Savings	39,936 lb reduction in hazardous waste generation
Total Financial Savings	
Source of Case Study	State of Washington, Department of Ecology
Contact	Joanne Philipson
Contact Phone	(360) 407-6740
Project Summary	

Snow sports equipment and skateboard manufacturer K2 Corporation on Vashon Island noted excellent progress in the first year of their 1997 Five-year Update. Screen wash was replaced with a less toxic alternative resulting in significant reductions in hazardous substance use, air emissions, and waste generation. Waste ink was reduced due to increased efficiency in screen-printing. They also believe improved communication and education contributed to reduced waste from spills. They reported a 38, 611 pound reduction in hazardous substance use, a 39,936 pound reduction in hazardous waste generation. Financial Savings: over $115,000.

Firm/Organization	Luhr Jensen & Sons
Issue	Hazardous Waste Reduction
Location	Hood River, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$74,400
Resource Savings	
Total Financial Savings	
Source of Case Study	Green Smart For Hood River Communities
Contact	
Contact Phone	
Project Summary	

This firm replaced a vapor degreaser using chlorinated hydrocarbons with a water-based cleaner, saving $4,200.00/month as well as eliminating a hazardous waste stream and the associated liability. Recycles metals locally, saving shipping costs of $24,000 annually.

Firm/Organization	Oregon Steel Mills
Issue	Hazardous Waste Reduction
Location	
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$2,000,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Oregon Steel Mills has developed a proprietary glassification process that turns electric arc furnace emissions into a substitute for technical grade oxide. The oxide is used as roofing granules and to make ceramic tiles. The new process means they can recycle 100 percent of their arc furnace "dust", entirely eliminating emissions of what was a hazardous waste. Since 1994, they have been recycling over 9,000 tons of this "dust". That saves them nearly $2 million in disposal costs, and they have another product to sell.

SECTION 5: WATER EFFICIENCY AND CONSERVATION

Introduction

Despite the many rivers and lakes, and the heavy rainfall throughout much of the Pacific Northwest, water resources are fully or over allocated in most river basins and water is increasingly in short supply. Excessive water consumption impacts fish and aquatic organisms. It also influences energy demand because energy is required to process and pump water to our businesses, homes and farms. Even more energy is needed to provide hot water for domestic, commercial and industrial uses.

As with energy production, it is always more cost-effective to reduce the consumption of water than to expand the supply. Water efficiency and conservation measures not only save firms and households money, they also generate significant environmental benefits. The following firms and organizations have taken steps to conserve and use water more efficiently.

Firm/Organization	Basic Frozen Foods
Issue	Water Conservation
Location	Washington State
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$10,770
Resource Savings	Per DAY: 201,500 gallons of water
Total Financial Savings	
Source of Case Study	State of Washington, Department of Ecology
Contact	
Contact Phone	
Project Summary	

This firm recently completed a waste reduction assessment for Basic Frozen Foods (BFF). BFF is a manufacturer of frozen shredded has browns potatoes in Warden, Washington. The City of Warden could not allocate more water to BFF for a new french fry line. When the TREE team first visited Basin in March, 1999, BFF was using 275,000 gallons of water per day. With TREE team suggestions, Basin staff decreased water use to 195,000 gallons per day by the end of April. By implementing the additional recommendations the TREE team has submitted to Basin, BFF will reduce use by an additional 70% (an additional 121,500 gallons per day.) Financial Savings: $10,770 Reducing water use in has brown production allows BFF to add the french fry line that satisfies their new contract with Nestle. The contract is worth an undisclosed amount.

Firm/Organization	Columbia Steel Casting Co, Inc
Issue	Water Conservation
Location	Portland, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$588,000
Resource Savings	478 million gallons per year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Bruce Schacht
Contact Phone	(503) 286-0685 x286
Project Summary	

Columbia Steel Casting is a large steel foundry with 18 buildings on 85 acres in North Portland. They were recognized for their long (and successful) history of water efficiency improvements. Starting back in 1980 they've taken actions such as using cooling towers, reusing and recycling water, switching processes to non-potable water sources, and changing manufacturing practices. Together their actions have reduced their water use by more than 98%, saving 478 million gallons a year and cutting their water bills by about $588,000 a year. Looked at another way, their water use has remained fairly constant since 1993 in spite of a 300% increase in production and an even larger increase in water and sewer rates.

Quote: "We at Columbia Steel Casting take environmental management seriously. What started two decades ago as a mere matter of filing necessary permit applications and renewals has grown into much more than a full time job. It has also evolved from a reactive necessity into a proactive strategy. Our strategy for the environment is based on the premise that what is good for the environment can also be good for the business, if you approach it with the right perspective. While the water conservation is our most impressive accomplishment in terms of dollars, it is only one of many examples where we have proven that this strategy works." Bruce Schacht, Plant Engineer

---

Firm/Organization	Elf Atochem North America
Issue	Water Conservation
Location	Portland, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	Per DAY: 346,000 gallons of water
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Elf Atochem's Portland plant is the second largest water user in the city. But thanks to follow through on employees' suggestions, Elf Atochem accomplished water savings of more than 346,000 gallons per day. They now reuse production water as cooling tower make-up water. They converted sprinklers from city water to river water. They shut down unneeded equipment and discontinued unnecessary processes. And, Elf Atochem now uses river water for an air dryer intercooler too.

Firm/Organization	Crown Cork & Seal Co, Inc
Issue	Water Conservation
Location	Portland, Oregon
Industry	Manufacturing
Costs	$12,000.00
Payback Period	3 months
Annual Financial Savings	$46,000
Resource Savings	8.5 million gallons of water per year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Harold Roberts, Plant Engineer
Contact Phone	(503) 240-4268
Project Summary	

Crown Cork & Seal is one of the world's top packaging companies. It is a leading producer of bottle caps and closures as well as metal and plastic containers. They've been operating in Portland since 1948; first as Continental Can Co and from 1991 as Crown, Cork & Seal. In 1997, they used over 14 million gallons or water at their Portland plant. This water was used mostly for cooling air compressors and vacuum pumps. Wanting to reduce their water and sewer costs, they began working with our Water Bureau staff. They corrected the operation of flow control valves and replaced water-cooled equipment with air-cooled models. The air-cooled equipment they installed was actually surplus from another Crown Cork & Seal plant that was downsizing. Their only expenses were for shipping and installation. A $12,000 investment is savings them about $46,000 per year … and freeing up 8.5 million gallons per year (60% of what they used to use!) for other users.

Quote: "As a responsible corporate citizen, Crown, Cork & Seal Co. is and always has been, committed to compliance with all environmental requirements. That affects our operations. It is the company's policy to operate our business in a manner that protects the environment and provides a safe work place. Implementation of this policy is a primary management objective and the responsibility of each Crown employee." Harold Roberts, Plant Engineer

---

Firm/Organization	Fred Meyer
Issue	Water Conservation
Location	Portland, Oregon
Industry	Retail
Costs	
Payback Period	less than 3 years
Annual Financial Savings	$800
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

For their Gateway store, Fred Meyer invested in a centralized computer control system that tracks soil moisture and applies water in shorter cycles to allow for "soak" time, limiting water use to just what is needed. These controls cut their irrigation water use by 50 percent. The irrigation control system saves Fred Mayer $800 in an average summer, and their initial investment was recovered in less than 3 years. Most Fred Meyer stores built since the Gateway store use the same controls.

Firm/Organization	Graphic Sciences, Inc
Issue	Water Conservation
Location	Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$12,000
Resource Savings	2.5 million gallons of water/year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

As part of an ink manufacturing process, Graphic Sciences added a cooling tower to their pigment grinding process. This allows them to reuse most of their cooling water -- cutting their water use by 2.5 million gallons per year (worth about $12,000/yr in water and sewer cost avoidance). The cooling tower cut their water use by 80 percent and the installation paid for itself in a matter of months -- helping them to make lower cost ink of the same quality using less water.

Firm/Organization	Hercules Incorporated
Issue	Water Conservation
Location	Portland, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	75 million gallons of water/year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Hercules employees, led by their "environment team" identified a number of water-saving opportunities. Water-saving projects at Hercules saved nearly 75 million gallons of water in 1993, about 40 percent of their total water use in prior years. They now re-use process water in their boilers, collect steam system condensate for their truck tank cleaning operation, and much more.

Firm/Organization	Merix Corporation
Issue	Water Conservation
Location	Forest Grove, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$190,000
Resource Savings	12.6 million gallons of water per year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Susan Mulholland
Contact Phone	(503) 992-4689

Project Summary

At this firm a printed circuit board manufacturing plant in Forest Grove implemented several water-saving process modifications. These included a reverse osmosis treatment system to allow the reuse of process water, a water reclamation system for their wastewater pre-treatment systems, and other flow reductions and float adjustments. Together these actions save 12.6 million gallons of water per year (about 20% of total water use). This reduces Merix's water, treatment, and disposal costs by $190,000 per year (at 1996 production rates). Other Details: These actions are consistent with Merix's corporate values which commit them to "active involvement in education, community programs and a proactive role in protecting the environment." They also were one of the first companies in Oregon to sign a "Climate Wise" pledge last year.

Firm/Organization	Oki Semiconductor
Issue	Water Conservation
Location	Tualatin, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$3,200
Resource Savings	1.7 millions gallons of water per year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Tom Fahey or Laurie Patterson
Contact Phone	(503) 692-9100

Project Summary

Before it went out of business (due to problems related to the Asian financial crisis) this firm had many self-directed employee quality control teams. One of these teams went by the name "Stompmeisers" because they're focusing on water conservation opportunities at their plant. They found that there was excessive water drained from their process vacuum pump cooling system. Some changes to this system resulted in a water use reduction of about 60%. This water savings added up to 1.7 million gallons per year, an annual savings for Oki of $3,200. Other Details: The "Stompmeisers" had future water conservation projects identified. Oki was preparing for certification by the International Standards Organization (ISO) before they closed. They hoped to be the first Oregon facility to have their environmental management systems certified under ISO 14001.

Firm/Organization	Riverside Golf & Country Club
Issue	Water Conservation
Location	Portland, Oregon
Industry	Golf Course
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Riverside Golf Course made changes to save water and reduce wastewater. They added a computerized irrigation system with weather station, use integrated pest management, and have a waste-water treatment plant to recycle wash water. Riverside has cut their cost for water, the energy to pump it, pesticides, and wastewater disposal.

Firm/Organization	Zefiro Restaurant
Issue	Water Conservation
Location	Portland, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	6,000 gallons per year
Total Financial Savings	
Source of Case Study	City of Portland Energy Office
Contact	Curt Nichols, Senior Energy Program Manager
Contact Phone	(503) 823-7418
Project Summary	

Zefiro Restaurants installed low temperature dishwashing machines that enable them to run fewer loads, save $25 in energy costs per 1,000 loads, and reduce their water consumption by 6,000 gallons a year.

SECTION 6: ENERGY EFFICIENCY AND WASTE REDUCTION/RECYCLING

Introduction

The firms and organizations described below have taken steps to combine energy efficiency and waste reduction and recycling activities.

Firm/Organization	Ikea
Issue	Energy Efficiency and Waste Reduction/Recycling
Location	Renton, Washington
Industry	Manufacturing
Costs	$60,000.00
Payback Period	15 months
Annual Financial Savings	$142,060
Resource Savings	213,200 KWh/year, 1,000 TPY of solid waste,
Total Financial Savings	
Source of Case Study	EPA Region 10*
Contact	
Contact Phone	
Project Summary	

The Renton IKEA store participates in a local energy conservation program sponsored by Puget Sound Energy, upgrading lights at the facility for an estimated savings of 213,200 kilowatt hours per year, saving $12,060 in annual energy costs.

IKEA USA participates in the energy-saving program called "Green Lights" sponsored by the U.S. Environmental Protection Agency which promotes the environment and economic development. Participants thoroughly review their entire lighting system and, within a period of five years, replace existing lighting with low energy lighting in at least 90 percent of the area lit. IKEA US upgraded 78 percent of its lit area, and estimates that the investment will pay for itself in less than two years. The company estimates that the changeover means reducing emissions of sulfur dioxide of 16.5 tons per year, nitrogen oxides by 6.5 tons and carbon dioxide by almost 2,000 tons.

Another innovative program sponsored by IKEA recovers returned or damaged items. Rather than ship the product back to the manufacturer, or discard damaged items, IKEA salvages the items for spare parts and re-assembles the products to be sold "as is." IKEA Renton estimates that it saves 1,000 tons per year of solid wastes with this program. IKEA Renton also went one step further with a prototype program called "IKEA Green." The Renton store re-designs and re-builds returned or damaged items and resells them, discounted, as "Green As-Is" items. Some of these recycled products are unique and one-of-a-kind. A planting bench made out of returned wood proved so popular that additional benches were produced. Initial costs for the program were $60,000, and it took 15 months to break even. Now, the program reduces about 1,500 cubic yards of solid waste, with estimated costs savings for this program of more than $2,500 per week.

Firm/Organization	Central Oregon Council on Aging
Issue	Energy Efficiency and Waste Reduction/Recycling
Location	Bend, Oregon
Industry	Food Service
Costs	
Payback Period	
Annual Financial Savings	$1,515
Resource Savings	650 KWh/yr; 2,600 polystyrene bowls/yr; 2,500 rolls/year; 1,200 lbs of food/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Central Oregon Council on Aging operates a senior lunch program at the Bend Senior Center. It was observed that many clients would not eat their roll because they were too full. Historically, rolls were placed on every client's plate along with all other foods. Now, staff try to circulate among the clients with the rolls in a basket; those clients who want a roll are given one, while others can choose to pass. Financial Savings: $450/year. Resource Savings: 2,500 rolls (312 pounds)/year. Paying closer attention to the amount of food left over (unserved) after each meal and adjusting orders for the off-site kitchen reduced entree waste by 50% and side dish waste by 25%. Financial Savings: $990/year. Resource Savings: 1,200 pounds/year. Soup is served once a week. The kitchen switched to reusable (washable) bowls for soup for sit-down clients (previously, disposable polystyrene bowls were used). Disposable bowls (with lids) are still used for the meals-on-wheels program. The reusable bowls are washed, along with other dishes, in the on-site commercial dishwasher. Additional water, energy, and detergent costs total a mere $6/year. It requires an additional 5 minutes of volunteer time per week to wash these extra dishes. Financial Savings: $45/year. Resource Savings: 2,600 polystyrene bowls/year. Removed 25% to 50% of the lamps in the manager's office and kitchen, which were both perceived as being "overlit". Financial Savings: $30/year. Resource Savings: 650 kWh/year.

Firm/Organization	Central Oregon Independent Health Services
Issue	Energy Efficiency and Waste Reduction/Recycling
Location	Bend, Oregon
Industry	Medical
Costs	
Payback Period	
Annual Financial Savings	$12,275
Resource Savings	1,700 KWh/year; 4,523 lbs of paper/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Switched to double-sided copying for the Participating Provider Directory. Financial Savings: $12,100/year (including postage). Resource Savings: 4,500 pounds/year of paper. An employee newsletter is now distributed to most employees via the company intranet, rather than in hard copy format. Financial Savings: $90/year. Resource Savings: 23 pounds/year of paper. Reminders at staff meetings, an e-mail message and wall signs were used to remind employees about the importance of turning off lights, monitors, copiers, and printers when not in use, especially at the end of the day. Also, lamps were removed above work stations as requested by employees. This resulted in a 1% decrease in electricity use despite a 15% increase in employment. Reduced hot water temperature from 130o to 120° Fahrenheit. Financial Savings: $85/year. Resource Savings: 1,700 kWh/year.

Firm/Organization	Cottage Flowers
Issue	Energy Efficiency and Waste Reduction/Recycling
Location	Cannon Beach, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$106
Resource Savings	70 KWh/year; 556 lbs of paper packaging/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Large packing boxes that flowers arrive in are saved and sent back with the flower supply company for reuse. Resource Savings: 187 pounds of packaging/year. Flowers arrive packed in tissue paper. This tissue paper is saved and reused for wrapping bouquets, rather than buying new. Financial Savings: $60/year. Resource Savings: 109 pounds/year. Rather than buying new paper bags, Cottage Flowers picks up paper bags at the local recycling center and reuses them. Financial Savings: $42/year. Resource Savings: 260 pounds/year. Reduced hot water temperature by 10 degrees Fahrenheit. Financial Savings: $4/year. Resource Savings: 70 kWh/year.

Firm/Organization	Royal Blend Coffee
Issue	Energy Efficiency and Waste Reduction/Recycling
Location	Bend, Oregon
Industry	Food Service
Costs	
Payback Period	
Annual Financial Savings	$910
Resource Savings	2,400 KWh/year; 812 lbs of paper packaging/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Royal Blend Coffee's First Street Store in Bend added a bulk dispenser of skim milk and stopped purchasing and wasting cartons of skim milk. The dairy supplier provided the dispenser at no charge. Each 6-gallon plastic bag of milk replaces 24 one-quart cartons. Financial Savings: $767/year. Resource Savings: 812 pounds of packaging/year. Lamps were removed in the reception area, offices, and conference rooms, all of which were overlit. Exit signs were changed from standard incandescent bulbs to low-energy LED lamps. The lights inside and above the reach-in cooler in the bakery were also turned off. Financial Savings: $143/year. Resource Savings: 2,400 kWh/year.

Firm/Organization	Western View Middle School
Issue	Energy Efficiency and Waste Reduction/Recycling
Location	Corvallis, Oregon
Industry	Education
Costs	
Payback Period	
Annual Financial Savings	$1,444
Resource Savings	32,000 KWh/year; 70 lbs of paper/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call DEQ for extended case study
Contact Phone	(503) 229-5913

Project Summary

The Student Leadership Class designed and delivered educational messages to teachers and other students on the importance of using both sides of paper, conserving energy, and recycling. Electricity use dropped 7% compared to the same period one year earlier. The school reduced the size of the school newsletter by shrinking advertisements from full pages to half- and quarter-pages, replacing registration forms with short articles (with phone numbers), and reformatting articles and announcements to use space more efficiently. The amount of paper used in the newsletters dropped 17%. Financial Savings: $155/year. Resource Savings: 70 pounds/year (about 14 reams). Each teacher is given a photocopying budget at the start of the year. Teachers who don't use all of their allotment are allowed to spend the difference on other improvements. One team of teachers saved enough to buy an extra computer for use by students. As 40-watt fluorescent lamps burn out, they are replaced with high efficiency 34-watt lamps. Financial Savings: $1,289/year. Resource Savings: 32,000 kWh/year.

SECTION 7: ENERGY EFFICIENCY AND WATER CONSERVATION

Introduction

The following firms have taken steps to combine energy efficiency and water conservation.

Firm/Organization	Ashland Flower Shop
Issue	Energy Efficiency and Water Conservation
Location	Ashland, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$400
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Oregon Office of Energy for extended case
Contact Phone	1-800-221-8035
Project Summary	

This store installed efficient electronic ballasts for fluorescent lights. Installed an occupancy sensor to turn lights off when room is not in use. Installed an ultra low flow toilet. Installed a new hot water heater. The new water heater significantly reduces the amount of time waiting for hot water at the faucet, and saves water. Financial Savings: $400/year (all activities).

Firm/Organization	Bend Community School
Issue	Energy Efficiency and Water Conservation
Location	Bend, Oregon
Industry	Education
Costs	
Payback Period	
Annual Financial Savings	$210
Resource Savings	3,000 KWh/year; 13,000 gallons of water/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This school placed signs above light switches and next to computers to turn lights and computers "off" when not in use. Set thermostats back at night. Turned down water temperature from 135o to 120o Fahrenheit. Installed 1.5 gallon-per-minute aerators on faucets at handwashing sinks. Financial Savings: $210/year. Resource Savings: 3,000 kWh/year and 13,000 gallons/year of water. Reduced paper use by encouraging double-sided copying, placing a bin next to the copy machine with "draft" paper (paper that is already used on one side, but can be reused), and turning off the automatic transmission report on the fax machine.

Firm/Organization	Brothers' Restaurant
Issue	Energy Efficiency and Water Conservation
Location	Ashland, Oregon
Industry	Food Service
Costs	
Payback Period	
Annual Financial Savings	$600
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Oregon Office of Energy for extended case
Contact Phone	1-800-221-8035
Project Summary	

This restaurant replaced most standard incandescent lamps with compact fluorescent light bulbs. Installed controls to turn off lights in unoccupied rooms. Sealed areas where cold air leaked in the building. Replaced inefficient ductwork. Installed faucet aerators to reduce water use. Raised awareness among staff to point out drips and leaks and not run water unnecessarily. Financial Savings: $600/year (all activities).

Firm/Organization	Computer Renaissance
Issue	Energy Efficiency and Water Conservation
Location	Corvallis, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$388
Resource Savings	3,475 KWh/year; 69,050 gallons of water/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This firm repaired a toilet leak. Financial Savings: $192/year. Resource Savings: 67,300 gallons/year. Installed faucet aerator on employee sink. Financial Savings: $5/year. Resource Savings: 1,750 gallons/year. Set unoccupied heat/cool on thermostat to 55/85 degrees Fahrenheit. Turn off all computers and monitors at night. Financial Savings: $191/year. Resource Savings: 3,475 kWh/year.

Firm/Organization	Corvallis Gazette-Times
Issue	Energy Efficiency and Water Conservation
Location	Corvallis, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$11,500
Resource Savings	123,000 KWh/yr; 12,921 therms; 2.5 mil gals/yr
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This newspaper upgraded its heating, ventilation and air conditioning (HVAC) system. Four controls were added to sense outside air temperature and adjust the heating and cooling system accordingly. A new direct digitally controlled fan with variable speed intake was installed to increase the use of "free" outside air to cool the building during morning and evening hours. The increased fresh air intake into the building is expected to improve indoor air quality as well as employee comfort and productivity, while reducing energy bills. Financial Savings: $11,500/year. Resource Savings: 123,000 kWh/year and 12,921 therms (natural gas)/year.

Also discovered the float valve on the roof-top cooling tower was stuck in the 'open' position and was flooding the cooling tower with wasted water. Fixing the float valve cut water use by 64%. Financial Savings: $2,900/year. Resource Savings: 2,480,000 gallons/year.

Firm/Organization	Corvallis-Benton County Public Library
Issue	Energy Efficiency and Water Conservation
Location	Corvallis, Oregon
Industry	Government
Costs	$1,352.00
Payback Period	1 year
Annual Financial Savings	$1,673
Resource Savings	8,000 KWh/yr; 440,000 gallons of water/yr;
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call DEQ for extended case study
Contact Phone	(503) 229-5913
Project Summary	

This library transports books between locations in durable plastic totes, rather than paper boxes. Uses remanufactured toner cartridges. Financial Savings: $325/year. Buys stationery containing recycled paper. Recycles office paper, corrugated cardboard boxes, newspaper, yard debris, bottles and cans. Encourages the reuse of books through an annual used book sale. Consolidates unsaleable books with Oregon State University for recycling. The Library has an unofficial policy banning the use of brightly colored papers ("astrobrights") which are difficult to recycle. Financial Savings: $200/year. All restroom sinks have self-regulating faucets that provide water for about three seconds before shutting off. Water is also set at a constant temperature, so patrons don't waste water adjusting the temperature. Reduced run times on automatic sprinkler irrigation system from 20 minutes per station to 6 - 10 minutes per station. Financial Savings: approximately $530/year. Resource Savings: approximately 440,000 gallons of water/year. As bulbs in exit signs burn out, staff are replacing them with LED lamps. LED lamps have life expectancies of 30 to 50 years, compared to 4 to 6 months for traditional incandescent lamps. The full retrofit will cost $1,352. Financial Savings: $628/year when fully implemented (electricity and bulb savings, labor savings not included). Resource Savings: 8,000 kWh/year (when fully implemented).

Firm/Organization	Doubletree Hotels
Issue	Energy Efficiency and Water Conservation
Location	Portland, Oregon
Industry	Hotel
Costs	
Payback Period	
Annual Financial Savings	$252,000
Resource Savings	see Project Summary
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Portland Energy Office BEST for extended case
Contact Phone	(503) 823-7222
Project Summary	

This motel filtered and recycled water and the central laundry facility saves $35,900 annually in water costs and $16,000 annually in natural gas costs. Financial Savings: $51,900/year. Other comprehensive energy and water conservation measures include energy management control systems for heating, cooling, and lighting; chillers connected for more efficient operation; converting incandescent light bulbs to compact fluorescents; exit sign retrofits; more efficient ballasts in fluorescent fixtures; adjustable speed drives on fan motors; automatic fan controls for individual guest rooms; low-flow showerheads and faucets; and toilet tank adapters to reduce the amount of water used per flush. Financial Savings: more than $200,000/year.

Firm/Organization	Pizza Pipeline
Issue	Energy Efficiency and Water Conservation
Location	Corvallis, Oregon
Industry	Food Service
Costs	
Payback Period	
Annual Financial Savings	$769
Resource Savings	10,000 KWh/year; 116,000 gallons of water/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This restaurant repaired a leak in the dishroom sprayer and installed low-flow aerators on sinks, reducing water, sewer, and energy bills. Financial Savings: $769/year. Resource Savings: 10,000 kWh/year and 116,000 gallons of water/year.

Firm/Organization	Red Lion Hotels
Issue	Energy Efficiency and Water Conservation
Location	Portland, Oregon
Industry	Hotel
Costs	
Payback Period	
Annual Financial Savings	$51,900
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

This motel adopted “Greener" Ways to Whiter Laundry: By filtering and recycling water, Red Lion's central laundry facility saves $35,900 annually in water costs and $16,000 annually in natural gas costs.

Firm/Organization	Red Lion Hotels & Inns
Issue	Energy Efficiency and Water Conservation
Location	Portland, Oregon
Industry	Hotel
Costs	
Payback Period	
Annual Financial Savings	$200,000
Resource Savings	4.8 mil KWh per year; 3.5 mil gals of water per yr
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Portland Energy Office BEST for extended case
Contact Phone	(503) 823-7222
Project Summary	

Red Lion saves more than 4.8 million kilowatt hours, 16,000 therms, and 3.5 million gallons of water each year. These projects help their bottom line too -- they've cut operating costs by more than $200,000 a year through changes including: energy management control systems for heating, cooling, and lighting; chillers connected for more efficient operation; incandescent lighting converted to compact fluorescents; exit sign retrofits; more efficient ballasts in fluorescent fixtures; adjustable speed drives on fan motors; individual guest room automatic fan controls; and low-flow showerheads and faucets.

Firm/Organization	Winchester Country Inn
Issue	Energy Efficiency and Water Conservation
Location	Ashland, Oregon
Industry	Hotel
Costs	
Payback Period	
Annual Financial Savings	$3,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This Inn reduced water heater and laundry temperatures. Using less water in the kitchen and garden. Sealed air leaks in the building. Installing higher efficiency lights and educating staff to turn fewer lights on. Financial Savings: Winchester Country Inn expects to save $3,000/year from these measures.

SECTION 8: GREEN BUILDING

Introduction

Our traditional approach to the industrial, commercial and residential construction of buildings in the Pacific Northwest leads to significant economic inefficiencies and environmental impacts. Traditional construction practices use excessive amounts of virgin wood and other raw materials as well as toxic materials and substances (such as paints). They also fail to design in maximum energy and water efficiency and conservation, thus costing building owners and taxpayers excessive and unneeded costs over the long run. Construction practices themselves cause excessive environmental damage such as soil compaction, loss of native vegetation and other impacts.

Green Building is a growing field focused on environmentally and economically sustainable construction. The following firms and organizations have taken steps to adopt more sustainable construction and building practices.

Firm/Organization	Double Tree Inns
Issue	Green Building
Location	Portland, Oregon
Industry	Commercial Project
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	18 million gallons of water/year
Total Financial Savings	
Source of Case Study	
Contact	
Contact Phone	
Project Summary	

Double Tree Inn hotels were retrofitted with efficient plumbing fixtures and established a conservation education program. Double Tree replaced single-pass laundry washing systems with filtration and reuse systems. Hotel retrofits saved 12 million gallons per year (36 percent). The laundry project saved 6 million gallons of water per year (an additional 30 percent).

Firm/Organization An Urban Retreat
Issue Green Building
Location Seattle, Washington
Industry Residential Project
Costs
Payback Period
Annual Financial Savings
Resource Savings
Total Financial Savings
Source of Case Study Robert Harrison Architects http://www.harrisonarchitects.com/Urban-Retreat.html.
Contact
Contact Phone
Project Summary

An Urban Retreat, Queen Anne, Seattle did a renovation of a 1930's house and incorporated double-glazed, argon filled windows; CFC-free, recycled insulation; advanced framing; salvaged timber and doors; bathroom tiles made of recycled glass bottles; water-based finish; a countertop water filter; light dimmers; a front-loading clothes washer; and a water-permeable parking spot. These features will provide operational savings for years to come, as well as being easy on the environment.

Firm/Organization Buckman Heights Apartments
Issue Green Building
Location Portland, Oregon
Industry Residential Project
Costs
Payback Period
Annual Financial Savings
Resource Savings
Total Financial Savings
Source of Case Study G. Binole. 1999. "Buckman Heights Makes Asphalt a History Lesson." Business Journal-Portland. April 16.
Contact
Contact Phone
Project Summary

This 144-unit affordable housing complex in northeast Portland incorporated recycled sheet rock and insulation, water-based adhesives, green-label carpeting, bioswales and planters that eliminate stormwater discharge, and continuous indoor ventilation. The cost was only $62 per square foot, and the apartments were full six months after opening.

Firm/Organization	Build a Better Kitsap Home Program
Issue	Green Building
Location	Hansville, Washington
Industry	Residential Project
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Build a Better Kitsap program, www.kitsaphba.com/bbk.html
Contact	
Contact Phone	
Project Summary	

The Build a Better Kitsap program is run by the Home Builders Association of Kitsap County. There is also a program in Clark County, Washington. This 2400 square-foot home meets the programs highest "3-Star" criteria and is expected to save $750/year in heating costs.

Firm/Organization	Cascadia Home
Issue	Green Building
Location	Eugene, Oregon
Industry	Residential Project
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Cascadia Web Page. http://darkwing.uoregon.edu/%7Eesbl/Begining.html
Contact	
Contact Phone	
Project Summary	

The design of Cascadia Home at the University of Oregon was developed by the Energy Studies in Buildings Laboratory at the University of Oregon's Department of Architecture. It uses 20 percent less energy per year than a comparable size house built to Oregon code. It is eligible for $1500 in rebates for energy efficiency, $1273 in Oregon income tax credits, and an Energy Efficient Mortgage. It is currently being built by the Springfield/Eugene Habitat for Humanity.

Firm/Organization	King Street Center
Issue	Green Building
Location	Seattle, Washington
Industry	Commercial Project
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	King County Department of Natural Resources
Contact	
Contact Phone	
Project Summary	

Opening in October 1999, this eight-story 327,000 square-foot office building is Seattle's "greenest" building to date, and includes the largest installation of renewed carpet in North America. Carpet renewal, consisting of super-cleaning, re-texturing and restyling used carpet tiles, saves about half the cost of new carpet and decreases landfill waste. The sensor-controlled lighting in the building is the most energy-efficient to date in Seattle, using 28 percent of the energy allowed by existing energy codes. An on-site rainwater reclamation system will supply 60 percent to 80 percent of water used for flushing toilets in the building.

Firm/Organization	Norm Thompson Outfitters
Issue	Green Building
Location	Hillsboro, Oregon
Industry	Commercial Project
Costs	$220,000.00
Payback Period	4 years
Annual Financial Savings	$22,000
Resource Savings	
Total Financial Savings	
Source of Case Study	J. Kerr. 1996. "'Green' Buildings Seek to Save Environment, Money." Business Journal-Portland. May 24.
Contact	
Contact Phone	
Project Summary	

This 55,000-square-foot building was completed in 1996 and features advanced lighting systems, recycled building material, and a bioswale to filter storm water. Though the environmental improvements initially cost an additional $4 per square foot, or $220,000, the company expects the savings to pay back the initial cost in just over 4 years, with annual energy savings of up to $22,000 after the fifth year.

Firm/Organization	Seventh Generation Systems
Issue	Green Building
Location	San Juan Island, Washington
Industry	Commercial Project
Costs	
Payback Period	
Annual Financial Savings	$32,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Rocky Mountain Institute
Contact	
Contact Phone	
Project Summary	

This 17,000 square foot commercial/office development, completed in 1995, targets high-technology firms and uses state-of-the-art green building technology. Some of its features include high performance windows, solar space and water heating, a super-insulated building envelope, onsite wastewater treatment, reclaimed water reuse, and recycled building materials. As a result, this development saves $32,000 a year--the equivalent of two months' free rent for all its tenants. Electricity costs were reduced 83 percent, and sewer and water costs were reduced 69 percent.

Firm/Organization	Tolman Creek Shopping Center
Issue	Green Building
Location	Ashland, Oregon
Industry	Commercial Project
Costs	
Payback Period	
Annual Financial Savings	$40,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Rocky Mountain Institute
Contact	
Contact Phone	
Project Summary	

Completed in 1991 by Watson and Associates, this 94,500 square-foot retail development incorporates a number of green building features, from site design to energy efficient building systems. The development preserved an existing stand of oak trees and a stream. In addition, it utilized natural lighting, high levels of insulation, a heat recovery system for the grocery store refrigerators, and occupancy sensors to control lighting and heating. The development also minimized the size of the parking lot and thereby decreased the impervious surface to improve storm drainage. As a result of these green measures, the energy performance of the development is beyond the City of Ashland's model energy code. The grocery store saves $40,000 annually in energy costs. The development received the Bonneville Power Administration's Energy Smart Award.

Firm/Organization	Town and Country
Issue	Green Building
Location	Seattle, Washington
Industry	Commercial Project
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Rocky Mountain Institute
Contact	
Contact Phone	
Project Summary	

This 69,000 square-foot retail grocery store development, completed in 1995, incorporates recycled building materials and a number of energy efficiency measures.

Firm/Organization	Unknown
Issue	Green Building
Location	Portland, Oregon
Industry	Green Building
Costs	
Payback Period	
Annual Financial Savings	$61,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland Energy Office
Contact	Curt Nichols, Senior Energy Program Manager
Contact Phone	(503) 823-7418
Project Summary	

A new 23-story building in Portland worked with the Oregon Department of Energy and Pacific Power to exceed Oregon's Non-residential Building Energy Code. The additional 30% in energy savings gained from this investment in low-energy lighting, efficient heating and cooling systems and insulated walls and windows saves $61,000 a year.

Firm/Organization	Wolf-Meyer House
Issue	Green Building
Location	Seattle, Washington
Industry	Residential Project
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	B. Kossen. 2000. "A Green and Growing Trend." Seattle Times. E1-E2. March 25.
Contact	
Contact Phone	
Project Summary	

Renovated by architect Rob Harrison, this 92-year-old home uses compostible linoleum and cork floors, non-toxic building materials, a circulating hot water pump that provides instant hot water, and a heat exchanger that heats water with water drained from the bathtub/shower.

SECTION 9: OVERALL ENVIRONMENTAL EFFICIENCY

Introduction

The following firms and organizations have taken steps to improve the overall environmental efficiency of their operations.

Firm/Organization	Barker-Haaland Insurance Company
Issue	Overall Efficiency
Location	Corvallis, Oregon
Industry	Insurance
Costs	$880.00
Payback Period	6 months
Annual Financial Savings	$1,776
Resource Savings	13,812 KWh/yr; ;9 cases of paper/yr
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call DEQ for extended case study
Contact Phone	(503) 229-5913
Project Summary	

This firm retrofitted its lighting system and reduced electricity use by 34%. The retrofit includes replacing T-12 fluorescent lamps and magnetic ballasts with T-8 lamps and electronic ballasts, removing lamps in areas that were overlit, and replacing standard "screw-in" incandescent bulbs with compact fluorescent bulbs. The retrofit cost $880 (after a utility rebate and Oregon Business Energy Tax Credit).Financial Savings: $717/year. Resource Savings: 13,812 kWh/year. Installed a new high-efficiency variable speed condensing gas furnace and replaced an undersized air conditioner. Also replaced a continuous speed fan with a variable speed fan that uses approximately 42% less electricity. The fan runs at a lower speed when the building isn't being heated or cooled. While these changes will reduce energy use, they will also significantly improve employee comfort, and thus productivity. Financial Savings: $429/year. Resource Savings: 6,990 kWh/year (electricity) and 217 therms/year (natural gas). Implementing a fully-electronic system for storing, accessing, and changing customer records. This is expected to save considerable time and paper. Resource Savings: about 9 cases of paper per year. Uses remanufactured toner cartridges. Financial Savings: $360/year. Resource Savings: 45 pounds/year. Recycles office paper. Financial Savings: $270/year. Purchases stationery and paper towels manufactured from recycled paper. Sends faxes electronically where possible; or uses small sticky notes or 1/2-page fax covers rather than full page covers. Insulated hot water heater. Placed bathroom lights on a crank-style timer, so that they can't be accidentally left on.

Firm/Organization	Breaker Point Condominiums
Issue	Overall Efficiency
Location	Cannon Beach, Oregon
Industry	Hotel
Costs	
Payback Period	
Annual Financial Savings	$7,650
Resource Savings	13,700 gallons of water/year; 175 lbs of metal/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This organization reorganized its garbage pick-up areas. A single large garbage dumpster was used to replace a large number of small dumpsters spread throughout the complex. While this made garbage removal slightly less convenient for residents, it saved an impressive amount of money. Financial Savings: $7,600/year. Resource Savings: 175 pounds of metal/year (less metal in dumpsters overall, amortized over the expected life of the dumpsters). Began mailing newsletters and bills are in a single envelope, rather than separately, reducing the use of envelopes and postage. Put lights in recreation areas (tennis courts, pool, sauna, Jacuzzi, and common room) on a timer so that lights automatically turn off after hours. The timers can only be changed by staff. Installed photocells and timers on exterior lights, so that lights are only on in the evening and early morning. Installed "toilet dummies" (foam inserts) in the tanks of 5 toilets to reduce the volume of each flush by _-gallon. Financial Savings: $50/year. Resource Savings: 13,700 gallons/year.

Firm/Organization	Cannon Beach City Hall
Issue	Overall Efficiency
Location	Cannon Beach, Oregon
Industry	Government
Costs	
Payback Period	
Annual Financial Savings	$526
Resource Savings	10,920 gals water; 5,560 KWh; 39 lbs paper/yr
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This government organization eliminated blank pages between print jobs. Financial Savings: $23/year. Resource Savings: 39 pounds of paper (8 reams)/year. Converted public notices to a self-mailer (without an envelope). Financial Savings: $35/year. Converted heat pump for City Council chambers from electric to natural gas and installed a 24-hour, 7-day thermostat. Since the chambers are used on an infrequent and inconsistent schedule, employees were also trained to be more conscientious about turning the settings down when leaving the room. Financial Savings: estimated at $422/year. Resource Savings: 5,560 kWh/year (electricity) and 124 therms/year (natural gas). Staff check furnace filters every 2-3 months and replace with new filters if needed. Installed toilet "dummies" (sealed bags filled with a weight, such as rocks) in the tanks of all toilets. Financial Savings: $30/year. Resource Savings: 7,800 gallons/year. The sidewalk in front of City Hall is now swept rather than hosed. Sweeping takes no more time than hosing the sidewalk down and uses no water. Financial Savings: $16/year. Resource Savings: 3,120 gallons/year. Installed faucet aerators on all sinks, saving energy and water.

Firm/Organization	City of Milwaukie
Issue	Overall Efficiency
Location	Milwaukie, Oregon
Industry	Government
Costs	
Payback Period	
Annual Financial Savings	$5,000
Resource Savings	59,700 gals water/yr; 68,400 KWh/yr; 246 therms/yr; 585 lbs paper/yr
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call Metro for extended case study
Contact Phone	(503) 234-3000
Project Summary	

The City of Milwaukie has four buildings: City Hall, Ledding Library, Public Security (fire and police), and the Johnson Creek Building (offices and shops). Reduced hot water temperature at all faucets to 120 degrees Fahrenheit. Financial Savings: $104/year. Resource Savings: 230 therms/year. Installed water conserving valves on all urinals in men's restrooms. Financial Savings: $97/year. Resource Savings: 25,000 gallons/year. Purchased a unit to recondition rechargeable batteries. After multiple rechargings, most batteries lose their ability to hold a charge. Reconditioning restores the batteries so that they can be recharged and reused again. Financial Savings: $274/year (net). Resource Savings: 55 pounds/year. Reduced paper use across all City offices by 6% through employee education about double-sided copying and efficient printing and formatting practices. Financial Savings: $351/year. Resource Savings: 585 pounds of paper/year. Encourages reuse of filing folders, hanging files, and other office supplies. Installed a crank timer for lights in a storage loft. This turns the lights off after 10 to 30 minutes. Financial Savings: $321/year. Resource Savings: 7,400 kWh/year, plus light bulbs. Installed a crank timer for lights in the parking garage. Financial Savings: $522/year. Resource Savings: 11,000 kWh/year, plus light bulbs. Reduced outside night-time lighting levels by 50% to 75% at the Johnson Creek Building offices and shops. Financial Savings: $3,211/year. Resource Savings: 50,900 kWh/year, plus light bulbs. Fixed a shower drip in a locker room. Financial Savings: $28/year. Resource Savings: 16 therms (gas) and 4,900 gallons (water)/year. Fixed a leak at the truck/car wash. Financial Savings: $113/year. Resource Savings: 29,200 gallons/year. Incorporated recycled content building materials into several remodeling projects.

Firm/Organization	Fred Meyer Baking Plant
Issue	Overall Efficiency
Location	Clackamas, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$3,280
Resource Savings	709,000 gallons of water/year; 1,772 therms/year12,480 lbs of pastry/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Fred Meyer Baking Plant (Clackamas) Number of Employees: unknown Identified and corrected water leaks and drips totaling 709,000 gallons per year. Financial Savings: $3,280/year. Resource Savings: 1,772 therms (natural gas) and 709,000 gallons (water)/year. Changed the packing procedure for bear claws and other pastries. Previously, packing staff had not always had enough time to switch packaging types when production shifted from one product to another. For example, at the end of a batch of bear claws, staff would need to move the packaged bear claws out of the packing area and prepare to package the next product. Insufficient time to make the switch meant that the last products in any given batch were often trashed. By increasing the time between product lines (at the packing end) by three minutes, this problem was largely eliminated. Resource Savings: 12,480 pounds/year.

Firm/Organization	Collins Companies
Issue	Overall Efficiency
Location	Klamath Falls, Oregon
Industry	Forest Products
Costs	$500,000.00
Payback Period	6 months
Annual Financial Savings	$1,200,000
Resource Savings	6 millions gallons water/year, 538,000 KWh/year, 175,200 million btu/year
Total Financial Savings	
Source of Case Study	Collins Companies and EPA Region 10
Contact	Lee Jimerson at Collins Companies
Contact Phone	
Project Summary	

This firm has a facility in Klamath Falls where they reduced water usage by 6 million gallons annually by reused condensate. Water discharge used to irrigate landscaping. Financial savings: $35,000. Installed lighting controls in truck loading areas. Financial savings: $804. Requested that vendors use biodegradable packaging. Captured waste heat from coating oven stacks and using it to heat the plant instead of using wall heaters. Financial savings: $38,000. Reintroduced sander dust into particleboard manufacturing (547 tons less emissions; reduced fiber needs). Financial savings: $562,550. Reused condensate from the veneer dryer to create flash steam to treat vault blocks. Financial savings: $152,000. Hammermill: Replaced 6 Pallmann with 1 Bliss Hammermill motor (electrical savings over 3 million kwh/year). Financial savings: $118,200. Scrap hardboard reclaim: Re-ingested waste fiber. Financial savings: $300,000.

Installed bag filter for two defibrators (Spent $500,000 to reduce particulate emissions by 28.2 lbs/hour); Raimann veneer patch machine develops more solid veneer as foundation for more production of hardwood; used veneer patching waste to make particleboard, sales realization increased by $42,000. Collins Pine Collins Pine, a family owned forest products company, has earned praise from environmentalists for its efforts to have independent certification of their forestry practices on their entire timberland base. The process of certification involves being graded on sustainability, ecosystem maintenance and social-economic benefits. To Collins, sustainability means managing the resource so that it will continue to produce to the same level and regenerate itself. Ecosystem maintenance means managing for biological and structural diversity and water quality. Social-economic benefits means the extent to which the land base or company provides those benefits to local communities.

Firm/Organization	Pacific Development, Inc./Port of Portland Bldg
Issue	Overall Efficiency
Location	Portland, Oregon
Industry	Green Building
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	1,000 tons CO2/yr; 2000 ft3 of landfill space
Total Financial Savings	$10,000
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

The Port of Portland Building slashed energy by replacing the single pane glass and old lighting, and improving the heating and cooling system. These changes cut their energy use by more than 45 percent, and prevents over 1,000 tons of CO2 from reaching our atmosphere each year. All this was done while recycling 90 percent of the removed material, saving approximately 2000 cubic feet of landfill space and reducing their renovation costs by $10,000. Now the 16 story Port of Portland building is more efficient, more comfortable, has better lighting, more precise temperature control, and better indoor air quality.

Firm/Organization	Department of Environmental Quality
Issue	Overall Efficiency
Location	Bend, Oregon
Industry	Government
Costs	
Payback Period	
Annual Financial Savings	$1,400
Resource Savings	5,800 KWh/yr; 16,600 gals water/yr; 1,000 lbs paper/yr
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This government agency canceled eight out of nine subscriptions to a newsletter and circulating the remaining subscription reduces paper use. Financial Savings: $393/year. Sending 1,500 copies of a public notification using a postcard rather than a full page inside an envelope saves paper and postage. Financial Savings: $330/year. Staff conducted a major paper waste prevention program that reduced per-employee use of copy and printer paper by 32%. Employees were encouraged to copy on both sides, avoid printing e-mails, and reformat documents to use less paper. A "tip card" was provided to all employees giving detailed instructions on various methods to use less paper, and the office's "paper waste prevention coordinator" provided hands-on training to employees. Personal computers were also networked to "draft" printers which use paper that has already been printed or copied on one side. Financial Savings: $472/year (paper only, doesn't include printing, copying, and filing savings). Resource Savings: 1,000 pounds(20 cases) of paper/year. Removed 25% to 50% of lamps from fixtures next to windows, in hallways, and in conference rooms. Also removed lamps above individual work stations as requested. Financial Savings: $208/year. Resource Savings: 4,200 kWh/year Installed 1.5 gallon per minute aerators on all hand-washing sinks. Financial Savings: $120/year. Resource Savings: 1,600 kWh and 16,600 gallons of water/year.

Firm/Organization	Mid Valley Market
Issue	Overall Efficiency
Location	Hood River, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$5,400
Resource Savings	
Total Financial Savings	
Source of Case Study	Green Smart For Hood River Communities
Contact	
Contact Phone	
Project Summary	

This retail store purchased a cardboard baler and saves $2,000/yr. on disposal costs and brings in $1,200/yr. from cardboard sales. An upgraded lighting system with new ballasts and fluorescent bulbs saves electricity amounting to $1,200/yr. Produce scraps donated to local farms for feed results in $500 savings on disposal costs.

Firm/Organization	Sagewood School
Issue	Overall Efficiency
Location	Bend, Oregon
Industry	Education
Costs	
Payback Period	
Annual Financial Savings	$23
Resource Savings	460 KWh/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This school informed parents of how to pack a "waste wise" lunch for kids; switched from paper towels to cloth towels for staff; and started a mixed paper recycling bin. The school was able to reduce the size of their garbage can from 60 gallons to 33 gallons. Reformatted reimbursement forms to use half as much paper. Began double-siding the school newsletter. Turned down hot water temperature from 130o to 120o Fahrenheit. Financial Savings: $23/year. Resource Savings: 460 kWh/year.

Firm/Organization	Sandtrap Inn
Issue	Overall Efficiency
Location	Cannon Beach, Oregon
Industry	Hotel
Costs	
Payback Period	
Annual Financial Savings	$692
Resource Savings	3,120 KWh/year; 15,400 gallons of water/yr; 19 lbs of paper
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Staff from this motel used to automatically mail confirmation notices to guests when they booked a reservation. Now, guests are asked if they want a confirmation notice. Approximately half of the guests ask not to be mailed a notice. Financial Savings: $426/year. Resource Savings: 14 pounds of paper/year. Redesigned promotional brochure to be a "self-mailer" (without an envelope). Financial Savings: $15/year. Resource Savings: 5 pounds of paper/year. Reduced the number of exterior ornamental lights by 1/3. Financial Savings: $66/year. Resource Savings: 1,300 kWh/year. Eliminated an extra, unnecessary rinse cycle in washing machines. Financial Savings: $20/year. Resource Savings: 5,200 gallons/year. In a few condos, refrigerators and hot water are turned off during the slowest month of the year and these condos are not rented out. Financial Savings: $23/year. Resource Savings: 420 kWh/year. Installed low flow showerheads to reduce energy and water use. Financial Savings: $119/year. Resource Savings: 1,400 kWh/year and 10,200 gallons of water/year. Eliminated "sanitized for your protection" paper toilet strips. Financial Savings: $23/year.

Firm/Organization	Southside Physical Therapy
Issue	Overall Efficiency
Location	Bend, Oregon
Industry	Medical
Costs	
Payback Period	
Annual Financial Savings	$87
Resource Savings	
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

This firm reformatted their newsletter so that it can be mailed without an envelope. Purchased microwavable hot packs and disconnect hydroculator (a tank of hot water that kept hot packs warm). Keep lights off in rooms when not in use. Switched to lower wattage light bulb. Retrofitted exist sign with high-efficiency LED. Limit washing to full loads only. Installed 24-hour 7-day programmable thermostat. Financial Savings: $87/year (energy bills only).

Firm/Organization	Stahlbush Island Farms, Inc.
Issue	Overall Efficiency
Location	Oregon
Industry	Agriculture
Costs	
Payback Period	
Annual Financial Savings	$6,800
Resource Savings	183,000 KWh per year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	Call DEQ for extended case study
Contact Phone	(503) 229-5913
Project Summary	

Stahlbush Island Farms is a grower and processor of fruits and vegetables. Most of the company's customers are large food product manufacturers. Water use has been reduced by more than 50%, due to an innovative system where water is used in three or four different applications. Water is used to cool hot pumpkin puree and compressor oil, and to condense ammonia refrigerant. The warmed water is then used to pre-heat both the boiler and pumpkins. Wastewater from pumpkin and equipment washing is applied to fields for irrigation. Timers were installed on fan motors in freezers so that fans don't run all of the time. Financial Savings: $4,500/year. Resource Savings: 133,000 kWh/year. As targeted motors wear out, they are replaced with high-efficiency motors. Financial Savings: when fully implemented, this will save $2,300/year in electric bills. Resource Savings: 50,000 kWh/year. Only "natural" (uncolored) 5-gallon HDPE plastic pails are used. These pails are easier for customers to recycle. Ammonia compressor head pressure and boiler pressure have been adjusted to conserve energy. The farm composts food scraps and is experimenting with using food scraps as cattle feed. Some bulk products are shipped in reconditioned drums. Stahlbush recycles corrugated cardboard boxes and office paper.

Firm/Organization	Coffee Resort
Issue	Overall Efficiency
Location	Milwaukie, Oregon
Industry	Food Service
Costs	
Payback Period	
Annual Financial Savings	$2,251
Resource Savings	see Project Summary
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	

Project Summary

This firm repaired a major leak in the toilet. Financial Savings: $1,764/year. Resource Savings: 332,000 gallons/year. Purchases dish soap in bulk (larger containers), thus reducing packaging waste. Financial Savings: $20/year. Washes dishes in dish pans rather than the sink. This saves water, the energy to heat it, and detergent. Financial Savings: $67/year. Resource Savings: 950 kWh and 6,700 gallons of water/year. Reduced the number of outside lights. Financial Savings: $225/year. Resource Savings: 2,360 kWh/year. Offers reusable mugs for in-store coffee consumption, as an alternative to disposables. Financial Savings: $175/year. Resource Savings: 178 pounds of disposable cups/year.

Firm/Organization	Intel Oregon
Issue	Overall Efficiency
Location	Portland, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Bill Calder
Contact Phone	(503) 264-5669

Project Summary

This firm implemented several energy efficient technologies at the Ronler Acres campus. The savings from installing high efficiency chillers, premium efficiency motors, high performance windows, and efficient lighting. Added together, this will save Intel 12.2 million kWh per year -- enough electricity to power 1,000 typical homes for an entire year -- and about $427,000 per year. - Water -- Process and equipment improvements at the new campus resulted in a total reduction of city water use by nearly 40%. They're saving 40% of the water used in their silicon wafer-cleaning "wet benches" and 62% of all non ultra-pure water used at the facility is made up of reclaimed water. - Waste -- Intel recycled 56% of all solid waste generated on their six campuses in Washington County. The total amount of waste diverted from the landfill for 1996 was 4,350 tons. This waste included wood, paper, metal, and cardboard. Not landfilling it saves them about $400,000 per year. - Transportation -- Intel implemented an inter-campus shuttle system as part of their comprehensive commuter trip reduction program. In the first six months of operation, this shuttle resulted in an average of 620 fewer single occupancy trips between campuses each week. That equals an annual trip reduction rate of more than 32,000 trips. In addition, they pay half their employees' cost for bus passes. They also worked with Tri-Met to expand bus service to their Jones Farm campus where 2,400 employees previously had no access to public transit. Other Details: Bill Pletz, an Energy Conservation Specialist with Intel was issued the "Energy Manager of the Year" award from the Association of Professional Energy Managers (APEM) in 1996.

Firm/Organization	Wacker Siltronic
Issue	Overall Efficiency
Location	Portland, Oregon
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$186,000
Resource Savings	37 million gallons of water/year; 5.3 million kWh/year; 143,000 gals of fuel; reused
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Tom McCue
Contact Phone	(503) 241-7532

Project Summary

This firm installed efficient lighting, motors, adjustable speed drives, and other equipment as well as a computerized energy management control system to optimize the operation of their steam boilers, air compressors, chillers, and other equipment. This resulted in saving more than 5.3 million kWh per year (about $186,000/year). - Water -- Wacker made upgrades to their silicon ingot cutting process that is saving them over 37 million gallons of water a year. In addition to using less water, the new cutting equipment requires less compressed air and reduced exhaust requirements. They recently installed a collection system in one facility that will allow them to collect and reuse process rinse water. This is expected to save them an additional 100 million gallons of water annually by directing rinse water into on-site reverse osmosis filtration that will produce ultra-pure water for reuse. - Waste -- The recycling program resulted in them recycling nearly 317 tons of waste in 1996. This waste was made up of cardboard, paper, wood, metal, plastic, and graphite. In addition they recycled nearly 14,000 gallons of oil and related process waste and reused 372,000 gallons of caustic waste which reduced the need to purchase additional chemicals. These accomplishments are on top of their 99% reduction in hazardous waste, 89% reduction in air emissions, and a 47% reduction in plant-wide chemical use during the past ten years. - Transportation -- Wacker's employee commute reduction program has reduced employee vehicle trips by 33%. The result is an annual savings of nearly 2.9 million vehicle miles traveled (approximately equal to 143,000 gallons of gasoline). They offered 12 shift schedules to all production workers which gave them more time off, reduced trips, and avoided rush hour traffic. In addition they increased their bus pass subsidy to 100% for their employees that wish to ride the bus. Telecommuting was successfully pilot-tested in 1996. They expanded their modem capacity to allow off-site computer access and e-mail retrieval allowing some employees to work from home. Other Details: Wacker was the first winner of a new regional award from EPA in 1996. They were given the Evergreen Award for demonstrating environmentally sustainable actions.

SECTION 10: TRANSPORTATION ALTERNATIVES

Introduction

Many of our traditional sources of transportation are major contributors to global climate change and other forms of air and water pollution. They also contribute to increasing congestion, longer commuting times and higher prices due to reduced worker productivity. In short, many of our transportation modes are not sustainable.

The following firms and organizations have taken steps to reduce the environmental, social and economic impacts of their modes of transportation.

Firm/Organization	United States Bakery (Franz)
Issue	Transportation Alternatives
Location	Portland, Oregon
Industry	Food Service
Costs	
Payback Period	
Annual Financial Savings	$12,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

For the past few years, Franz has been converting their fleet from gasoline to propane. With 47 conversions last year, they now have 142 propane powered delivery trucks. They have found that propane costs less, is cleaner, and means they need less maintenance on their trucks. They figure it saves them $12,000 each year.

Firm/Organization	Bank of America
Issue	Transportation Alternatives
Location	Portland, Oregon
Industry	Banking
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Soon after Bank of America launched a company-wide Environmental Program in 1990, B of A's Oregon employees began making their purchasing, property management, and even lending, more environmentally friendly. The results are impressive: the company has cut vehicle-related smog, fuel consumption and congestion by supporting a variety of employee transportation programs in which more than 160 of its 1,300 Portland-area employees participate, and also reduces, reuses and recycles more of its waste each year.

Firm/Organization	Buckman Heights Apartments
Issue	Transportation Alternatives
Location	Portland, Oregon
Industry	Housing
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Ed McNamara, Director of Development
Contact Phone	(503) 223-8724
Project Summary	

Buckman Heights is a new apartment complex that was built as one phase of redeveloping a vacant auto dealership. Prendergast & Associates designed a mixed-use, mixed-income, transit-oriented development in its place. The Buckman Heights Apartment building is 4 stories and 113,000 square feet with 144 dwelling units. The developer incorporated a number of resource-efficient and environmentally-friendly features in the design that exceed both code and current practice. The way they addressed transportation issues may have been the most innovative of all. They selected the site in part because their tenants would have a Max station and 4 major bus lines all within 10 blocks. Their design focused on making the facility - and the surrounding area - pedestrian friendly. They kept on-site auto parking to a minimum - 61 spaces for 144 apartments. In fact, they have more spaces for bike parking - 92 locking bike racks - than they do for cars. They are adding a couple "loaner" bikes for their tenants. And, they offer three "loner" cars as well! These shared vehicles are available through an innovative partnership with CarSharing Portland which lets their tenants join at a discount. All this pre-planning is providing their tenants with a number of easily accessible alternatives to the automobile. And, if they do need to use a car, they don't have to buy one - they can just rent one of the CarSharing cars on site.

Quote: "We couldn't have built Buckman Heights Apartments the way it is without the investment the Portland region has made in buses, light rail, bike lanes, and pedestrian connections. The citizen activists and the public employees who created that system - and the entrepreneur behind CarSharing - paved the way for us. We can only take credit for being smart enough to capitalize on their good work."
Ed McNamara, Director of Development

Firm/Organization	CarSharing Portland
Issue	Transportation Alternatives
Location	Portland, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	$1,800
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Maren Souders
Contact Phone	(503) 872-9882

Project Summary

CarSharing Portland was established in 1997 to promote the use of shared vehicles instead of more individually-owned vehicles. It's the first in the US patterned after services in Europe and Canada. CarSharing has been a huge success; they have 16 vehicles located at 14 sites throughout Portland. These vehicles are shared by CarSharing's 240 members. Members save an average of $150 per month in avoided transportation costs. And, a survey of their members in the first year showed that 79% sold off or avoided buying another vehicle. Most recently, CarSharing took delivery of a 70 mpg Honda Insight, the first alternative fueled vehicle in their fleet.

Quote: "Car sharing is a pretty simple concept; it provides access to shared vehicles as an alternative to ownership. By placing cars in neighborhoods close to where our members live, we can serve as a convenient alternative to owning a car or, in some cases, owning two cars. it's decentralized, hourly automobile rental."

Firm/Organization	Flightcraft Aviation
Issue	Transportation Alternatives
Location	Portland, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	3,120 gallons of gasoline/year
Total Financial Savings	
Source of Case Study	City of Portland Energy Office
Contact	Curt Nichols, Senior Energy Program Manager Dave Brook, CarSharing Portland Founder
Contact Phone	(503) 823-7418

Project Summary

Flightcraft aviation uses two electric carts to tow corporate jets between the runway and terminals rather than letting the jets do so under their own power saving a minimum of 60 gallons of gasoline a week.

Firm/Organization	Fred Meyer, Inc
Issue	Transportation Alternatives
Location	Portland, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$50,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	Pat Vernon, (503) 797-5617
Project Summary	

Fred Meyer's main office campus in Portland has 1,400 employees that travel there to work each day. Some of their employees commute from Washington. So, when the I-5 Bridge was closed for repair in late 1997, Fred Meyer helped them start up three vanpools to ease their commute. Both the bridge repair and the vanpools were big successes. Those three vans are still operating at capacity and eight more have been started coming from Salem, Scappoose, and other communities. Fred Meyer pays for the van lease - which includes regular maintenance and gasoline for their employees. As an unplanned bonus, they found that employees are using these 15 passenger vans to travel to off-site meetings rather than taking several cars. The miles of vehicle travel avoided is significant; nearly 800,000 miles per year (saving their employees more than $50,000 per year in avoided gasoline costs). So, if you see a van with a sign on it that says, "Fred Meyer Vanpool: Working Harder for Clean Air", you'll know that you're looking at a winner.

Firm/Organization	Marquam Hill Transportation Partnership
Issue	Transportation Alternatives
Location	Portland, Oregon
Industry	Transportation Partnership
Costs	
Payback Period	
Annual Financial Savings	$174,000
Resource Savings	174,000 gallons per year
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

A partnership formed by OHSU, the Shriners Children's Hospital, and the VA Medical Center, found an innovative way to address the parking and traffic problems in the Marquam Hill area. They worked with the City of Portland and Tri Met to implement a trip reduction plan. And, the results are impressive. Drive alone trips were cut by more than 20 percent, bus ridership doubled, and carpooling and vanpooling increased also. Together, this reduced employee commute trips by 3.7 million miles per year. That's saving their employees from buying nearly 174,000 gallons per year of gasoline (worth about $190,000/yr) and cut CO2 emissions by more than 1,700 tons a year.

Firm/Organization	Mickey Finn's Brew Pub
Issue	Transportation Alternatives
Location	Portland, Oregon
Industry	Food Service
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Just before the pub opened in July 1995, the owners of this pub built an indoor bike rack out of scrap lumber. Now, customers' and employees' bikes fill the rack. It's so popular that the Millers will enlarge it. And the city has added racks on the sidewalks outside the pub. More, the rack has attracted plenty of bicyclist customers and media coverage.

Firm/Organization	NIKE Town
Issue	Transportation Alternatives
Location	Portland, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

NIKE Encourages Alternative Commuting. NIKE has an innovative program that rewards employees who use public transportation, carpools, vanpools, or muscle power (running, biking, walking, skating, etc.) to commute to work. NIKE Town employees have established two new car pools, bus ridership has doubled, and nearly three times as many bike, run, skate, or walk to work. This has eliminated 26 single occupancy vehicle trips each month.

Firm/Organization	Portland General Electric
Issue	Transportation Alternatives
Location	Portland, Oregon
Industry	Utility
Costs	
Payback Period	
Annual Financial Savings	$1,500
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland Energy Office
Contact	Curt Nichols, Senior Energy Program Manager
Contact Phone	(503) 823-7418

Project Summary

Portland General Electric meter readers now park their trucks in many neighborhoods and use bikes to get from house to house. With 12 bikes in use, PGE estimates they will save $1,500 the first year alone.

Firm/Organization	Providence St Vincent Medical Center
Issue	Transportation Alternatives
Location	Portland, Oregon
Industry	Administration
Costs	
Payback Period	
Annual Financial Savings	$46,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	Nona DeDual
Contact Phone	(503) 216-2255

Project Summary

St Vincent's medical records department provided their transcriptionists with digital remote transcribing stations and telephone interface modems. This allowed employees to work from home (telecommute) if they wanted to and were qualified. By the end of 1996, they had annual commute trip reductions of nearly 70,000 miles -- saving gasoline and preventing congestion and air pollution also. In addition, the transcriptionists found there were fewer interruptions working at home so they could accomplish more. Other Details: While her totals were not included in the trip reduction number above, telecommuting technology allowed them to retain a valuable employee whose family relocated to Coos Bay. With the new telecommuters already added for 1997, their trip reduction will be nearly 90,000 miles this year. Providence also has a complete menu of trip reduction incentives for their employees that can't telecommute. These include a 100% subsidy for bus passes, priority parking for carpools, compressed workweeks and more.

As part of its successful efforts to reduce commuter-related pollution, Providence St. Vincent Medical Center has trained 13 of its 25 medical transcriptionists to work at home. Teleworking is a win-win proposition. It keeps valuable employees on-board, reduces demands on office space, saves energy and reduces air pollution. By teleworking, transcriptionists eliminated more than 57,000 commuter miles in 1996 and a projected 87,300 in 1997, and saved about $30,000 to $46,000--without compromising quality and productivity. Providence St. Vincent's efforts to go the extra mile won them a BEST Innovation Award for Transportation Alternatives in 1997.

Firm/Organization	U.S. Bank
Issue	Transportation Alternatives
Location	Gresham, Oregon
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	35,000 gallons of gasoline/year
Total Financial Savings	
Source of Case Study	City of Portland Energy Office
Contact	Curt Nichols, Senior Energy Program Manager
Contact Phone	(503) 823-7418
Project Summary	

When U.S. Bank relocated 1,500 employees from downtown Portland to new office space in Gresham, they purchased four vans and established a van pool. The forty employees participating in the program save half a million commuter miles and 35,000 gallons of gasoline per year.

Firm/Organization	US Bancorp
Issue	Transportation Alternatives
Location	Portland, Oregon
Industry	Banking
Costs	
Payback Period	
Annual Financial Savings	$31,000
Resource Savings	
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

For the past few years, US Bank has been offering their employees discounted bus passes, flexible work schedules (to avoid rush hours), and incentives for carpooling. When they relocated their data center a couple years ago, they bought three vans for employee vanpooling. These alternatives help their employees, reduce congestion, air pollution, and fuel use. They figure it saves over $31,000 each year.

SECTION 11: WASTE REDUCTION, REUSE, RECYCLING AND WATER CONSERVATION

Introduction

The following firms and organizations have combined waste reduction, reuse or recycling with water conservation.

Firm/Organization	Tektronix, Inc
Issue	Waste Reduction/Recycling and Water Conservation
Location	Beaverton, Oregon
Industry	Manufacturing
Costs	
Payback Period	6 months; one year
Annual Financial Savings	$3,500,000
Resource Savings	115 million gallons of water
Total Financial Savings	
Source of Case Study	City of Portland, Oregon Energy Office
Contact	
Contact Phone	
Project Summary	

Tektronix's water conservation projects save over 115 million gallons of water, and over $500,000 in avoided water and sewer charges. They eliminated four single-pass cooling systems in their Beaverton campus. These changes paid for themselves in less than one year. They also modified their irrigation system to use clear (waste) water instead of domestic water. Seventy-five percent of their treatment plant output is used for irrigation. This paid for itself in less than six months.

Tektronix sends old circuit boards, solder paste jars and cleaning wipes to a refiner where the precious metals are extracted and reused. In addition, they recycle office paper, sell old office furniture and dismantle and recycle items that don't sell. Total annual savings: $3 million.

Firm/Organization	Cannon Beach Elementary School
Issue	Waste Reduction/Recycling and Water Conservation
Location	Cannon Beach, Oregon
Industry	Office Building
Costs	
Payback Period	
Annual Financial Savings	$1,734
Resource Savings	425,700 gallons of water; 25 lbs of garbage can liners
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

At this school, when garbage cans are emptied, the custodian only replaces the plastic liners if they are soiled or starting to smell. Garbage can liners that have held nothing but paper and other dry wastes are not changed every day. Financial Savings: $90/year. Resource Savings: 25 pounds of liners/year. The foot pedal on a large bathroom sink was stuck in the "on" position. Fixing it cut water and sewer bills. Financial Savings: as much as $1,348/year in water and sewer bills. Resource Savings: 345,600 gallons/year. Low-flow aerators were installed on restroom and classroom water faucets, saving water and the energy to heat it. Financial Savings: $154/year. Resource Savings: 39,600 gallons/year. Floats on tank toilets were adjusted to use less water per flush. Financial Savings: $142/year. Resource Savings: 40,500 gallons/year. Coils on refrigerator and milk coolers are vacuumed every 3 months to improve energy efficiency.

Firm/Organization	Melanie’s Flowers
Issue	Water Conservation and Waste Reduction/Recycling
Location	Cannon Beach, Oregon
Industry	Retail
Costs	
Payback Period	
Annual Financial Savings	$945
Resource Savings	5,100 gallons of water/year; 630 lbs of paper products/year
Total Financial Savings	
Source of Case Study	Oregon Department of Environmental Quality
Contact	
Contact Phone	
Project Summary	

Melanie’s Flowers is a flower and coffee shop. Large packing boxes that flowers arrive in are saved and sent back with the flower supply company for reuse. Resource Savings: 190 pounds/year. When coffee is served in disposable cups, staff used to automatically "double cup" all drinks. Staff switched to asking if a single- or double-cup was preferred. Financial Savings: more than $800/year in cup costs. Resource Savings: 390 pounds/year. Uses reusable, washable coffee filters. Financial Savings: $125/year. Resource Savings: 50 pounds/year. Installed toilet "dummy" (sealed bags filled with a weight, such as rocks) in the tanks of all toilets. Financial Savings: $20/year. Resource Savings: 5,100 gallons/year. Repaired leaking window. Reduced size of coffee club cards.

SECTION 12: OTHER U.S. SUSTAINABILITY EXAMPLES

Introduction

The following firms and organizations are cited to provide examples of the sustainability activities occurring across the U.S.

Firm/Organization	A California Textile Plant
Issue	Energy Efficiency
Location	California
Industry	Manufacturing
Costs	$130,000.00
Payback Period	1.3 years
Annual Financial Savings	$101,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm's Book: Cool Companies
Contact	
Contact Phone	
Project Summary	

A California textile plant reduced the energy consumption of its ventilation system 59 percent by installing motor controls, saving $101,000 a year in energy costs. An energy services firm paid for the $130,000 system (a 1.3-year payback) and took its payment from the energy savings. The new system reduced maintenance costs and, by reducing the plant's airborne lint, increased product quality.

Firm/Organization	Interface, Inc.
Issue	Energy Efficiency
Location	City of Industry, California
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm's Book: Cool Companies
Contact	
Contact Phone	
Project Summary	

Interface, Inc., with Solarex and AC Battery, is installing a 109-kW solar array that will generate the electricity needed to manufacture tufted carpet at its Bently Mills plant in City of Industry, California. Photovoltaics reduce peak summer electricity loads and provide backup for uninterruptible power supplies.

Firm/Organization	ACT2 House
Issue	Green Building
Location	Davis, California
Industry	Residential Project
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	$1,800 in saved construction costs
Source of Case Study	Rocky Mountain Institute
Contact	
Contact Phone	
Project Summary	

This 1672 square-foot demonstration house used advanced framing techniques to cut consumption by 50 percent. Green heating and cooling features allowed for the elimination of a furnace and air-conditioning. Energy costs were cut by 75 percent, and construction costs were $1800 less than comparable non-green houses.

Firm/Organization	Village Homes
Issue	Green Building
Location	Davis, California
Industry	Residential Project
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Rocky Mountain Institute
Contact	
Contact Phone	
Project Summary	

Considered to be the "grandaddy of green development," this 70 acre, 240-unit residential development was completed in 1981 by Michael and Judy Corbett. All homes are solar heated, as is the development's swimming pool. Narrow streets of 24-26 feet are used to cut down on stormwater runoff, to lower ambient air temperatures, and to improve pedestrian safety. Natural surface drainage swales provide for on-site storm water control. This project has been a resounding financial success. The project's original investors made a profit of 30 percent annually. In 1995, the homes in the development sold for $10-$25 more per square foot than standard homes in the area. Surface drainage measures alone saved $800 per lot.

Firm/Organization	3M
Issue	Energy Efficiency
Location	Illinois
Industry	Manufacturing
Costs	$690,000.00
Payback Period	1.5 years
Annual Financial Savings	$460,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	

Project Summary

At one Illinois plant, 40 percent of the hot exhaust from air pollution control equipment is recirculated in product dryers and another 40 percent is burned to make steam for plant use; the process improvement cost $690,000 but saves $460,000 a year in energy costs. Also, 3M has been phasing out coal boilers and increasingly adopting natural gas cogeneration technologies.

Firm/Organization	Amtrak
Issue	Energy Efficiency
Location	Normal/Bloomington, Illinois
Industry	Service
Costs	
Payback Period	five years
Annual Financial Savings	$20,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph Romm
Contact	
Contact Phone	
Project Summary	

The Amtrak passenger station at Normal/Bloomington, Illinois combines photovoltaics with energy efficiency. A 2.4-kW rooftop array provides energy for part of the building's electricity requirements, including two vending-machines and much of the lighting. (Photovoltaics reduce peak summer electricity loads and provide backup for uninterruptible power supplies.) The use of daylighting and efficient lighting technologies has reduced the energy needed for lighting by more than 70 percent. Passive solar heating, increased insulation and shading, and a gas-fired air conditioning system help reduce the HVAC energy. The station also has a computerized management control system. Overall, this station requires 75 percent less energy--and thus generates one-quarter the greenhouse gases--than a typical station of similar size located in a similar climate. The energy savings of $20,000 a year over standard design paid for the extra cost of the energy-saving measures in about five years.

Firm/Organization	Bethlehem Steel
Issue	Energy Efficiency
Location	Burns Harbor, Illinois
Industry	Manufacturing
Costs	
Payback Period	one year
Annual Financial Savings	
Resource Savings	40-million KWh/year
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

By modifying one steam turbine and making other steam system improvements, Bethlehem Steel generated annual savings of 40-million kilowatt-hours of electricity with a simple payback of just over one year.

Firm/Organization	The Austin Convention Center
Issue	Energy Efficiency
Location	Austin, Texas
Industry	Service
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

The Austin Convention Center has a 20-kW photovoltaic system. It is roof-mounted on a motorized east-west tracking system to follow the sun throughout the day for maximum efficiency.

Firm/Organization	Dow Chemical
Issue	Energy Efficiency
Location	Louisiana
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$75,000,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

After ten years of running one of the industry's most successful program for capturing energy savings, Dow Chemical's Louisiana Division was still able to identify more than one hundred projects from 1991 through 1993 with an average return on investment of 300 percent and savings exceeding $75 million a year.

Firm/Organization	Perkin-Elmer
Issue	Energy Efficiency
Location	Wilton and Norwalk, Connecticut
Industry	Manufacturing
Costs	
Payback Period	one year, varies
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

Perkin-Elmer is a billion-dollar manufacturer of analytical instruments. In 1991, the facilities manager began focusing on energy efficiency for the company's headquarters in Wilton and its nearby facility in Norwalk. The company needed a new air compressor, and the local utility had a rebate program that bought a better machine. With the help of RPM Systems in New Haven, an environmental services company, he did a comprehensive energy audit and upgrade. The company incorporated high-efficiency lighting, an energy management control system, an upgrade to the HVAC equipment, energy-efficient motors and improvements to compressed air. In one case, a new low-pressure air system replaced a system that hat put out 125 psi but had been throttled down to 7 psi, wasting virtually all of the energy. The upgrade did not qualify for a rebate, but the system paid for itself in a year.

Between 1992 and 1997, the Connecticut plant has achieved a 26 percent cut in its electric-power bill, despite a rate increase, expansion in square footage, and an increase in sales.

According to the facilities manager, "Awareness is probably the biggest key to energy savings. If people think you don't care about it, they won't do anything about it. Workers have no idea what energy costs." The company set up an innovative charge-back mechanism so managers, for instance, who brought workers in on the weekend for work not only had to budget for overtime but for energy costs, too. They tell a manager that it costs $300 an hour to run the air conditioning system for his/her area. A manager bringing in three people on a Saturday now knows it costs about $2,400 to cool those three workers for eight hours. So now the managers make better decisions. If they have to work Saturdays, they'll bring in more people for fewer hours.

The combination of all these efforts cut energy consumption per dollar of sales by 60 percent from 1991 to 1997.

Firm/Organization	General Motors
Issue	Energy Efficiency
Location	Flint, Michigan
Industry	Manufacturing
Costs	
Payback Period	2 years
Annual Financial Savings	$4,000,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

General Motors combined efficiency with cool power to cut carbon dioxide emissions from steam use by more than 60 percent. Annual savings came to $4 million with a two-year payback.

Firm/Organization	Georgia Pacific
Issue	Energy Efficiency
Location	Madison, Georgia
Industry	Manufacturing
Costs	
Payback Period	six months
Annual Financial Savings	
Resource Savings	6,570 tons of fuel/year
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

By insulating its steam lines, Georgia-Pacific reduced fuel costs by one-third with a six-month payback at a plywood plant. The project saved 18 tons of fuel per day, lowered emissions, made the workplace safer, and improved process efficiency.

Firm/Organization	DuPont
Issue	Energy Efficiency
Location	New Jersey
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$19,000,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

DuPont is one of the world's largest chemical manufacturers, with energy expenditures exceeding $1 billion a year. It also has one of the most ambitious programs to reduce greenhouse gas emissions. In overall operations, from 1991 through 1996, DuPont reduced greenhouse gas emissions by 16 percent, the equivalent of 25 million metric tons of carbon dioxide. The company emits a number of different greenhouse gases, including nitrous oxide, chlorofluorocarbons, hydro fluorocarbons, and per fluorocarbons. As part of the Climate Wise program begun by the EPA and the Department of Energy, DuPont pledged to eliminate nitrous oxide emissions by implementing projects that will destroy or recapture it for beneficial use. Carbon dioxide emissions dropped 10 percent between 1991 and 1996.

The 1,450-acre Chambers Works facility in New Jersey, home of manufacturing operations for thirteen different businesses, with a major research and development laboratory. From 1993 to 1997, it reduced energy use per pound of product by one-third, and, with the help of improved cogeneration, cut carbon dioxide emissions per pound of product by nearly one-half. Even as production rose 9 percent, the total energy bill fell by more than $17 million a year.

Through energy-efficient improvements in waste-water treatment, the Chambers Works facility is saving $2 million a year. It optimized air distribution for aeration in the treatment plant, which allowed it to eliminate the use of a 1,000-hp motor entirely. Improved monitoring of the wastewater temperature allowed a reduction in steam used in the treatment process.

After the remarkable energy savings Chambers Works achieved from 1993 to 1997, in 1998 the company was "only really getting into motors right now". In one case, a 1,000-hp motor failed and the company was going to rewind it. But then the energy team realized it was an inefficient motor and that they could replace it with an efficient motor with a one-year payback. That one change is saving $20,000 a year.

Firm/Organization	Ford Motor Company
Issue	Energy Efficiency
Location	Buffalo, New York
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	$200,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

Ford Motor Company's stamping plant uses exterior solar ventilation walls to preheat air for the plant. The 50,000-square-foot Solarwall system, made by Conserval Systems of Buffalo, covers plant walls with a southern exposure. The heated air is distributed throughout the plant by more than a mile of flexible ducting. The system saves Ford nearly $200,000 a year.

Firm/Organization	Four Time Square
Issue	Energy Efficiency
Location	Manhattan, New York
Industry	Building
Costs	
Payback Period	varies, 14 months
Annual Financial Savings	$500,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

A skyscraper at the intersection of Broadway and 42nd Street, built by the Durst organization, the Four Times Square building combines many energy-efficient and cool power opportunities. The 48-story, 1.6 million square feet building adopted a "cool design" strategy.

The building is between 35 and 40 percent more efficient than New York State code requires. The annual energy savings of $500,000 will pay for the incremental cost of these measures within five years. On the efficiency side, the building has energy-efficient lighting and windows, as well as increased insulation and an automated energy management system with efficient heating and cooling, individual fan units, and variable air volume. Some 25-percent of the floor area uses daylighting. Savings from daylight dimming on the lighting system will payback in fourteen months.

On the cool power side, the building has two 200-kW phosphoric acid fuel cells (to provide electricity and hot water), an extremely efficient natural-gas fired chiller, and a 15-kW photovoltaic system integrated into the building. Thin film panels were placed at the center of the southern and eastern sides of the building on the upper nineteen floors in the spandrels (the area of a façade between the top of one window and the bottom of the one above). The efficiency and cool power measures together bring total greenhouse emissions down by 40 percent.

The Four Times Square building has completely rented out its space. Many organizations are eager to work in an environmentally superior building with reduced operating costs.

Firm/Organization	Applebee's Restaurant
Issue	Energy Efficiency
Location	Charlotte, North Carolina
Industry	Service
Costs	
Payback Period	two months
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

An Applebee's Restaurant has a 1.7-kW photovoltaic array that replaces part of the roof. Integrated into it is a heat-recovery system that uses the array's waste heat to preheat water. The project had a payback of under two months with state tax credits.

Firm/Organization	A South Carolina aluminum refiner
Issue	Energy Efficiency
Location	South Carolina
Industry	Aluminum
Costs	
Payback Period	No capital outlay whatsoever
Annual Financial Savings	$104,000
Resource Savings	2,500 tons of carbon dioxide/year
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

A South Carolina aluminum refiner analyzed its dust collection system and found that a few simple operational changes would save $104,000 per year, reduce system energy consumption 12 percent a year, and reduce carbon dioxide emissions by over 2,500 tons a year with no capital outlay whatsoever.

SECTION 13: INTERNATIONAL SUSTAINABILITY EXAMPLES

Firm/Organization	Suntory Brewery
Issue	Energy Efficiency
Location	Musashino, Japan
Industry	Manufacturing
Costs	
Payback Period	1.9 years
Annual Financial Savings	
Resource Savings	700,000 kWh/year
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

Suntory upgraded five motors with variable speed drives, reducing overall energy consumption 47 percent. This measure saved more than 700,000 kWh/year, with a simple payback of 1.9 years.

Firm/Organization	Scott Paper Company
Issue	Energy Efficiency
Location	Westminster, British Columbia
Industry	Manufacturing
Costs	
Payback Period	under two years
Annual Financial Savings	
Resource Savings	300,000 kWh/year
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

By eliminating a control valve regulating the flow of pulp stock and installing a variable speed drive, energy use was cut in half, saving 300,000 kWh/year, with a simple payback of under two years.

Firm/Organization	Several
Issue	Pollution Prevention (Canada)
Location	Canada
Industry	Several
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	see Project Summary for website URL address
Contact	
Contact Phone	
Project Summary	

To view several examples of pollution prevention in Canada, please see:
http://iisd.ca/business/jump.asp?curpage=polexample.htm&ref=http://www.ec.gc.ca/pp/english/success.html

Firm/Organization	Royal Darwin Hospital
Issue	Energy Efficiency
Location	Australia
Industry	Service
Costs	$120,000.00
Payback Period	3.2 months
Annual Financial Savings	$450,000
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm's book: Cool Companies
Contact	
Contact Phone	
Project Summary	

Royal Darwin Hospital installed variable speed drives (VSDs) on its air-handling units. With the improved air control for the VSDs, room setpoints could be increased by one degree Celsius. The result: Fan power was cut by 71 percent with a payback of three months. An investment of $120,000 (Australian dollars) yielded savings of $450,000 per year.

Firm/Organization	British Steel
Issue	Energy Efficiency
Location	England
Industry	Manufacturing
Costs	
Payback Period	
Annual Financial Savings	
Resource Savings	
Total Financial Savings	
Source of Case Study	Joseph J. Romm
Contact	
Contact Phone	
Project Summary	

British Steel upgraded its system for pumping the water that cools the steel plates during manufacturing. The systematic combination of new motors, VSDs, and the control regime made possible by the variable speed drives resulted in a 76 percent energy savings with a payback of 3.3 years. The process improvement also seems to have improved product quality, with a slight increase in the percentage of steel plates successfully cooled.