



Local Action Plan on GLOBAL WARMING

April 2001



City of Portland & Multnomah County

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April 2001

Dear Friends,

It is impossible to overstate the importance of global warming. No other issue threatens our planet with such dramatic, far-reaching impacts, and no other issue is so clearly a worldwide problem. At the same time, many of the most promising solutions to global warming are local initiatives that we can control.

The City of Portland and Multnomah County developed this plan to reduce greenhouse gas emissions in the Portland area. The City of Portland has been a leader among local governments in combating global warming and in 1993 became the first local government in the U.S. to adopt a greenhouse gas-reduction plan. This new joint plan for the City of Portland and Multnomah County represents an important step forward for both organizations and makes clear that all governments—and all citizens—have a responsibility to address global climate change.

There is no time to lose. The scientific consensus expects substantial changes not only in temperature but in rainfall patterns, water supply, snow levels, forest health, local air quality, and sea level. These changes are not in the distant future but are in evidence now:

- Eighteen glaciers in Glacier National Park have melted in the last 30 years, and the park is expected to have no glaciers by 2070 if temperatures continue to rise as projected.
- Sea level has risen four to 10 inches over the last century, and low-lying islands in the Pacific Ocean have already been covered.
- Since 1900 temperatures in the Pacific Northwest have increased 1.5° F and precipitation has increased 14 percent.

Portland City Council and Multnomah County Board of Commissioners have established a goal of reducing greenhouse gas emissions to 10 percent below 1990 levels by 2010. Achieving this goal will require action by government, businesses, and individuals. We know what causes global warming, and the steps to combat it are clear: reduce the use of fossil fuels. Reducing greenhouse gas emissions doesn't have to be difficult. In almost every case, it's good for the family budget and for the local economy.

We encourage you to join us in taking action on both a personal and a policy level. We will continue to examine local government activities to identify areas where we can reduce emissions from City and County operations. Please take an equally serious look at your own actions and search for ways to reduce emissions from your own activities. Every reduction matters, no matter how small.

Thank you for your interest in this vital issue.



Erik Sten
City Commissioner



Bill Farver
Interim County Chair

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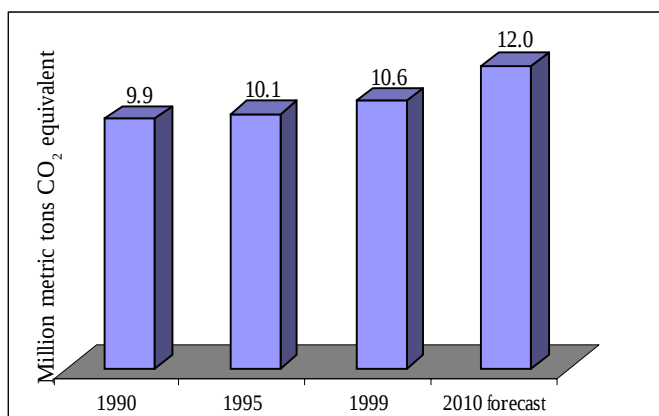
INTRODUCTION

Global climate change presents one of the foremost threats—economically, socially and environmentally—of the new century. Increases in the concentration of greenhouse gases in the atmosphere are expected to result in substantially higher temperatures, more frequent intense storms, rising sea levels, and changes in water flows and quality. There is broad agreement in the scientific community that human activities are contributing to these changes, largely by releasing carbon dioxide into the atmosphere through burning fossil fuels to generate electricity, manufacture goods, heat our homes, and power our vehicles.

A Local Plan

In 1993 Portland became the first U.S. city to adopt a plan to reduce carbon dioxide (CO₂) emissions. Early in 2001 Multnomah County joined these efforts, identifying climate change as a key element in its overall sustainability initiative. Nearly 400 municipal governments worldwide have joined Portland and Multnomah County in adopting climate-change mitigation goals. Together, these communities represent more than seven percent of global greenhouse gas emissions. While the actions of any single municipality can impact only a small fraction of emissions, this collaboration of a large number of urban areas can achieve meaningful reductions.

Figure 1. Total Multnomah County greenhouse gas emissions



Portland and cities throughout the world are responsible for creating a sustainable future for our children. We know that cutting CO₂ emissions is not only smart for the environment, it's great for business, too. If we reduce our CO₂ emissions, we also reduce local air pollution, plant more trees, lower energy bills for residents and business, use more solar and wind power, and create a more livable, walkable, community-oriented city for all of us. Cities must take a leadership role. We cannot wait for federal action.

— Vera Katz, Mayor of Portland

Portland's 1993 CO₂ reduction strategy established a reduction target of 20 percent below 1990 emissions by 2010. Today, seven years into the City's original plan, we have far to go. Although impressive achievements in energy efficiency, transportation, recycling, and tree planting have helped reduce per capita emissions, rapid population growth has led to an overall increase in CO₂ emissions since 1990 (see Figure 1).

Portland and Multnomah County's Goal

Largely because of rapid population growth, this plan adopts a more realistic reduction target of 10 percent below 1990 levels. This target is still more aggressive than the 1997 Kyoto Protocol, which, though not ratified by the U.S. Senate, sets a national reduction goal of seven percent below 1990 levels by 2008 to 2012.

As aggressive as it is, Portland and Multnomah County's greenhouse gas-reduction goal must be viewed as only the beginning. Reducing emissions to 10 percent below 1990 levels will slow the accumulation of greenhouse gases, but the atmospheric concentration of those gases will continue to rise. To stabilize atmospheric levels of greenhouse gases will require a reduction in emissions of 60 to 70 percent from 1990 levels.¹

The Science of the Greenhouse Effect

The greenhouse effect is essential to life as we know it. Without it, the Earth would be permanently icy and inhospitable. Instead, water vapor and other gases in the Earth's atmosphere absorb some of the infrared energy radiating from the sunlight-warmed surface of the Earth. These gases, called greenhouse gases, allow the Earth's atmosphere to function as a sort of thermostat, keeping temperatures on Earth within a broad, mostly habitable range. Increasing the atmospheric concentration of these energy-absorbing gases threatens to disrupt the global climate, substantially altering temperature and precipitation patterns.

The gases of greatest concern are carbon dioxide, methane, nitrous oxide, and halocarbons. Carbon dioxide, which is produced primarily through burning gasoline, natural gas, coal, and oil, is the largest contributor to the greenhouse effect, with emissions estimated to be 82 percent of all U.S. greenhouse gas emissions.² Emissions of methane account for just under 10 percent of U.S. emissions and result from decomposing landfill waste, manure and fermentation from livestock, and natural gas systems.

Nitrous oxide emissions are six percent of U.S. emissions and arise from agricultural soil management and combustion engines. Halocarbons, which include chlorofluorocarbons, hydrochlorofluorocarbons, and perfluorocarbons, are typically produced during industrial processes.

In addition to these greenhouse gases, changing patterns of land use and land cover are altering the atmospheric balance. Soil, forests, and other vegetation have the potential to remove carbon dioxide from the atmosphere, and changes in the quantities and management of land uses have large impacts on the atmosphere.

Emissions of sulfate aerosols, microscopic airborne particles released during industrial processes, introduce a further complexity. These aerosols tend to reflect sunlight before it reaches the Earth and therefore have a cooling

effect on the atmosphere. In a few parts of the world, in fact, the cooling effect of aerosols has more than offset the warming influence of greenhouse gases.³ Aerosols remain in the atmosphere for a much shorter time than greenhouse gases, however, and the long-term cooling impact of aerosols is small compared to the warming effect of greenhouse gases. Including these aerosols in climate models has greatly improved the models' ability to reproduce observed changes in global temperatures.

The Earth Is Warming

There is no debate that the atmospheric concentration of greenhouse gases is increasing, and the broad scientific consensus is that this will lead to significant changes in the global climate.

The United Nations Environment Programme and the World Meteorological Organization convened the Intergovernmental Panel on Climate Change (IPCC) in 1988, and the IPCC remains the primary international authority on global climate change.

Long-term observations confirm that our climate is now changing at a rapid rate.

— U.S. Global Change Research Program National Assessment Synthesis Team, 2000⁴

The 1995 IPCC *Second Assessment* report projected an increase in mean global temperature of between 1.8° F and 6.3° F over the next century. The 1995 report concluded that “The balance of evidence suggests a discernible human influence on global climate.”⁵

The 2000 IPCC *Third Assessment*, drawing on an expanded and improved body of scientific research, concluded that temperatures are likely to be much hotter than previously expected. The report found that a business-as-usual scenario is expected to lead to a temperature rise of between 2.5° and 10.4° F by 2100. The report also strengthened its conclusion about the role of humans, finding that human-generated emissions “have contributed substantially to the observed warming over the last 50 years.”⁶

In the Pacific Northwest, scientists have already observed measurable warming. Over the last century, the regional average temperature has increased by 1.5° F, and average annual precipitation has increased by 2.8 inches.⁷

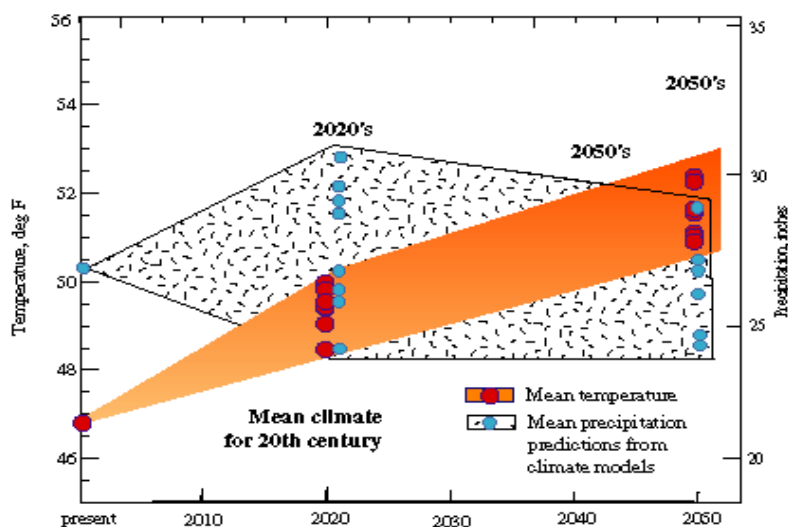


Figure 2. Changes in average temperature and precipitation from seven Pacific Northwest climate model scenarios. Each dot represents a 10-year average for one model.

Source: JISAO/SMA Climate Impacts Group, University of Washington

Expected Impacts of Climate Change

Globally, climate change is expected to increase temperatures, alter soil moisture levels, raise sea level, and increase the likelihood of severe heat waves, floods, droughts, and other extreme weather events.

At a regional level, probable impacts in the Pacific Northwest include warmer temperatures, wetter winters, and drier summers (see Figure 2).⁸ At moderate elevations, higher temperatures are expected to lead to an increase in winter rainfall and decrease in snow. In turn, this results in higher levels of winter runoff, increasing the likelihood of flooding. In the summer, expected lower levels of rainfall—coupled with reliance on runoff from a diminished snowpack—increase the likelihood and severity of drought, reducing the volume of water available for competing human, agricultural, and wildlife needs.

Warmer water temperatures, an earlier peak flow of water, and lower summer streamflows all add to the difficulties facing salmon, which are already under considerable stress from human impacts in the Northwest.

Forests, another outstanding natural resource in the Northwest, are expected to experience added stress as well. Tree growth is likely to be limited by drier summers, and

Impacts of Climate Change

Water resources. Changes in the location, time of year, and form in which precipitation falls can alter the reliability and quality of water supplies.

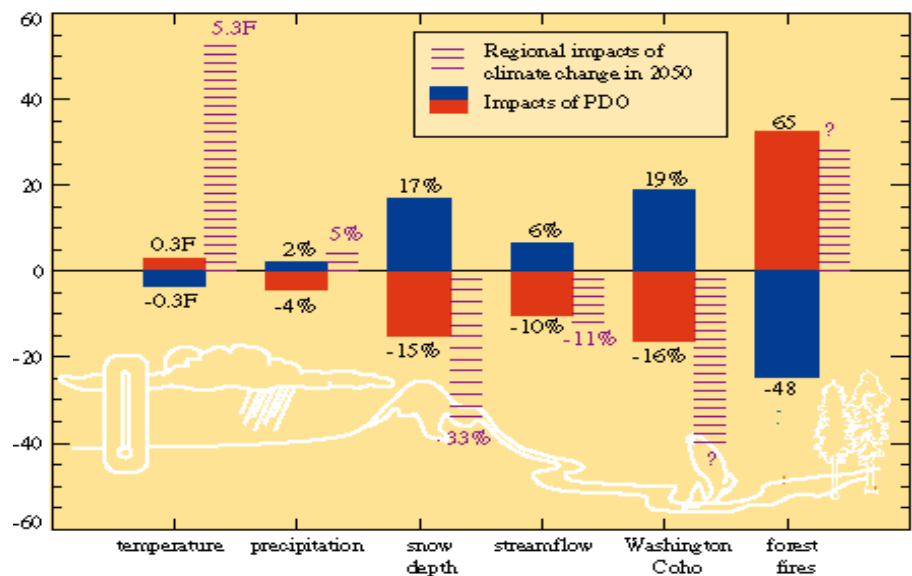
Human health. Although warmer temperatures are expected to lead to a decrease in cold-related illnesses, scientists expect a net increase in human mortality due to higher temperatures, urban air pollution problems, an increase in extreme weather incidents, and changing regional disease patterns.

Agricultural production. Changes in temperature, precipitation, and soil moisture will affect the distribution and productivity of crops and increase the prevalence of disease and pests. Initial studies suggest that global food production can be maintained, though regional impacts will vary widely.⁹

Coastal systems. A rise in sea level of one to two feet by 2100—IPCC's most recent mid-range estimate—would cause severe disruption for residents in coastal areas, where population has been growing much more quickly than average, as well as for biologically diverse and productive coastal ecosystems. Many low-lying and island countries face potentially catastrophic storm surges and tidal flooding.

Ecosystems. Climate change may affect where individual ecological systems can thrive, the mix of species the ecosystems include, and the ability of ecosystems to provide the vast range of benefits that enable human societies to survive.

Figure 3. Gray and black bars indicate changes as a percentage of average (except for temperature) for available data during the warm (gray) and cool (black) phases of the Pacific Decadal Oscillation. Regional impacts of climate change in 2050 (using the average of seven climate model scenarios, hatched bars) compared to impacts of PDO. Temperature (averaged over the PNW, for October-March); total annual precipitation (averaged over the PNW); snow depth (average from January 15 to April 15 at Snoqualmie Pass, Washington); streamflow (at The Dalles, corrected for the changing effects of dams); annual catch of Washington coho salmon; area burned by forest fires in Washington and Oregon.



Source: JISAO/SMA Climate Impacts Group, University of Washington

the possible increase in wildfires, pests, and disease may pose a severe threat to forest health.

Finally, coastal areas can expect a higher risk of flooding and increases in coastal erosion. These can be extremely destructive to both human and natural communities.

Figure 3 compares the expected regional impacts of global warming with the effects of the natural variability of climate in the Pacific Northwest. Northwest weather patterns are strongly influenced by the Pacific Decadal Oscillation, the dominant atmospheric circulation pattern in the North Pacific, which tends to create either relatively warm, dry

conditions or cool, wet conditions over a cycle that reverses every 20 to 30 years. As Figure 3 shows, in most respects the impacts of global climate change will be much stronger than the natural climatic variation of the Pacific Decadal Oscillation.

Portland Greenhouse Gas Emissions

Between 1990 and 1999, total greenhouse gas emissions in Multnomah County increased from 9.9 million to 10.6 million metric tons of carbon dioxide equivalent, a rise of just over seven percent (see Figure 1). By 2010, emissions are projected to reach 12 million metric tons for a total increase of over 20 percent.

Figure 4. Multnomah County greenhouse gas emissions by sector

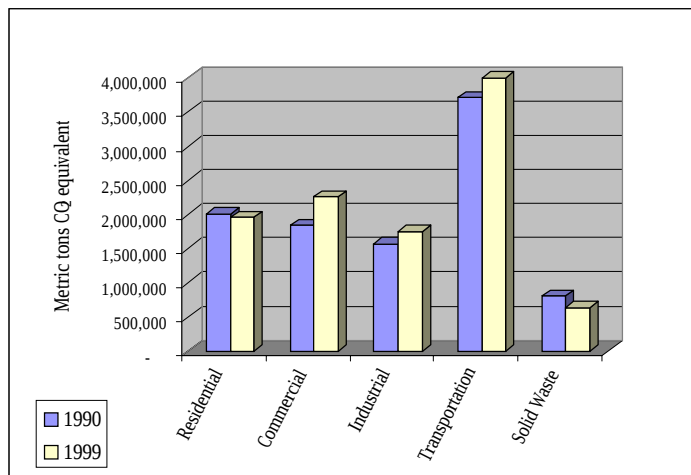
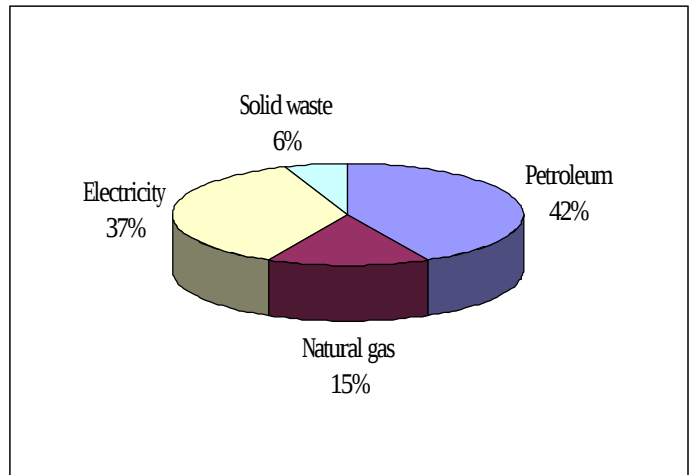


Figure 5. 1999 Multnomah County greenhouse gas emissions by source



This forecast increase is due primarily to population growth and the associated increases in energy use and vehicle miles traveled. Commercial and industrial energy use, however, are projected to increase as well.

Figure 4 shows the change in greenhouse gas emissions from the various sectors between 1990 and 1999, and Figure 5 depicts the source of 1999 emissions by fuel.

To reach this plan's goal of 10 percent below 1990 levels in 2010 requires a reduction in emissions to 8.9 million metric tons, or a real total reduction of almost 26 percent. This aggressive goal will require considerable efforts by the City, County, other governments, the commercial, industrial, and transportation sectors, and individual residents.

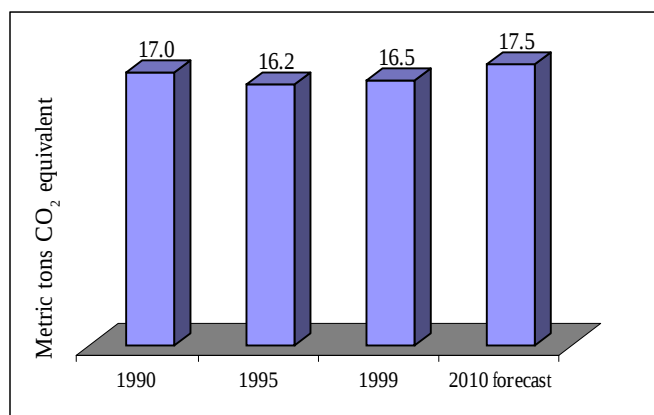
A coordinated, determined effort, however, can plausibly achieve the reductions target. Between 1990 and 1995, for example, local per capita energy use and greenhouse gas emissions decreased almost five percent. This was the result primarily of aggressive electricity conservation efforts promoted by local utilities, the State, the City, and the County. Substantial increases in energy use between 1995 and 1999, however, reduced those gains (see Figure 6). Similarly, per capita greenhouse gas emissions from transportation decreased two percent between 1990 and 1999, despite the proliferation of minivans and sport-utility vehicles.

Table 1 on the following page shows greenhouse gas emissions in Multnomah County by sector and fuel. Table 2 shows the same information on a per capita basis. These inventories do not include nitrous oxide or halocarbons, and they also do not consider land use and land cover changes. A detailed description of the greenhouse gas emissions inventory and methodology is available from the City of Portland Office of Sustainable Development.

Global Warming Action Plan Components

This plan identifies five primary components with specific greenhouse gas reduction targets and a sixth element—Policy, Research, and Education—that will enhance the success of the other five strategies but is not credited directly with quantifiable reductions. Table 3 indicates the

Figure 6. Multnomah County per capita greenhouse gas emissions



target reductions for each component in units of million metric tons (2205 pounds).

- Energy-efficiency initiatives will reduce emissions by decreasing energy use in residential, commercial, industrial, and government buildings and facilities by 10 percent.
- Transportation reductions will be achieved by reducing per capita vehicle miles traveled to 10 percent below 1995 levels by 2010 and by improving the average fuel efficiency of vehicles in Multnomah County from 18.5 to 26 mpg.

Table 3: Greenhouse gas reduction targets
(million metric tons)

Component	Emissions reductions
Policy, Research, and Education	--
Transportation, Telecommunications, and Access	1.35
Energy Efficiency	0.67
Renewable Resources	0.54
Solid Waste Management	0.23
Forestry and Carbon Offsets	0.31
TOTAL	3.10

Table 1: Aggregate Multnomah County greenhouse gas emissions by sector and source (metric tons CO₂ equivalent)

	1990	1995	1999	2010 forecast
Residential				
Electricity	1,395,853	1,229,869	1,235,404	1,385,087
Natural gas	414,102	473,605	591,686	636,476
Propane	20,132	25,883	24,445	21,380
Fuel oil	173,049	91,516	81,533	111,986
Kerosene	2,416	1,643	3,287	1,411
Subtotal	2,005,551	1,822,517	1,936,355	2,156,340
Commercial				
Electricity	1,255,468	1,528,429	1,686,207	1,890,510
Natural gas	417,609	440,775	461,370	521,284
Propane	2,876	4,314	4,314	3,773
Fuel oil	129,787	76,541	73,213	100,559
Kerosene	-	1,643	1,643	705
Residual	32,169	10,723	5,362	13,284
Subtotal	1,837,910	2,062,425	2,232,108	2,530,115
Industrial				
Electricity	737,987	817,563	971,968	1,089,733
Natural gas	515,160	589,242	542,966	639,991
Propane	38,825	44,577	54,643	47,790
Fuel oil	276,212	254,581	214,647	294,821
Kerosene	-	1,643	-	-
Residual	90	37,531	19,659	48,709
Subtotal	1,568,275	1,745,138	1,803,883	2,121,045
Transportation				
Gasoline	2,403,032	2,564,668	2,518,261	3,232,044
Diesel fuel	1,069,907	1,001,686	1,124,817	1,481,187
Propane	10,066	5,752	5,752	11,878
Jet fuel	227,856	351,480	392,688	415,435
Subtotal	3,710,861	3,923,586	4,041,518	5,140,544
Solid waste				
	800,830	575,515	631,675	50,283*
TOTAL	9,923,427	10,129,181	10,645,539	11,998,328

Table 2: Per capita Multnomah County greenhouse gas emissions by sector and source (metric tons CO₂ equivalent)

	1990	1995	1999	2010 forecast
Residential				
Electricity	2.39	1.96	1.91	2.02
Natural gas	0.71	0.76	0.91	0.93
Propane	0.03	0.04	0.04	0.03
Fuel oil	0.30	0.15	0.13	0.16
Kerosene	-	-	0.01	-
Subtotal	3.43	2.91	2.99	3.15
Commercial				
Electricity	2.15	2.44	2.61	2.76
Natural gas	0.72	0.70	0.71	0.76
Propane	-	0.01	0.01	0.01
Fuel oil	0.22	0.12	0.11	0.15
Kerosene	-	-	-	-
Residual	0.06	0.02	0.01	0.02
Subtotal	3.15	3.29	3.45	3.70
Industrial				
Electricity	1.26	1.30	1.50	1.59
Natural gas	0.88	0.94	0.84	0.94
Propane	0.07	0.07	0.08	0.07
Fuel oil	0.47	0.41	0.33	0.43
Kerosene	-	-	-	-
Residual	-	0.06	0.03	0.07
Subtotal	2.69	2.79	2.79	3.10
Transportation				
Gasoline	4.12	4.09	3.89	4.72
Diesel fuel	1.83	1.60	1.74	2.16
Propane	0.02	0.01	0.01	0.02
Jet fuel	0.39	0.56	0.61	0.61
Subtotal	6.36	6.26	6.25	7.51
Solid waste				
	1.37	0.92	0.98	0.07*
TOTAL	17.0	16.2	16.5	17.5

*Emissions from solid waste disposal are expected to fall sharply by 2010 as a result of EPA regulations requiring landfills to capture methane. Note, however, that reducing waste and recycling also reduces emissions in other categories by decreasing the need for energy in manufacturing processes and, in some cases, transportation of materials.

- Meeting all growth in local electricity load since 1990 with renewable energy resources will reduce greenhouse gas emissions by 0.54 million metric tons.
- Reducing solid waste and improving recycling and recovery rates and practices will reduce methane emissions from landfills and the energy required in manufacturing processes.
- Promoting expanded and improved forestry and seeking other carbon offsets will acquire just over 0.3 million metric tons of emission reductions.
- Providing policy, research, and community-wide education will enhance all of these efforts.

Each of the six elements of this plan includes one or more objectives. Within each objective, activities are identified as either “Government Actions” or “Community Initiatives.” “Government Actions” primarily affect internal local government operations. An increasing number of businesses and organizations are inventorying the greenhouse gas emissions associated with their operations and establishing emissions-reduction programs. “Government Actions” together constitute the City of Portland’s and Multnomah County’s greenhouse gas-reduction plans as corporate entities.

“Community Initiatives” are actions or policies that impact emissions arising from all Multnomah County residents, businesses, and institutions. While some of these activities include important roles for government, most actions require that the City and County be strategic partners, catalysts, or advocates, and the success of these initiatives depends on the involvement of a broad array of community partners.

The estimated potential emissions reduction from each action is indicated by the icon . Because estimating possible reductions involves many assumptions, the estimates in this plan are intended to give a sense of the magnitude of the impact, rather than specific expectations. For this reason,  represents less than 10,000

metric tons of emissions reductions per year;  indicates between 10,000 and 100,000 metric tons per year; and  more than 100,000 metric tons per year. In the Policy, Research, and Education section, estimates are not included, since the expected reductions are indirect and therefore both difficult to measure and captured by other action items.

Finally, activities are categorized as targeted for completion either by 2003 or by 2010. Every two years the City and County will evaluate progress to date and identify a further set of actions to pursue in the following two years.

Why are cities a good place to look for reductions in greenhouse gas emissions? Because that’s where the people are. It’s people who drive cars, throw away mountains of garbage and use billions of kilowatts of electricity. And it’s in their local communities where people can join forces to reduce the impacts of these activities.

— Paul Schell, Mayor of Seattle, and
Denis Hayes, President of the Bullitt Foundation,
2000¹⁰

Public Process

This Local Action Plan is the result of collaboration among members of the public, businesses, non-profit organizations, utilities, and City and County agencies. Initial meetings took place in June 2000, and formal discussions continued through the fall.

A draft plan was released for public comment in November 2000, and more than 300

copies of the draft were distributed. City and County agencies held meetings with a variety of individuals, businesses, and civic organizations to present the draft strategy and to invite comments and improvements. Thirty parties submitted comments, including individuals, business owners, nonprofit organizations, and local, state, and federal agencies.

A number of comments proposed specific clarifications, which are incorporated in this final version wherever possible. Many commenters suggested that the final plan prioritize the proposed actions more clearly than the draft plan had. In response, the final plan targets individual actions for completion by either 2003 or 2010 and also estimates the potential emissions reductions associated with each action.

Finally, a number of parties observed that the plan takes only the most preliminary steps toward achieving a

sustainable level of greenhouse gas emissions. This point is well taken: as noted above, the IPCC estimates that emissions reductions on the order of 60 to 70 percent below 1990 levels will be necessary to stabilize atmospheric concentrations of greenhouse gases. This is a daunting challenge, but one that cannot prevent us from taking the first important steps toward reducing emissions of greenhouse gases.

Multnomah County's collaboration with the City of Portland on the global warming plan marks an important step forward. Reducing greenhouse gases means the involvement of the entire community. We must all be wise stewards of our land, air, and water for future generations.

— Bill Farver, Interim Multnomah County Chair

Table 4 on the following page to estimate your household's emissions and to identify ways to reduce them. Every reduction in greenhouse gas emissions makes a difference, and the people of Multnomah County can have the greatest impact of all on our community's contribution to combating global warming.

This plan identifies a wide variety of measures that will reduce emissions directly, but it also emphasizes educating community leaders and decisions makers about the causes and expected impacts of climate change. Local governments can meaningfully reduce greenhouse gas emissions only by engaging our many partners throughout the community.

The most important partners of all are the people of Multnomah County. Each of us can and must make a difference. A typical Multnomah County household generates 45,000 pounds of carbon dioxide annually. Use

Looking Ahead

The City of Portland and Multnomah County will monitor the success of efforts by inventorying greenhouse gas emissions annually and preparing a report every two years on our progress in implementing this plan. The report will include data on local energy use, renewable power purchases, solid waste disposal and recycling rates, and tree-planting efforts. The progress report will also identify additional actions from the plan to pursue over the following two years. By keeping the community informed of our progress, we can sustain Portland and Multnomah County's commitment to doing our part to address global warming.

¹Houghton, T.M., C.F. Jenkins, and J.J. Ephraums, eds. *Climate Change: The IPCC Scientific Assessment*. Intergovernmental Panel on Climate Change, Cambridge University Press, 1990.

²*Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 1998*. U.S. Environmental Protection Agency, 2000. Following the practice of the Intergovernmental Panel on Climate Change and the U.S. Environmental Protection Agency, all greenhouse gas emissions figures in this report are weighted by the “global warming potential” (GWP) of the gas. GWP is defined as the ratio of the global warming (i.e. direct and indirect radiative forcing) from one unit mass of the gas to the radiative forcing of one unit mass of carbon dioxide. Methane, for example, has a GWP of about 21—meaning it traps 21 times as much radiation as an equivalent mass of carbon dioxide—and therefore one ton of methane emissions would be reported here as 21 tons of emissions.

³*The Regional Impacts of Climate Change: An Assessment of Vulnerability*. Intergovernmental Panel on Climate Change, 1997. URL: <http://www.ipcc.ch/pub/sr97.htm>.

⁴*Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change*. U.S. Global Change Research Program's National Assessment Synthesis Team, draft report released for public comment, 2000. URL: <http://www.gcric.org/NationalAssessment>.

⁵*IPCC Second Assessment: Climate Change 1995*. Intergovernmental Panel on Climate Change, 1995. URL: www.ipcc.ch.

⁶*Third Assessment of Working Group I of the Intergovernmental Panel on Climate Change*, 2001. URL: www.ipcc.ch.

⁷*Impacts of Climate Variability and Change: Pacific Northwest*. JISAO/SMA Climate Impacts Group, University of Washington, 1999. URL: <http://jisao.washington.edu/PNWimpacts>.

⁸*Ibid.*

⁹*IPCC Second Assessment: Climate Change 1995*. Intergovernmental Panel on Climate Change, 1995. URL: www.ipcc.ch.

¹⁰Schell, Paul and Denis Hayes. “Global warming is a very local problem.” *The Seattle Times*, April 25, 2000.

Table 4. Estimating Annual Household Greenhouse Gas Emissions

		Your Household CO₂ Emissions (lbs./yr.)
Electricity	1 kilowatt hour electricity = 1 pound CO₂ Average monthly bill : \$25/mo. = 4,000 lbs./yr. \$60/mo. = 11,000 lbs./yr. \$100/mo. = 19,000 lbs./yr.	+
Green power purchase	1 kilowatt hour renewable electricity avoids 1 pound CO₂ 100 kWh blocks purchased: 1/mo. = 1,200 lbs./yr. 5/mo. = 6,000 lbs./yr.	
Natural gas	1 therm natural gas = 12 pounds CO₂ Average monthly bill : \$25/mo. = 4,000 lb. /yr. \$60/mo. = 10,000 lb. /yr. \$100/mo. = 18,000 lb. /yr.	+
Heating oil	1 gallon fuel oil = 22 pounds CO₂ Average annual use: 300 gallons = 7,000 lbs. 500 gallons = 11,000 lbs. 700 gallons = 15,000 lbs.	+
Vehicles	1 gallon gasoline = 20 pounds CO₂ Use auto emissions calculator below.	+
Air travel	1 mile air travel = 1 pound CO₂ Cross-country trips: 1 round trip = 6,000 lbs. 3 round trips = 18,000 lbs. 5 round trips = 30,000 lbs.	+
Trash	1 pound garbage = 1.5 pounds CO₂ Garbage can size (weekly collection): 20 gallon = 1,000 lbs./yr. 32 gallon = 2,000 lbs./yr. 65 gallon = 3,500 lbs./yr.	+
Recycling	1 full recycling bin = 10 pounds CO₂ Full bins of recycling: 1 bin/wk. = 500 lbs./yr. 2 bins/wk. = 1000 lbs./yr.	+
Tree planting	1 tree = 25 pounds CO₂ reduced each year for 30 years Trees planted in last 30 years: 4 trees = 100 lbs./yr. 10 trees = 250 lbs./yr.	
TOTAL ANNUAL CO₂ EMISSIONS		=

[†]Be sure to consider both winter and summer bills in estimating an average month for electricity and natural gas usage.

Sources

For electricity, natural gas, heating oil, and gasoline emissions: *Emissions Factors, Global Warming Potentials, Unit Conversions, Emissions, and Related Facts*. Compiled by ICF Consulting. November 1999.

For air travel: *Transportation Energy Data Book: Edition 20*. Oak Ridge National Laboratory. November 2000.

For trash and recycling: City of Portland Office of Sustainable Development.

For tree planting: Oregon Office of Energy.

Vehicle Emissions Calculator

Directions:

1. Find the fuel efficiency of your car (top row).
2. Find the number of miles you drive that car (left column)
3. Follow the row and column you select to their intersection to find the annual CO₂ emissions for your car.
4. Repeat for each car you drive.

	15 mpg	20 mpg	30 mpg
8,000 miles/yr.	11,000	8,000	5,000
12,000 miles/yr.	16,000	12,000	8,000
15,000 miles/yr.	20,000	15,000	10,000

GOAL

Promote a sustainable future by reducing total Multnomah County emissions of greenhouse gases by 10 percent from 1990 levels by 2010.

A. POLICY, RESEARCH, AND EDUCATION

The City of Portland Office of Sustainable Development and Multnomah County Department of Sustainable Community Development will coordinate Portland-area efforts to reduce greenhouse gas emissions and assist other local government agencies with complementary programs and policies.

The City of Portland and Multnomah County will assume leadership roles in taking aggressive, prudent action to reduce greenhouse gas emissions. High quality, timely information is essential to implementing these policies successfully. The City and County must ensure that the Portland community has access to this information and becomes increasingly aware of global warming and the impacts residents and businesses have on greenhouse gas emissions.

Objective	Ensure that policy decisions at all levels—government, business, and individual—seek to reduce global warming impacts.
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Government Actions

- | | |
|------|---|
| 2003 | <ol style="list-style-type: none">1. Compile and update an inventory of greenhouse gas emissions from City and County operations and track related solid waste, energy, economic, and environmental data.2. Educate employees and bureau managers about sustainability with a focus on specific operational changes that can be made to reduce greenhouse gas emissions. Require employee education on fuel-efficient driving and reducing energy use at work. |
| 2010 | <ol style="list-style-type: none">3. Review major policies and programs in the early stages of development to identify ways to reduce related greenhouse gas emissions.4. Integrate the goal and actions set out in this plan into future City and County policies. |

Community Initiatives

- | | |
|------|---|
| 2003 | <ol style="list-style-type: none">1. Inform local elected officials, community leaders, and local and regional media about the causes and impacts of global warming.2. Continue to compile and distribute information on greenhouse gas reduction technologies, programs, and policies that will improve Portland's economy and environment. |
|------|---|

3. Expand the civic, educational, religious, and neighborhood institutions that specifically address global warming.
4. Implement and support education and outreach programs to:
 - a. Improve community understanding of the nature of the greenhouse gas effect and possible global, regional, and local impacts of climate change
 - b. Inform residents, businesses, and institutions about how their actions affect greenhouse gas emissions
 - c. Encourage residents, businesses, and institutions to reduce greenhouse gas emissions.
5. Provide tools to local residents and businesses to estimate their greenhouse gas emissions and emission reductions.
6. Work with City and County agencies to publicize greenhouse gas-reducing projects and actions through public education efforts.
7. Encourage and support greenhouse gas-reduction efforts at state, national, and international levels.

-
- | | |
|------|---|
| 2010 | <ol style="list-style-type: none"> 8. Establish a hotline for business and household resource-conservation questions. Provide educational information and referrals to resources and global warming-related programs. 9. Ensure that teachers have access to effective educational materials about global warming. 10. Compile and update an inventory of greenhouse gas emissions in Multnomah County and track related air quality, solid waste, energy, and environmental data. 11. Formally acknowledge the global warming impacts of City planning, transportation, and urban redevelopment policies and decisions such as North Macadam, North Interstate Avenue, and Outer Southeast. 12. Prepare a progress report on the Local Action Plan on Global Warming every two years and propose action items for the following two years. 13. Monitor the development of greenhouse gas emission credit mechanisms, and seek to bank credits for the City and County. |
|------|---|
-

How to Use This Plan

Each of the six elements of this plan includes one or more objectives. Within each objective, activities are identified as either “Government Actions” or “Community Initiatives.” “Government Actions” address internal local government operations, while “Community Initiatives” are actions or policies that impact emissions arising from Portland residents, businesses, and institutions. While some of these activities include important roles for government, most actions require that the City and County be strategic partners, catalysts, or advocates, and the success of these initiatives depends on the involvement of a broad array of community partners.

The estimated potential emissions reduction from each action is indicated by the icon . Because estimating possible reductions involves many assumptions, the estimates here are intended to give a sense of the magnitude of the impact, rather than specific expectations. For this reason,  represents less than 10,000 metric tons of emissions reductions per year;  indicates between 10,000 and 100,000 metric tons per year; and  more than 100,000 metric tons per year. In the Policy, Research, and Education section, estimates are not included, since the expected reductions are indirect and therefore both difficult to measure and captured by other action items.

Finally, activities are categorized as targeted for completion either by 2003 or by 2010. Every two years the City and County will evaluate progress to date and identify a further set of actions to pursue in the following two years.

B. ENERGY EFFICIENCY IN BUILDINGS

Reduction Goal: 0.67 million metric tons of CO₂

The Office of Sustainable Development and Department of Sustainable Community Development shall promote energy conservation as the preferred energy resource. OSD and DSCD will take lead roles in developing energy-saving programs and build partnerships with City and County agencies, other governments, non-profit organizations, utilities, and private-sector businesses to implement energy programs and policies.

Principles for Reducing Building Energy Use

1. Benefit all neighborhoods and socioeconomic groups, with particular attention to low-income residents.
2. Promote energy, economic, environmental, and social benefits, including developing active, healthy neighborhoods.
3. Consider community values along with a broad definition of cost effectiveness that includes total costs to individuals and all resource savings.
4. Minimize lost opportunities, such as new residential and commercial construction.
5. Emphasize education and outreach value.
6. Support local businesses and expand local infrastructure for delivering energy-efficiency services.

Greenhouse gas emissions from energy use in buildings accounted for 55 percent of all Portland greenhouse gas emissions in 1999. Electricity, natural gas, and fuel oil generated 5.9 million metric tons of greenhouse gas emissions in 1999, a figure that is forecast to rise to 6.7 million metric tons in the baseline 2010 forecast.

The energy-efficiency objectives are achievable but ambitious, particularly given the changing nature of the energy

industry. Energy savings will be captured by implementing programs in the current integrated resource plans of Portland General Electric, PacifiCorp, and NW Natural, through programs supported by the electricity system benefit charge or other public benefits funding, and through City, County, State, regional, individual, and collaborative initiatives.

Regulatory changes in the electric utility industry are substantially altering the mechanisms for funding and implementing energy-conservation programs. To maximize energy savings under the new structure, the City, County, utilities, and other conservation partners will need to seek new opportunities to develop programs.

The energy-efficiency goal represents a reduction of 10 percent of total emissions from residential, commercial, governmental, and industrial energy use. The 2010 baseline forecast for building-related energy emissions

2000 Energy Efficiency Progress Report

Per capita emissions from residential energy use (excluding transportation) fell by 15 percent between 1990 and 1995, but this encouraging trend then reversed, with emissions from residential energy use showing a moderate increase from 1995 to 2000.

Total energy use in all sectors (again, excluding transportation) increased by 10 percent for the decade. A strong economy for both commercial and industrial businesses accounts for most of this increase. Total natural gas consumption increased steadily since 1990, growing by about two percent per year. Residential gas use has shown the sharpest rise, increasing by over 40 percent, though more than half of this increase is the result of residents converting from fuel oil heat to natural gas. (See Tables 1 and 2 on page nine.)

is almost 6.7 million metric tons, and the 10 percent reduction is therefore 670,000 metric tons.

The greenhouse gas emissions associated with electricity use were calculated using the weighted average emissions of all power generated in the U.S. part of the Western Systems Coordinating Council, the electricity grid that serves Portland. This figure does not represent the specific generating resources of the utilities that supply the

Portland area. The deregulation of the market for wholesale electricity generally has eliminated the direct connection between the amount of electricity the customers of a given utility consume and the amount of electricity that utility generates.

In calculating the avoided greenhouse gas emissions from reduced electricity use, this report assumes that electricity conservation offsets the current mix of power in the Western Systems Coordinating Council grid.

Objective 1 Reduce greenhouse gas emissions from City of Portland and Multnomah County facilities to 10 percent below 1990 levels by 2010 through energy-efficiency measures.

Government Actions

- 2003
- 

1. Invest in all energy-efficiency measures with simple paybacks of 10 years or less.
- 

2. Develop and adopt energy- and resource-efficient building standards for all City and County new construction and major renovation projects.
- 

3. Establish City and County policies to purchase ENERGY STAR® or equivalent products, when available, for any equipment that uses electricity, natural gas, or fuel oil.
- 

4. Require all City and County construction projects to exceed energy code by 20 percent on new construction and 10 percent on retrofits.
- 2010
- 

5. Convert traffic signals to LED technologies.
- 

6. Improve energy efficiency in City and County facilities by 10 percent.
- 

7. Invest in building commissioning for new City and County facilities and retrocomissioning for facilities larger than 25,000 square feet.
- 

8. Convert street lights and traffic signals to more efficient technologies as they become available.

Potential Annual Emissions Reduction (metric tons)		
 = less than 10,000	  = 10,000 - 100,000	   = more than 100,000

Objective 2 Reduce forecast greenhouse gas emissions in the residential sector by 10 percent by 2010.

Community Initiatives

- 2003
-  1. Weatherize 250 homes occupied by low-income households through the City's Block-By-Block program and 500 homes through the County's weatherization program.
 -  2. Facilitate the installation of energy-conservation measures in 3,500 multi-family units.
 -  3. Support the implementation of local residential energy-conservation programs funded through the electricity system benefits charge or utility funds.
 -  4. Implement neighborhood-based outreach efforts to combine and promote energy and water conservation, solid waste reduction, safety, and livability.
 -  5. Require green building and energy-efficiency measures, including ENERGY STAR® or equivalent appliances, lighting, and heating equipment in City-funded affordable housing and other development projects.
 -  6. Support residential conservation programs through new agreements in franchises with local utilities.
-
- 2010
-  7. Provide green building design assistance and technical resources to Portland residential developers, designers, homebuilders, and residents. Impact at least 5,000 new units or major remodels.
 -  8. Work with Community Action Programs to weatherize 10,000 low-income homes in Multnomah County.
 -  9. Weatherize 1,250 homes occupied by low-income households through the City's Block-By-Block program and 2,500 homes through the County's weatherization program.
 -  10. Facilitate the installation of energy-conservation measures in 15,000 multi-family units by 2010.
 -  11. Work closely with the Northwest Energy Efficiency Alliance to promote local access to household resource-efficiency products.
 -  12. Improve the maintenance of residential heating, ventilation, and air-conditioning equipment by educating consumers and schoolchildren.
 -  13. Work with the state and other partners to offer financing for the purchase of high-efficiency furnaces, heat pumps, air-conditioning systems, replacement windows, insulation, water heaters, appliances, and other large energy-using systems.

- 🌍 14. Promote energy-efficient construction and renovation of attached single- and multi-family dwelling units, including accessory units.
- 🌍 15. Broaden standard residential energy audits to include review of major appliances, education of residents, and direct installation of efficient lighting and water-saving devices.
- 🌍 16. Improve the efficiency, effectiveness, and control of residential outdoor lighting through regional efforts and retail promotions.
- 🌍🌍 19. Develop a consortium of local and state support for more stringent federal efficiency standards for furnaces, refrigerators, water heaters, air conditioners, other appliances, and lighting products.
- 🌍🌍 20. Explore requiring weatherization of residential properties at time of sale. Bring properties up to the 1992 code, at a minimum.

Objective 3 Cut forecast greenhouse gas emission in the commercial, industrial, public, and non-profit sectors by 10 percent by 2010.

Community Initiatives

- 2003 🌍🌍🌍 1. Work with the 100 largest local business, industrial, and institutional energy consumers to establish and meet energy-efficiency and greenhouse gas-reduction targets.
- 🌍🌍 2. Actively promote the implementation of local commercial and industrial energy-conservation programs funded through the electricity system benefits charge or utility funds.
- 🌍 3. Provide green building design assistance and technical resources to Portland developers, designers, and builders. Develop local standards for green buildings and help local buildings meet national energy-efficiency and green building standards such as LEED™, ENERGY STAR®, and Earth Advantage®. Impact at least 10 million square feet of commercial and institutional space by 2010.
- 🌍 4. Facilitate the use of energy-service performance contracts, when appropriate, by businesses, government, and non-profit agencies.
- 🌍 5. Reduce heating and cooling loads by promoting light-colored roofs and paving materials, planting trees, and increasing vegetative cover.
- 🌍 6. Support amendments to the State Business Energy Tax Credit and State Energy Loan Program to encourage green building practices and make the tax credit more accessible to organizations.
-

Potential Annual Emissions Reduction (metric tons)

🌍 = less than 10,000

🌍🌍 = 10,000 - 100,000

🌍🌍🌍 = more than 100,000

2010

- 7.  Help small businesses, non-profit organizations, and public agencies gain access to energy-efficiency services.
 - 8.  Promote opportunities to improve operations and maintenance practices in local buildings, including resource-conservation managers.
 - 9.  Continue to advocate strengthening the Oregon state building code to include all cost-effective energy-efficiency measures.
 - 10.  Work with industry to identify opportunities to improve energy efficiency in process applications, including waste-heat recovery for cogeneration.
 - 11.  Support the establishment of a City energy plans examiner and a required field inspection of energy systems, with technical consultation available at the planning stage.
 - 12.  Develop guidelines for the installation of combustion distributed generation systems to facilitate low-cost interconnection and encourage increased efficiencies.
 - 13.  Support small business conservation programs through new agreements in utility franchises.
 - 14.  Investigate sliding-scale building permit fees with rebates for high-performance green buildings and higher fees for conventional buildings.
-

Potential Annual Emissions Reduction (metric tons)

 = less than 10,000

  = 10,000 - 100,000

   = more than 100,000

C. TRANSPORTATION, TELECOMMUNICATIONS, AND ACCESS

Reduction Goal: 1.35 million metric tons of CO₂

The City and County shall pursue energy-efficient transportation that provides convenient, affordable access to goods, jobs, education, leisure, and information with reduced environmental impact.

Principles for Reducing Transportation Emissions

1. Reduce the need for trips by using telecommunications and remote access whenever possible.
2. Encourage people who must travel to do so on foot, by bicycle, on transit, or as part of a rideshare.
3. Implement mechanisms to ensure that people who drive pay the full social cost of driving.
4. Improve access to alternative-fuel and highly fuel-efficient vehicles.*

In 1990, transportation accounted for 37 percent of all greenhouse gas emissions in Multnomah County. By 1999, that figure had risen to 38 percent, and in 2010 transportation is forecast to generate almost 43 percent of all local greenhouse gas emissions.

There are two primary strategies for reducing emissions from vehicles: reduce vehicle miles traveled (VMT) and improve fuel economy. Reducing VMT not only cuts greenhouse gas emissions but also reduces traffic congestion, allowing those vehicles that must be on the road to

2000 Transportation, Telecommunications, and Access Progress Report

While vehicle miles traveled are increasing everywhere in the United States, per capita greenhouse gas emissions from transportation in Multnomah County have fallen by almost two percent since 1990.

Tri-Met ridership increased nearly five percent per year from 1990 to 1998. In 1999, with the Westside MAX in operation for a full year, ridership jumped 12 percent from 1998 levels; from 1999 to 2000, ridership rose a further eight percent for a total increase of over 60 percent since 1990.

Bicycle commuting has also shown consistent progress, with ridership doubling since 1990. Some routes have experienced even stronger growth: daily bike trips over the Hawthorne Bridge, for example, more than tripled between 1990 and 1999, increasing from 750 to 2,620.

While individual local residents are bicycling and taking transit more, total vehicle miles traveled continue to grow. Federal figures indicate a 34 percent increase in VMT in the Portland metropolitan area between 1990 and 1998, and per capita daily VMT have increased as well, from 18.8 in 1990 to 21.0 in 1998.

There has been no progress in raising the federal fuel efficiency requirements. The Corporate Average Fuel Efficiency standards were established in 1978 to set a minimum level of average fuel efficiency for all vehicles sold in the U.S. The standard took effect in 1978 at 18 mpg for cars and increased gradually each year until 1985, when it reached 27.5 mpg. These standards have not increased since then. Standards for light trucks, a category that includes minivans and sport-utility vehicles, remain even lower, at 20.7 mpg.

*As used here, “alternative fuel” refers only to those fuels that have lower life-cycle greenhouse gas emissions than gasoline without increasing other harmful emissions.

travel more efficiently, and reduces the need for costly new road infrastructure. Improving fuel economy saves energy and reduces greenhouse gas emissions, since every gallon of gasoline releases 19.6 pounds of carbon dioxide when burned regardless of a vehicle's pollution control equipment. In other words, a "clean car," "dirty car," huge sport-utility vehicle, and super-efficient hybrid vehicle all emit *the same* amount of carbon dioxide per gallon of gasoline.

Local governments, supported by state and federal actions and incentives, can have a major influence on vehicle miles traveled, particularly on auto trips with a driver traveling alone. Federal and state laws and programs increasingly require and encourage a balanced, multi-modal transportation system.

On the federal level, the actions proposed here are consistent with the framework of the Transportation Equity Act for the 21st Century (TEA-21), a successor to the Intermodal Surface Transportation Efficiency Act of 1991. Passed in 1998, TEA-21 increased funding for mass transit and projects that relieve congestion and improve air quality.

At the state level, the actions support the implementation of the State Transportation Planning Rule (Goal 12) to coordinate land use and transportation planning. The actions are consistent with state benchmarks for land use,

air quality, mobility, and global warming, as well as the State Transportation Plan.

If implemented successfully, the actions below will enable Portland and Multnomah County to reduce per capita VMT by 10 percent from current levels. This represents a decrease of eight percent from 1995 levels and would show meaningful progress toward the State Transportation Planning Rule requirement of a 10 percent per capita reduction in VMT from 1995 levels by 2015. Reducing VMT will lead to an annual decrease of 87 million gallons of gasoline and 772,000 metric tons of greenhouse gas emissions.

Improving the fuel economy of vehicles by 40 percent will reduce Multnomah County greenhouse gas emissions by 573,000 metric tons annually. Nationally, the current fleet of cars in use—not including light trucks, minivans, or sport-utility vehicles—averages 18.5 miles per gallon (mpg). Improving this figure to 26 mpg and achieving a similar 40 percent improvement in the fuel economy of light trucks, minivans, and sport-utility vehicles will reduce greenhouse gas emissions substantially. The recent introduction of hybrid gasoline-electric vehicles with ratings of 50 to 60 mpg is encouraging, but widespread improvements in fuel economy are unlikely without an increase in the federal Corporate Average Fuel Economy standards.

Objective 1 Improve the quality, convenience, affordability, and awareness of walking, bicycling, teleworking, public transit, ridesharing, and vehicle sharing.

Government Actions

- 2003  1. Require City and County agencies to offer bus tickets to visitors who arrive by transit in any situation where the agency validates parking.
-  2. Implement City and County policies to encourage transit whenever appropriate and to provide employees with transit tickets for travel on business.

-  3. Expand City and County transit-pass subsidy programs.

2010

-  4. Reduce per employee vehicle miles traveled in City and County administrative vehicles by 20 percent by 2010 by promoting teleconferencing and the availability of pedestrian, bicycle, transit, and rideshare options for employees on business.
-  5. Promote City and County telework and flexible hours policies and provide education to agency managers to encourage consistent application of the policies. Enable 25 percent of City and County employees to telework or work compressed schedules to avoid commuting at least one day every two weeks.
-  6. Expand the participation of City and County agencies in vehicle-sharing programs.

Community Initiatives

2003

-  1. Support expanded transit lines and increased frequency of service on major transit arterials.
-  2. Expand the number of businesses that offer transit tickets to shoppers who request them.
-  3. Work with Tri-Met to improve access to transit service.
- a. Encourage shared parking opportunities such as movie theaters with primary parking needs in evenings and churches or other facilities with weekend-only parking needs.
 - b. Support additional park-and-ride lots in locations where substantial VMT reductions can be achieved.
 - c. Provide additional services such as secure, covered bicycle parking, coffee and newspapers during peak hours, and other amenities.
 - d. Continue and expand projects that increase pedestrian accessibility to transit stops, neighborhood shopping areas, schools, churches, and parks.
 - e. Help transit riders to show their neighbors, friends, and co-workers how easy it is to take transit.
-  4. Support the expansion of Tri-Met's "Fareless Square" to appropriate areas.
-  5. Continue to provide maps highlighting alternative modes of transportation and preferred routes for those modes.
-  6. Publicize and participate in campaigns to promote options to single-occupancy vehicle travel.
- a. Implement an area-wide, internet-based rideshare program to encourage use of carpools and vanpools.
 - b. Establish a storefront "transportation options center" in downtown Portland to help residents and visitors learn and use a variety of travel alternatives.
 - c. Support bicycling and walking tours and transportation fairs.

Potential Annual Emissions Reduction (metric tons)

 = less than 10,000

 = 10,000 - 100,000

 = more than 100,000

7. Provide secure, covered bicycle parking at schools, in commercial districts, and at other destinations.

2010

8. Provide transit passes for all Portland residents funded through a household levy or business tax.
9. Continue the City and County's signal optimization plans until all major streets and roads are optimized for vehicles, bicycles, and pedestrians.
10. Continue to improve Portland's pedestrian and bicycle infrastructure, and meet the needs of pedestrians and both children and adult cyclists.
11. Promote telework, compressed workweeks, and other flexible-schedule work options.
a. Encourage the establishment and use of home and satellite offices.
b. Establish a quick-response system to encourage telework during winter storms, summer ozone alerts, and major road construction projects.
c. Support the availability and use of tele- and video-conferencing facilities.
12. Promote vehicle sharing to individuals and businesses.
13. Enhance transportation management associations (TMAs) and encourage the development of TMAs in all regional centers to make more efficient use of existing transportation resources.
14. Establish neighborhood-level ride-share cooperatives to encourage neighbors to carpool and reduce both work and non-work trips.
15. Continue and expand education efforts in schools to promote safe transportation alternatives to single-occupancy vehicles and smart use of cars (e.g. trip chaining, ride sharing, and car sharing).

Objective 2 Make the private cost of driving reflect the full costs to society.

Community Initiatives

2003

1. Work with businesses to encourage all employers who offer subsidized parking to employees also to offer a parking "cash out"—an equivalent payment to employees who do not require vehicle parking.

2010

2. Extend parking pricing to all appropriate commercial areas to reduce single-occupancy vehicle use.
3. Support the use of auto insurance premiums based on the number of miles a car is driven.

Potential Annual Emissions Reduction (metric tons)

 = less than 10,000

  = 10,000 - 100,000

   = more than 100,000

- 🌐🌐 4. Support the use of congestion pricing on appropriate regional roadways.
- 🌐 5. Work with financial institutions to promote location-efficient mortgages.
- 🌐 6. Encourage the state to add a fee to vehicle-inspection charges to fund transportation-options education.
- 🌐 7. Investigate a City-wide parking permit and/or state-wide registration fee based on a vehicle's greenhouse gas emissions. Revenue will be used to reduce use of single-occupancy vehicles.

Objective 3 Increase the use of highly fuel-efficient and alternative-fuel engines in on-road and off-road vehicles as well as in stationary applications.

Government Actions

- 2003 🌐 1. Purchase a minimum of 25 City and five County hybrid gasoline-electric vehicles with fuel efficiency of at least 45 mpg.
- 🌐 2. Educate all employees on fuel-efficient driving practices, such as avoiding unnecessary idling.
- 🌐 3. Implement EPA's "Best Environmental Practices for Fleet Maintenance" in the County's Fleet Services Shop.
- 2010 🌐 4. Increase the average fuel efficiency of passenger vehicles in the City and County motor pools to 35 mpg.

Community Initiatives

- 2003 🌐🌐🌐 1. Strongly advocate raising the federal Corporate Average Fuel Economy standards for new automobiles to 45 mpg and for light duty trucks to 35 mpg.
- 2010 🌐🌐🌐 2. Work with the state to provide loans and other financial incentives to promote the purchase of 50,000 vehicles with fuel efficiency of at least 45 mpg by business, government, and individuals.
- 🌐 3. Encourage the use of low- or no-CO₂ technologies in non-road vehicles and equipment, such as electric forklifts and medium-duty construction equipment.
- 🌐 4. Work with vehicle maintenance providers to educate consumers about the potential savings and impact on fuel consumption of maintaining vehicles properly and practicing fuel-efficient driving techniques.

Potential Annual Emissions Reduction (metric tons)

🌐 = less than 10,000

🌐🌐 = 10,000 - 100,000

🌐🌐🌐 = more than 100,000

- 🌐 5. Support programs to retire and recycle fuel-inefficient vehicles.
- 🌐 6. Promote efficient transportation options such as high-speed rail for commuting between Northwest urban centers.

Objective 4 Change the pattern of urban development to be more compact, more bicycle and pedestrian friendly, to provide for mixed uses, and to offer a range of mobility choices.

Community Initiatives

- 2003 🌐🌐 1. Promote growth through redevelopment and infill that maintains or improves the quality of life for existing neighborhoods.
- a. Promote proximate commuting (i.e., living near a workplace).
 - b. Support continued use of transportation demand management strategies.
- 🌐🌐🌐 2. Continue to implement the City's Transportation System Plan, which includes policies to reduce vehicle miles traveled, increase non-motorized vehicle trips, and support the connection between land use and transportation.
- 🌐🌐🌐 3. Partner with surrounding communities and Metro to implement the Regional Transportation Plan and the 2040 Growth Concept it complements, including light rail lines, rapid bus, frequent bus service, high-occupancy vehicle lanes, and the addition of new and improvement of existing intermodal connections.
- 🌐 4. Implement new parking ratios in City Title 33 and support programs that allow for innovative new development to occur with a minimum number of parking spaces.
-

Potential Annual Emissions Reduction (metric tons)

🌐 = less than 10,000

🌐🌐 = 10,000 - 100,000

🌐🌐🌐 = more than 100,000

D. RENEWABLE ENERGY RESOURCES

Reduction Goal: 0.54 million metric tons of CO₂

The City and County shall support environmentally acceptable, sustainable energy sources such as solar, wind, geothermal, biomass, and small hydroelectric power plants and meet all growth in electricity demand since 1990 with new, zero-carbon dioxide sources of electricity.

Renewable energy resources offer a way to generate electricity with few or no greenhouse gas emissions. The cost of developing renewable resources such as wind, geothermal, solar heating, and photovoltaics continues to decrease. The State of Oregon offers tax credits and loans for development of renewable resources, and the 1992 National Energy Policy Act authorized federal tax credits for the production of solar, geothermal, and wind power.

PacifiCorp and Portland General Electric recently began offering customers the option of purchasing electricity from renewable sources, and in the near future customers will be able to choose from a variety of alternative sources of electricity. The City and County anticipate that future development of new renewable energy resources by PacifiCorp, PGE, other regional utilities, and private power producers will depend substantially on the customer-driven markets for these products.

2000 Renewable Energy Resources Progress Report

Development of new renewable energy resources in the 1990s was very slow and fell far short of the pace needed to meet the goal established in the City's 1993 Carbon Dioxide Reduction Strategy. At that time, a target was established of 400 average megawatts of new renewable resources by 2010. To date, PacifiCorp and Portland General Electric have developed two major new wind projects, the Wyoming Wind Energy Project and the Vansycle Ridge Wind Farm. Together, these projects have a capacity of about 65 megawatts, of which Portland's share is about 10 megawatts. In early 2001 PacifiCorp announced plans for the 300-megawatt Stateline wind project, which will include about 200 megawatts in eastern Washington and 100 megawatts in eastern Oregon. The first units are expected to begin producing electricity by the end of 2001.

In 2000, both PGE and PacifiCorp introduced programs allowing all customers to sign up for green power. More than 3,000 customers have signed up for PGE's wind and salmon-friendly power programs, and over 1,000 Oregon customers have signed up for PacifiCorp's wind power program. The City of Portland and Multnomah County committed to purchase a total of one million kilowatt hours per year of renewable power for City and County facilities.

Greenhouse gas emissions reductions from new renewable resources are based on the emissions from a natural-gas fired, combined-cycle combustion turbine. Currently, combustion turbines are the conventional source of new electricity generation in the region.

Objective **Acquire 170 average megawatts of new renewable energy resources by 2010.**

Government Actions

- 2003  1. Purchase 10 percent of City government electricity load from new renewable resources by 2003.
-
- 2010   2. Purchase 100 percent of City government electricity load from new renewable resources.
-  3. Fully develop the generation potential of anaerobic digester gas produced at the City's wastewater treatment plant.
-  4. Install solar, geothermal, and other renewable energy applications at appropriate City and County facilities.
-    5. Explore cost-effective opportunities to invest directly in new larger-scale renewable projects like wind, photovoltaic, geothermal, and landfill gas systems.

Community Initiatives

- 2003    1. Encourage residents and businesses to purchase at least 10 percent of their electricity from new renewable sources by promoting green power as a community ethic.
-    2. Support the use of the electricity system benefits funding allocated to renewables to leverage the development of new renewable resources.
-
- 2010   3. Include renewable resource incentives or requirements in utility franchise agreements.
-   4. Promote a green-power purchase by aggregating public-sector entities.
-  5. Support the deployment of small-scale renewable energy systems in mobile applications.
-  6. Provide technical assistance to builders and developers to include solar water heaters and photovoltaics in rooftop and building-integrated systems.
-  7. Support code revisions that facilitate low-cost interconnection of photovoltaic and other renewable electricity systems.
-    8. Support legislation requiring 20 percent of all power sold to rate-regulated customers be from new renewable resources.

Potential Annual Emissions Reduction (metric tons)

 = less than 10,000

  = 10,000 - 100,000

   = more than 100,000

E. WASTE REDUCTION AND RECYCLING

Reduction Goal: 0.23 million metric tons of CO₂

The City and County shall promote solid waste management practices that reduce greenhouse gas emissions and promote community understanding of the relationship between solid waste reduction and global climate change.

Principles for Reducing Emissions from Solid Waste

1. Reduce the generation of solid waste, including source prevention and reduction in packaging and other excess materials.
2. Recover materials from the waste stream for direct reuse and remanufacture into new products.
3. Reuse products whenever possible.
4. Recycle materials whenever possible.
5. Purchase recycled-content products.

Reducing waste, reusing products and materials, and recycling reduce greenhouse gas emissions in three important ways. First, preventing waste at the source and reducing extraneous materials like packaging reduces the need for raw materials and energy throughout the lifecycle of manufacturing, transportation, reuse, and eventual disposal. Second, using recycled materials in manufacturing processes typically requires substantially less energy

than using virgin materials. Third, decreasing the amount of waste sent to landfills reduces emissions of methane, a landfill gas and potent greenhouse gas.

Greenhouse gas emissions reductions from solid waste management and recycling were calculated using a model developed by the U.S. Environmental Protection Agency. This model includes emissions from all phases of the

materials/waste cycle and therefore introduces the possibility of double counting some reductions. The energy that might be saved when a local manufacturer begins using a certain recovered material, for example, would be accounted for both by the E.P.A. model and in the decreased energy use at the facility. This scenario is unlikely to be a major source of error, however, and the advantage of using a national standard model makes it preferable to any alternative.

2000 Waste Reduction and Recycling Progress Report

The continued success of Portland-area recycling programs has led to an increase in the overall recovery rate in Portland from 47 percent in 1996 to 53.6 percent in 2000. This increase can be attributed to the comprehensive residential curbside collection of recyclable material and yard debris and to the commercial recycling requirements the City adopted in 1996.

In February 2001, *Waste News* reported that Portland's recycling rate was the highest of any of the 30 largest U.S. cities.

Despite the positive trends in the recovery rate, the quantity of waste landfilled continues to increase. Between 1999 and 2000, for example, the amount of solid waste generated in the Portland metropolitan area increased 48,000 tons.

Objective **Achieve an overall solid waste recycling rate of 60 percent by 2005 and establish a new target for 2010.**

Government Actions

- | | |
|------|--|
| 2003 | <ul style="list-style-type: none">  1. Track waste disposal and recycling practices and quantities at all City and County facilities.  2. Establish City and County policies to use recycled antifreeze, recycled latex paint, and paper with at least 30 percent post-consumer recycled-content paper. Investigate establishing standards for the purchase of additional recycled-content products.  3. Evaluate purchasing printers and copiers with duplexing capacity and making duplexing the default setting.  4. Seek approval to hire a County pollution-prevention specialist to reduce environmental and human health risks from air-, water-, and land-based pollutants. |
| 2010 | <ul style="list-style-type: none">  5. Continue to improve internal City and County waste prevention practices.  6. Achieve a solid waste recovery rate of 60 percent at City and County facilities.  7. Hire a City resource-conservation manager to reduce solid waste and the use of energy, water, and other resources at City facilities.  8. Hold City and County agency managers directly responsible for resource-conservation practices in their agencies.  9. Conduct employee awareness campaigns at the City, County, and other partner businesses and organizations.  10. Require City and County contractors and vendors to document the use of recovered materials in their products and follow environmentally responsible solid waste management.  11. Expand City and County recycling of asphalt and other street material. |

Community Initiatives

- | | |
|------|---|
| 2003 | <ul style="list-style-type: none">   1. Improve and expand curbside recycling and other residential recycling services.   2. Assist 150 local businesses in developing and implementing improved waste management practices, and continue to expand commercial recycling programs and services. |
|------|---|

Potential Annual Emissions Reduction (metric tons)

 = less than 10,000

  = 10,000 - 100,000

   = more than 100,000

- 3.  Promote the continued development of the local building deconstruction and material salvage industries.
 - 4.  Encourage contractors to recycle street and other infrastructure materials.
 - 5.  Implement a commercial food-waste collection program.
 - 6.  Work with the Oregon Department of Environmental Quality and other jurisdictions to develop mechanisms to ensure extended product responsibility.
-

2010

- 7.  Explore residential food waste-collection options.
 - 8.  Investigate opportunities for waste-recovery technologies.
 - 9.  Promote the reuse and recovery of electronic devices.
-

F. FORESTRY AND CARBON OFFSETS

Reduction Goal: 0.31 million metric tons of CO₂

Trees can be an effective tool for sequestering carbon dioxide, a major greenhouse gas, and also have important benefits for stormwater management, urban temperature control, and water quality.

Principles for Enhancing CO₂ Sequestration and Mitigation

1. Achieve a net gain in the size, health, and diversity of local forests, encouraging native species wherever practical.
2. Plant the right tree in the right place to achieve the greatest functional benefit and longevity.
3. Ensure community understanding of and appreciation for forest both as a vital part of Portland's character and as a greenhouse gas-reduction strategy.
4. Pursue carbon-offset strategies to complement but not substitute for local emissions-reduction strategies.

Trees and vegetation remove carbon dioxide from the atmosphere through photosynthesis. They store carbon as woody vegetation and foliage and release carbon only when burned or oxidized. Middle-aged trees tend to grow quickly and assimilate carbon at a relatively high rate, while older trees grow more slowly but contain a much larger amount of stored carbon.

Oregon has considerable potential for tree planting. In its 1995 statewide global warming strategy, the Oregon Office of Energy estimated that about 700,000 acres of Oregon timberland could be replanted. This plan assumes that 50,000 acres will be replanted by locally owned businesses, governments, and other organizations.

2000 Forestry and Carbon Offsets Progress Report

Portland made tremendous progress in tree planting during the 1990s. As part of its efforts to protect water quality, between 1996 and 2000 the City Bureau of Environmental Services planted over 600,000 trees and 200,000 shrubs. In addition, the Seed the Future Campaign run by the nonprofit organization Friends of Trees planted over 144,000 trees, shrubs, and seedlings over the same period.

In 1996, City Council adopted an ordinance regulating the cutting of trees on private property. In 1999 the City revised the zoning code to require most new residential construction projects either to preserve existing trees, plant new trees, or pay into a Tree Fund to provide resources for additional planting.

Another approach to reducing net emissions of greenhouse gases is to achieve emissions reductions in other localities. These reductions, called offsets, can take the form of energy-conservation programs, transportation efficiency initiatives, tree planting, forest preservation efforts, or any other activity that reduces net greenhouse gas emissions. By implementing actions that would not take place otherwise, the sponsor can claim credit for reducing greenhouse gas emissions.

Objective 1 Support state-wide efforts to reforest un- and understocked timberland and reduce the use of non-sustainably harvested timber.

Government Actions

- 2010 🌐 1. Adopt policies to restrict the purchase and use of non-sustainably harvested timber by City and County agencies.

Community Initiatives

- 2010 🌐🌐🌐 1. Support private, non-profit, and government efforts to reforest 50,000 acres of Oregon timberland.

Objective 2 Promote local tree planting and preserve and improve maintenance of existing trees.

Government Actions

- 2010 🌐🌐 1. Plant 3,000 acres of trees.
- 🌐 2. Update the City Urban Forestry Department’s inventory of the urban canopy to determine its current health and identify needs and priorities for future urban forest management.
- 🌐 3. Seek funding for urban forestry as a core component of the City’s climate, air, and water infrastructure.
- 🌐 4. Document and, where possible, quantify the multiple benefits associated with Portland’s urban canopy. Use this analysis to inform policy decisions and include this information in adult and child education programs.
- 🌐 5. Identify and promote the planting of tree species to accrue optimum benefits in the areas of carbon offsets, energy conservation, air quality, stormwater management, and habitat.
- 🌐 6. Explore tax deferral for County forestlands certified by the Forest Stewardship Council.
- 🌐 7. Implement best management practices for City and County urban landscaped areas and, where appropriate, seek certification.

Potential Annual Emissions Reduction (metric tons)

🌐 = less than 10,000

🌐🌐 = 10,000 - 100,000

🌐🌐🌐 = more than 100,000

Community Initiatives

- 2010  1. Improve development practices to limit destruction of trees and encourage planting of suitable trees.
-  2. Expand the urban forest and improve forest performance by maintaining trees carefully, eradicating invasive vegetation, and promoting trees that will perform well for a long period of time.
-  3. Forge partnerships with community cooperatives to organize tree-planting and maintenance events.
-  4. Improve community understanding of the role and value of the urban forest.
-  5. Secure increased funding for green infrastructure through partnerships and from businesses, residents, and organizations that benefit, either directly or indirectly, from tree planting.
-  6. Seek resolution to conflicting City, County, and State goals that impact urban forestry.
-

Objective 3 **Actively partner with other communities and organizations to secure greenhouse gas emission offsets.**

Government Actions

- 2010    1. Explore investing in carbon offsets and retire the credits to help meet the City and County's overall greenhouse gas-reduction goal.
-

Community Initiatives

- 2010    1. Encourage residents, businesses, governments, schools, and institutions to invest in greenhouse gas-reducing projects to offset their personal or corporate greenhouse gas emissions.
-

Appendix A: Local Government Actions

This appendix extracts all “Government Actions” from the City of Portland and Multnomah County’s Local Action Plan on Global Warming. These activities are largely or entirely under the control of the City and/or County, and together they comprise the City and County’s greenhouse gas emissions-reduction programs as corporate entities.

A. POLICY, RESEARCH, AND EDUCATION

Objective	Ensure that policy decisions at all levels—government, business, and individual—seek to reduce global warming impacts.
2003	1. Compile and update an inventory of greenhouse gas emissions from City and County operations and track related solid waste, energy, economic, and environmental data. 2. Educate employees and bureau managers about sustainability with a focus on specific operational changes that can be made to reduce greenhouse gas emissions. Require employee education on fuel efficient driving and reducing energy use at work.
2010	3. Review major policies and programs in the early stages of development to identify ways to reduce related greenhouse gas emissions. 4. Integrate the goal and actions set out in this plan into future City and County policies.

How to Use This Plan

Each of the six elements of this plan includes one or more objectives. Within each objective, activities are identified as either “Government Actions” or “Community Initiatives.” “Government Actions” address internal local government operations, while “Community Initiatives” are actions or policies that impact emissions arising from Portland residents, businesses, and institutions. While some of these activities include important roles for government, most actions require that the City and County be strategic partners, catalysts, or advocates, and the success of these initiatives depends on the involvement of a broad array of community partners.

The estimated potential emissions reduction from each action is indicated by the icon . Because estimating possible reductions involves many assumptions, the estimates here are intended to give a sense of the magnitude of the impact, rather than specific expectations. For this reason,  represents less than 10,000 metric tons of emissions reductions per year;  indicates between 10,000 and 100,000 metric tons per year; and  more than 100,000 metric tons per year. In the Policy, Research, and Education section, estimates are not included, since the expected reductions are indirect and therefore both difficult to measure and captured by other action items.

Finally, activities are categorized as targeted for completion either by 2003 or by 2010. Every two years the City and County will evaluate progress to date and identify a further set of actions to pursue in the following two years.

B. ENERGY EFFICIENCY IN BUILDINGS

Objective 1 Reduce greenhouse gas emissions from City of Portland and Multnomah County facilities to 10 percent below 1990 levels by 2010 through energy-efficiency measures.

- 2003
-  1. Invest in all energy-efficiency measures with simple paybacks of 10 years or less.
 -  2. Develop and adopt energy- and resource-efficient building standards for all City and County new construction and major renovation projects.
 -  3. Establish City and County policies to purchase ENERGY STAR® or equivalent products, when available, for any equipment that uses electricity, natural gas, or fuel oil.
 -  4. Require all City and County construction projects to exceed energy code by 20 percent on new construction and 10 percent on retrofits.
- 2010
-  5. Convert traffic signals to LED technologies.
 -  6. Improve energy efficiency in City and County facilities by 10 percent.
 -  7. Invest in building commissioning for new City and County facilities and retrocommissioning for facilities larger than 25,000 square feet.
 -  8. Convert street lights and traffic signals to more efficient technologies as they become available.

C. TRANSPORTATION, TELECOMMUNICATIONS, AND ACCESS

Objective 1 Improve the quality, convenience, affordability, and awareness of walking, bicycling, teleworking, public transit, ridesharing, and vehicle sharing.

- 2003
-  1. Require City and County agencies to offer bus tickets to visitors who arrive by transit in any situation where the agency validates parking.
 -  2. Implement City and County policies to encourage transit whenever appropriate and to provide employees with transit tickets for travel on business.

Potential Annual Emissions Reduction (metric tons)

 = less than 10,000

 = 10,000 - 100,000

 = more than 100,000

3. Expand City and County transit-pass subsidy programs.

2010

4. Reduce per employee vehicle miles traveled in City and County administrative vehicles by 20 percent by 2010 by promoting teleconferencing and the availability of pedestrian, bicycle, transit, and rideshare options for employees on business.

5. Promote City and County telework and flexible hours policies and provide education to agency managers to encourage consistent application of the policies. Enable 25 percent of City and County employees to telework or work compressed schedules to avoid commuting at least one day every two weeks.

6. Expand the participation of City and County agencies in vehicle-sharing programs.

Objective 3 Increase the use of highly fuel-efficient and alternative fuel engines in on-road and off-road vehicles as well as in stationary applications.

2003

1. Purchase a minimum of 25 City and five County hybrid gasoline-electric vehicles with fuel efficiency of at least 45 mpg.

2. Educate all employees on fuel-efficient driving practices, such as avoiding unnecessary idling.

3. Implement EPA's "Best Environmental Practices for Fleet Maintenance" in the County's Fleet Services Shop.

2010

4. Increase the average fuel efficiency of passenger vehicles in the City and County motor pools to 35 mpg.

D. RENEWABLE ENERGY RESOURCES

Objective Acquire 170 average megawatts of new renewable energy resources by 2010.

2003

1. Purchase 10 percent of City government electricity load from new renewable resources by 2003.

2010

2. Purchase 100 percent of City government electricity load from new renewable resources.

3. Fully develop the generation potential of anaerobic digester gas produced at the City's wastewater treatment plant.

Potential Annual Emissions Reduction (metric tons)

☉ = less than 10,000

☉☉ = 10,000 - 100,000

☉☉☉ = more than 100,000

-  4. Install solar, geothermal, and other renewable energy applications at appropriate City and County facilities.
-  5. Explore cost-effective opportunities to invest directly in new larger-scale renewable projects like wind, photovoltaic, geothermal, and landfill gas systems.

E. WASTE REDUCTION AND RECYCLING

Objective **Achieve an overall solid waste recycling rate of 60 percent by 2005 and establish a new target for 2010.**

- | | |
|------|--|
| 2003 | <ul style="list-style-type: none">  1. Track waste disposal and recycling practices and quantities at all City and County facilities.  2. Establish City and County policies to use recycled antifreeze, recycled latex paint, and paper with at least 30 percent post-consumer recycled-content paper. Investigate establishing standards for the purchase of additional recycled-content products.  3. Evaluate purchasing printers and copiers with duplexing capacity and making duplexing the default setting.  4. Seek approval to hire a County pollution-prevention specialist to reduce environmental and human health risks from air-, water-, and land-based pollutants. |
| 2010 | <ul style="list-style-type: none">  5. Continue to improve internal City and County waste prevention practices.  6. Achieve a solid waste recovery rate of 60 percent at City and County facilities.  7. Hire a City resource-conservation manager to reduce solid waste and the use of energy, water, and other resources at City facilities.  8. Hold City and County agency managers directly responsible for resource-conservation practices in their agencies.  9. Conduct employee awareness campaigns at the City, County, and other partner businesses and organizations.  10. Require City and County contractors and vendors to document the use of recovered materials in their products and follow environmentally responsible solid waste management.  11. Expand City and County recycling of asphalt and other street material. |

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 = 10,000 - 100,000

 = more than 100,000

F. FORESTRY AND CARBON OFFSETS

Objective 1 Support state-wide efforts to reforest un- and understocked timberland and reduce the use of non-sustainably harvested timber.

- 2010  1. Adopt policies to restrict the purchase and use of non-sustainably harvested timber by City and County agencies.

Objective 2 Promote local tree planting and preserve and improve maintenance of existing trees.

- 2010   1. Plant 3,000 acres of trees.
-  2. Update the City Urban Forestry Department's inventory of the urban canopy to determine its current health and identify needs and priorities for future urban forest management.
-  3. Seek funding for urban forestry as a core component of the City's climate, air, and water management infrastructure.
-  4. Document and, where possible, quantify the multiple benefits associated with Portland's urban canopy. Use this analysis to inform policy decisions and include this information in adult and child education programs.
-  5. Identify and promote the planting of tree species to accrue optimum benefits in the areas of carbon offsets, energy conservation, air quality, stormwater management, and habitat.
-  6. Explore tax deferral for County forestlands certified by the Forest Stewardship Council.
-  7. Implement best management practices for City and County urban landscaped areas and, where appropriate, seek certification.

Objective 3 Actively partner with other communities and organizations to secure greenhouse gas emission offsets.

- 2010    1. Explore investing in carbon offsets and retire the credits to help meet the City and County's overall greenhouse gas reduction goal.

Potential Annual Emissions Reduction (metric tons)

 = less than 10,000

  = 10,000 - 100,000

   = more than 100,000

