City of Everett

Climate Action Plan for Municipal Operations

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Prepared by

ICLEI Local Governments for Sustainability USA

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This report was compiled by Justus Stewart – Regional Associate, with assistance from Michael Steinhoff – Program Officer, Jennifer Ewing-Thiel – Tools & Technical Innovation Director, Kara Reeve – Technical Innovation Manager, and Jaylyn White – PNW Regional Director, ICLEI - Local Governments for Sustainability.

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Executive Office
Sharon Fuller

Finance Department
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John Petersen
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John Gage

Police Department
John DeRousse

Transportation Services Department
Bill DeRousse
George Baxter
Steffani Lillie
Matthew Coomes
Bob Carlson
Tom Hingson

Public Works Department
John McClellan
Jack Harris
Mark Sadler
Chris Chesson
Souheil Nasr
Dave Davis

Facilities Department
Carlton Gipson
Scott Pattison

Information Technologies Department
Joe Boland

Snohomish County Public Utility District:
Suzanne Oversvee
John Petosa, Jr
Tom Hovde

Table of Contents

1. Executive Summary 4
2. Introduction and Background 14
3. Municipal Greenhouse Gas Emissions Inventory and Forecast 22
4. Climate Action Plan for Municipal Operations 30
5. Next Steps 51
6. Conclusion 53
Appendix A: List of Acronyms 55
Appendix B: Definitions 56

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1. Executive Summary

Global climate change presents a clear and compelling threat to our environment, our economy, and our future. Governments both large and small, all around the world, are responding to this threat by taking action to reduce their greenhouse gas (GHG) emissions, planning for anticipated impacts, and increasing the resiliency of their communities. While any one person or community represents only a small fragment of the global problem, many cities in the United States are showing leadership by transitioning to a low-carbon future that includes GHG reductions from both internal operations and the community-at-large. The City of Everett is a proven leader; the City took the initiative to develop this plan, which measures the GHG emissions generated from its municipal operations and also identifies actions the City can take to reduce its carbon footprint.

However, even before this plan, the City was taking action on reducing GHG emissions and implementing environmental best practices in most aspects of their operations. In fact, most every department has been working for the last decade – and in some cases much longer – to replace products with greener options, to reduce water and energy use, and to provide their services more efficiently. These efforts have not only saved water, electricity, and fuel, but have also saved City and taxpayer dollars. Our analysis of a limited number of the City's current environmental actions showed an annual savings of over $330,000– which is very likely a conservative estimate since all measures were not analyzed.

Other signs of leadership from the City of Everett include the signing of the Mayor's Climate Protection Agreement in 2007, committing the City to reduce its GHG emissions by 7 percent by 2012, from the baseline year 1990. Also in that year, the City joined ICLEI-Local Governments for Sustainability (ICLEI), and began its GHG emissions inventory for municipal operations, using ICLEI's Clean Air and Climate Protection (CACP) software.

GHG Emissions Inventory Results

In 2010, the City retained ICLEI to update that GHG inventory with a newer version of the software and create a Climate Action Plan for municipal operations. A new GHG inventory was created using 2001 as the baseline year, and 2006 as an interim year, for reference. The GHG inventory was conducted using ICLEI's CACP software, version 3.0. The resulting updated inventory shows that the City of Everett's municipal operations emissions in 2001 were 26,503 metric tons[1] carbon dioxide equivalent ($MTCO_2e$).[2] GHG emissions in 2006

[1] Greenhouse gas emissions are typically expressed in metric tons, rather than the US standard 'short tons.' ICLEI uses metric tons in this report to maintain uniformity in global GHG emissions reporting.

[2] Greenhouse gas emissions are typically expressed using Carbon Dioxide Equivalent, where other greenhouse gases such as methane and nitrous oxide are converted into carbon dioxide using a factor known as their Global Warming Potential (GWP). The aggregate number is expressed as CO_2e.

had risen just 2.5 percent, to 27,130 $MTCO_2e$.[3] The largest contributors to these emissions were electricity used in buildings and to move and deliver drinking water, and the gasoline and diesel fuel used for the municipal vehicle fleet, which includes Everett Transit buses.

It is important to note that the emissions total for 2006 does not include GHG emissions from the wastewater treatment plant; when these emissions are included, the 2006 total increases to 29,145 $MTCO_2e$ – a ten percent increase over 2001 emissions. However, it is incorrect to make such a comparison, since wastewater emissions were not included in the 2001 baseline due to lack of data. Therefore, anywhere comparisons between 2001 and 2006 are made, the wastewater emissions are deducted so that the comparison between years is being made between like sectors. Since all emissions reductions estimates from future measures are made from the 2001 baseline, this discrepancy for 2006 does not in any way affect the implementation of measures included in this plan.

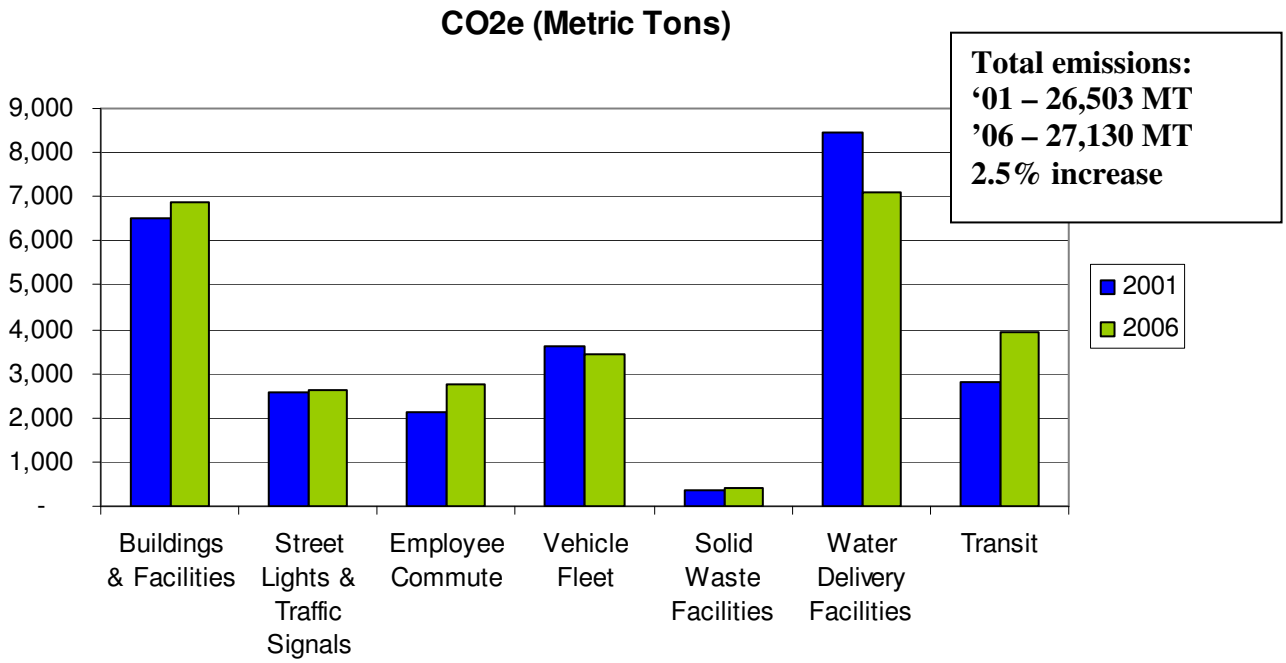
A summary of the City of Everett's GHG emissions is provided in the following tables and charts.

Table ES1. City of Everett GHG Emissions by Sector – $MTCO_2e$

Sector	2001	% Total	2006	% Total	% change 2001-2006
Buildings & Facilities	6,523	24.6%	6,878	25.4%	+5.0%
Street Lights & Traffic Signals	2,562	9.7%	2,630	9.7%	+3.0%
Employee Commute	2,138	8.1%	2,776	10.2%	+30.0%
Vehicle Fleet	3,605	13.6%	3,424	12.6%	-5.0%
Solid Waste Facilities	377	1.4%	410	1.5%	+9.0%
Water Delivery Facilities	8,473	32.0%	7,092	26.1%	-16.0%
Transit	2,825	10.7%	3,919	14.4%	+39.0%
Totals	**26,503**		**27,130**[4]		**+2.5%**

[3] It should be noted that since ICLEI's CACP software uses regional, rather than local, emissions factors to calculate emissions from electricity, the estimated GHG emissions from electricity are likely overestimates. Therefore the City's GHG emissions are likely lower than reported here.
[4] Chart totals may differ slightly from the sum of their respective columns due to rounding of fractions.

Chart ES1. City of Everett GHG Emissions by Sector: 2001 and 2006 Comparison



While the net increase between 2001 and 2006 was only 2.5 percent, emissions from some sectors *increased* more than that, while emissions from some sectors actually *decreased*.

The largest proportional increases in emissions were from Employee Commute, which rose by 30 percent, and from Transit, which also rose by just under 40 percent.[5] Employee commute increased due to two factors: an increase in the number of full-time employees, and an increase in the average commute distance. Transit emissions increased from service expansion of the Transit system. Water Delivery Facilities showed the greatest decrease over this period, at 16 percent, likely due to water efficiency and conservation practices implemented as part of the City's 2001 Comprehensive Water Plan.

Emissions Reduction Opportunities

Everett has started to implement many programs and policies to reduce GHG emissions and is actively looking for additional actions it can take. In Section III of this document these actions are grouped into three categories of activities, called "measures."

[5] See Section III. A. for a discussion on the implications of increased emissions from public-facing municipal operations, such as Everett Transit.

- Group I represents existing measures – policies and programs that the City has already begun implementing.[6] These existing measures were reviewed and analyzed for their GHG emissions reduction potential, cost savings, and other benefits. These measures are not intended to be a comprehensive overview of every action that the city is taking, but rather are an analysis of the actions with the clearest and highest emissions reduction potential.
- Group II represents measures that build and expand on the work to reduce GHG emissions that the City has already begun. These are measures for which a foundation is already in place, but greater emissions reductions can occur. For forecasting purposes, annual reductions from these measures are assumed to begin in 2010.
- Group III represents entirely new measures, some of which may be implemented in the near term, and some of which represent longer-term investments. For forecasting purposes, annual reductions from these measures are assumed to begin in 2010.

Climate Action Plan Development Process

The City of Everett Climate Action Plan for Municipal Operations (CAP) was developed over a period of 12 months, with regular input from City staff. The CAP was divided into five main tasks: an update of the existing GHG emissions inventory; development of a framework for choosing an emissions reduction target; quantitative analysis of the City's existing measures, quantitative analysis on proposed new measures; and delivery of a final Climate Action Plan.

During all five major components of the process, City staff were engaged to provide key information and feedback, including data on existing measures and the impact of those measures on municipal operations, feedback and guidance to refine the proposed new measures and assess their impact on city operations, and feedback on the CAP itself. Regular updates were also provided, and feedback requested, from the Mayor's Office, as well as the City's Chief Financial Officer.

Measures were analyzed from the following City departments or divisions: Facilities, Fire, Motor Vehicles, Parks and Recreation, Police, Public Works, and Transit.

[6] The analysis of Existing Measures includes projects funded through the federal Energy Efficiency and Conservation Block Grant (EECBG) program. Some of these projects are still underway (as of March 2011), and the final results of those projects may differ from this analysis. The modeling on all EECBG projects was conducted using data current as of December 2010.

Table ES2. List of Existing Measures Analyzed

Existing Measures Analyzed
Buildings
(1) High Efficiency Lighting *Emissions Reduction:* 320 metric tons of CO_2e per year
(2) EECBG HVAC Retrofits *Emissions Reduction:* 67 metric tons of CO_2e per year
(3) EECBG Lighting Retrofits *Emissions Reduction:* 199 metric tons of CO_2e per year
Fleet
(4) Commute Trip Reduction Program *Emissions Reduction:* 583 metric tons of CO_2e per year
(5) ULS Diesel/B-5 Biodiesel Blend *Emissions Reduction:* 234 metric tons of CO_2e per year
(6) Hybrid Vehicles Purchases *Emissions Reduction:* 33 metric tons of CO_2e per year
(7) Streamlined Equipment Use *Emissions Reduction:* 30 metric tons of CO_2e per year
(8) Hybrid Transit Buses *Emissions Reduction:* 76 metric tons of CO_2e per year
Public Works
(9) 2000/2006 Comprehensive Water System Plan *Emissions Reduction:* 578 metric tons of CO_2e per year with the savings that resulted from the 2000 Comprehensive Water System Plan. This number increases to 1,014 metric tons of CO2e per year once additional savings expected by 2012 are accounted for.
(10) Recycling and Waste Prevention - City Facilities *Emissions Reduction:* 3 metric tons of CO_2e per year
(11) EECBG Water Filtration Plant Pump Replacement *Emissions Reduction:* 51 metric tons of CO_2e per year
Parks and Recreation
(12) EECBG Park Lighting Projects *Emissions Reduction:* 38 metric tons of CO_2e per year
(13) Boiler Replacement *Emissions Reduction:* 15 metric tons of CO_2e per year
(14) Energy Conservation *Emissions Reduction:* 3 metric tons of CO_2e per year
(15) New Waste Facilities *Emissions Reduction:* 23 metric tons of CO_2e per year
(16) New Boiler

Emissions Reduction: 17 metric tons of CO_2e per year
Fire Dept
(17) Compressed Work Week *Emissions Reduction:* 12 metric tons of CO_2e per year
(18) Work Schedule Adjustments *Emissions Reduction:* 200 metric tons of CO_2e per year
(19) Building Upgrades *Emissions Reduction:* 398 metric tons of CO_2e per year

Table ES3. Net Annual Impact of Existing Measures Analyzed

Impact of Existing Measures Analyzed	
Total Annual GHG Reduction - $MTCO_2e$	2,880
Total 2001 Emissions - All Sectors	26,503
GHG Emissions Reduction as percent of 2001 Total	11%
Forecast Emissions Increase Through 2010	2,497
Forecast Emissions Increase Through 2010 as percent of 2001 Total	9%

Table ES4. List of Expansion Measures Analyzed

Expansion Measures Analyzed
Buildings and Facilities
(1) High Performance HVAC *Emissions Reduction:* 2015: 485 metric tons of CO_2e per year 2020: 971 metric tons of CO_2e per year 2030: 971 metric tons of CO_2e per year
(2) High Efficiency Lighting Expansion *Emissions Reduction:* 2015: 320 metric tons of CO_2e per year 2020: 703 metric tons of CO_2e per year 2030: 1,405 metric tons of CO_2e per year
Fleet
(3) Expand Purchasing of Hybrid Vehicles and Electric *Emissions Reduction:* 2015: 92 metric tons of CO_2e per year 2020: 205 metric tons of CO_2e per year 2030: 382 metric tons of CO_2e per year
(4) Expand Purchasing of Hybrid Buses *Emissions Reduction:* 2015: 138 metric tons of CO_2e per year

	2020: 253 metric tons of CO_2e per year 2030: 1,835 metric tons of CO_2e per year
(5) Employee Commute (Commute Trip Reduction) *Emissions Reduction:*	2015: 138 metric tons of CO_2e per year 2020: 277 metric tons of CO_2e per year 2030: 277 metric tons of CO_2e per year
Public Works	
(6) Water Delivery Efficiency *Emissions Reduction:*	2015: 155 metric tons of CO_2e per year 2020: 466 metric tons of CO_2e per year 2030: 622 metric tons of CO_2e per year
(7) Greenwaste Composting *Emissions Reduction:*	1 metric ton of CO_2e per year 1 metric ton of CO_2e per year 1 metric ton of CO_2e per year
Parks and Recreation	
(8) Swim Center Pool Cover *Emissions Reduction:*	2015: 93 metric tons of CO_2e per year 2020: 93 metric tons of CO_2e per year 2030: 93 metric tons of CO_2e per year

Table ES5. List of New Measures Analyzed

New Measures Analyzed	
Buildings	
(1) Plug Load Reduction Policy *Emissions Reduction:*	2015: 10 metric tons of CO_2e per year 2020: 21 metric tons of CO_2e per year 2030: 21 metric tons of CO_2e per year
(2) Vending Misers *Emissions Reduction:*	2015: 11 metric tons of CO_2e per year 2020: 11 metric tons of CO_2e per year 2030: 11 metric tons of CO_2e per year
(3) IT Consolidation *Emissions Reduction:*	2015: 0 metric tons of CO_2e per year 2020: 132 metric tons of CO_2e per year 2030: 132 metric tons of CO_2e per year
(4) Green Purchasing *Emissions Reduction:*	2015: 35 metric tons of CO_2e per year 2020: 70 metric tons of CO_2e per year 2030: 106 metric tons of CO_2e per year

Fleet
(5) Route Optimization *Emissions Reduction:* 2015: 138 metric tons of CO_2e per year 2020: 138 metric tons of CO_2e per year 2030: 138 metric tons of CO_2e per year
Public Works
(6) Water Pollution Control Facility Anaerobic Digester *Emissions Reduction:* 2015: 0 metric tons of CO_2e per year 2020: 2,720 metric tons of CO_2e per year 2030: 2,977 metric tons of CO_2e per year
Police
(7) Cruiser Idle Reduction *Emissions Reduction:* 2015: 0 metric tons of CO_2e per year 2020: 149 metric tons of CO_2e per year 2030: 149 metric tons of CO_2e per year
(8) Increase Bicycle Police *Emissions Reduction:* 2015: 9 metric tons of CO_2e per year 2020: 9 metric tons of CO_2e per year 2030: 9 metric tons of CO_2e per year
(9) Motorcycle Mounted Police *Emissions Reduction:* 2015: 38 metric tons of CO_2e per year 2020: 57 metric tons of CO_2e per year 2030: 57 metric tons of CO_2e per year

Table ES6. Net Annual Impact of All New Proposed Measures

Impact of New Measures – $MTCO_2e$	2015	2020	2030
Total Annual Reduction from Expansion Measures	1,423	2,968	5,585
Total Annual Reduction from New Measures	241	3,307	3,600
Total Annual Reduction from All New Measures	1,664	6,275	9,185

After analyzing the City's existing measures, it was clear that the greatest amount of GHG emissions reductions came primarily from energy efficiency projects, either in the City's buildings or – in the case of the water delivery system – in other system efficiencies. Other high impact items included measures to increase efficiency in the operations of the City's vehicle fleet, and in the use of biodiesel in place of diesel fuel. However, the single largest reduction in the City's existing measures came from the employee Commute Trip Reduction program; this is perhaps not surprising, since automobile emissions make up a higher proportion of the City's emissions, compared to other regions without the clean electricity sources of the Pacific Northwest.

An analysis of the potential to expand the City's existing measures demonstrated that energy efficiency projects in the City's buildings and water delivery and wastewater

treatment systems continue to show the highest impact on reducing GHG emissions. Expanding on the City's ongoing efforts offers an implementation pathway that leverages existing staff familiarity with the types of processes and technologies under consideration. Expansion also allows the City to utilize funding mechanisms such as revolving loan funds to capture savings from existing work and use it to fund expanded work without additional draw-down from general funds.

Hybrid bus and vehicle technology are not the most impactful near-term strategies, but are key measures in later years, between 2020 and 2030. Another measure with little or no immediate benefit, but huge long-term reduction potential is the installation of an anaerobic digester at the wastewater facility. Modeling shows this to be the greatest single reduction measure by 2030.

Collectively, these measures can reduce the City's annual emissions from municipal operations by as much as 9,185 $MTCO_2e$ by 2030, a 35 percent decrease from the 2001 baseline. In addition to 2030, two interim years were analyzed – 2015 and 2020 – to better track the emissions reduction potential of these measures in both the near and long term. The total reduction potential from all existing and proposed measures can be seen in Table ES7 below:

Table ES7. Net Annual Impact of All Measures

Impact of All Measures – $MTCO_2e$	Through 2010	%	2015	%	2020	%	2030	%
Total Reduction from Existing Measures	2,880	11%	2,880	11%	2,880	11%	2,880	11%
Total Reduction from Expansion Measures	-	-	1,423	5%	2,968	11%	5,586	21%
Total Reduction from New Measures	-	-	241	1%	3,307	12%	3,600	14%
Total Reduction from All New Measures	-	-	1,664	6%	6,275	24%	9,185	35%
Total Reduction from All Measures Analyzed	-	-	4,543[7]	17%	9,155	35%	12,065	46%

Target-Setting

The GHG emissions reductions strategies described above help to frame the GHG emissions reduction target that the City will choose to set for municipal operations emissions reductions. Targets assist in decision making and provide a framework for recognizing accomplishments. As a signatory to the U.S. Mayors' Climate Protection Agreement (MCPA),

[7] Chart totals may differ slightly from the sum of their respective columns due to rounding of fractions.

the City of Everett has resolved to "strive to meet or exceed the Kyoto Targets"[8] by reducing emissions in both municipal operations and the community at-large.

Under a 'Business as Usual' scenario, in which the City implements no new GHG reduction measures, Everett's GHG emissions are projected to rise to 28,960 $MTCO_2e$ by 2030, while the impact from all three sets of measures is projected to reduce emissions by 45 percent, compared to the 2001 baseline. However, a 45 percent reduction would indicate 100 percent implementation of the measures in this Climate Action Plan. Therefore an ambitious GHG reduction target might be around 40 percent by 2030, while a conservative target might be about 25 percent by 2030. A future reduction target should fall somewhere within this range, with a more conservative reduction for earlier target years, such as 2015 or 2020, and a more aggressive target for outer years such as 2030.

This plan provides an assessment of many near-term strategies the City can implement to reduce the GHG emissions from its own operations, while also reducing energy use and saving money. The completion of this plan is an important step in the City's ongoing efforts to improve the environmental quality, economic resiliency, and quality if life for the City's residents – now and into the future.

[8] The Kyoto Protocol establishes a GHG emissions reduction target of 7 percent below 1990 levels by 2012.

2. Introduction and Background

Organization of Climate Action Plan

1 Introduction and Background. This section includes a brief discussion of the context in which activities to reduce GHG emissions take place, including a review of projected climate change impacts to this region, the current legislative context, and the ICLEI Five Milestone process.

2 Municipal Operations Emissions, Forecast and Target Setting. This section includes a summary of current municipal operations emissions, a forecast of future municipal emissions, and a brief discussion of frameworks for setting emissions reduction targets.

3 Climate Action Plan for Municipal Operations. This section includes the full range of existing and proposed climate action measures, divided into three categories which together are designed to frame the City's climate targets for municipal operations. These categories include the following:

- **Group I: Existing Municipal Measures**: This subsection contains explanation and quantification of actions that were implemented prior to 2010, when this planning process was begun. These measures include current implementation of stimulus-funded Energy Efficiency and Conservation Block Grant (EECBG) projects. Measures are categorized by sector.
- **Group II: Building on the City's Existing Actions**: This subsection contains analysis of the potential impact of expanding on actions already being implemented. Many of the measures in this section may be faster or easier to implement, they build on the foundation of existing programs. Measures are categorized by sector.
- **Group III: New Municipal Actions/Activities**: Group III measures describe activities or projects that may require longer time horizons or greater financial or institutional resources to implement. Some are longer-term, and will not significantly impact the City's emissions for ten or even twenty years. However, they all represent actions that can be implemented with existing technology and municipal authority. Measures are categorized by sector.

4 Next Steps. This section provides an overview of how this plan may be implemented, and what steps the City might take after this plan to continue the work of implementing sustainable practice in city operations.

5 Conclusion. This section provides an overview of the plan's content and calculations, and re-states the context in which the City is undertaking this important work.

A. Potential Regional Impacts of Climate Change

The international scientific community has reached consensus that anthropogenic activities, like the burning of fossil fuels, are responsible for an increase in the concentration of greenhouse gas (GHG) emissions in the atmosphere, and consequently humans are in fact contributing to global climate change. Climate change is one of the most pressing environmental problems facing this generation and those to come, and local governments, like Everett, Washington, can lead efforts to reduce the amount of GHG emissions that humans are producing, thereby mitigating the impact that climate change will have on humans and the environment over time.

In the 20th century, the planet has experienced warming temperatures that are unparalleled in the geologic record. The past decade has been the warmest in recorded history, and the global scientific community has overwhelming evidence that human activity is the cause.[9]

The impacts of climate change are already being felt, and are expected to escalate if the levels of heat trapping pollution continue to increase. The University of Washington's Climate Impacts Group has found that climate change has already been observed in the Pacific Northwest, and that these change may significantly impact the region's natural and built systems.[10]

The Climate Impacts Group notes that while it is premature to assume that anthropogenic (i.e., human caused) activities are *exclusively* driving these local trends, these patterns cannot be fully explained by climate variability alone. Additionally, the observed climate trends are consistent with observed global changes and projected global and regional climate change impacts.[11]

According to the peer-reviewed studies of the Climate Impacts Group, some of the observed changes in the 20th century include:[12]

- **Temperature increases.** Average annual temperature increased 1.5°F (0.7-0.8°C) in the Pacific Northwest between 1920 and 2003. The warming has been fairly uniform and widespread, with little difference between warming rates at urban and rural weather monitoring stations. Only a handful of locations recorded cooling. Although 1934 was the warmest single year, the warmest decade was the 1990s (Mote 2003).

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[9] United Nations Intergovernmental Panel on Climate Change (IPCC). *Climate Change 2007: The Physical Science Basis. Summary for Policy Makers* http://www.ipcc.ch/SPM2feb07.pdf.

[10] Casola, Kay, Snover et. al.*Climate Impacts on Washington's Hydropower, Water Supply, Forests, Fish, and Agriculture*. Climate Impacts Group, University of Washington. 2005. http://www.cses.washington.edu/db/pdf/kc05whitepaper459.pdf

[11] All subsequent references in this section are from: Climate Impacts Group. Impacts of Climate on PNW Climate. http:// http://www.cses.washington.edu/cig/pnwc/ci.shtml#anchor3

[12] Ibid

- **Rapid winter and daily minimum (nighttime) temperature increases.** Temperature increases from 1916-2003 were largest for January-March. The minimum daily temperature rose faster than the maximum daily temperature through the mid-20th century. In the second half of the 20th century, minimum and maximum temperature rose at about the same rate (Mote 2003, Hamlet and Lettenmaier 2007).

- **Decadal variability dominating annual precipitation trends.** Annual precipitation increased 14percent for the period 1930-1995 for the Pacific Northwest region. Decadal variability is therefore the most important feature of precipitation during the 20th century.

- **Cool season precipitation variability increases.** Cool season precipitation in the Pacific Northwest is more variable from year to year, displays greater persistence, and is more strongly correlated with other regions in the West since about 1973 (Hamlet and Lettenmaier 2007).

- **April 1 snow water equivalent (SWE) declined at nearly all sites in the Pacific Northwest between 1950 and 2000.** The declines of snowpack can be explained by observed increases in temperature and declines in precipitation over the same period (Mote et al. 2003, Hamlet et al. 2005, Mote 2006). Low elevation declines at individual stations in the Washington and Oregon Cascades are frequently 40 percent or more (Mote et al. 2003, Mote et al. 2005). The decline in April 1 SWE for the Washington Cascades is roughly –15 percent to –35 percent (mostly around –25 percent) for a variety of points between 1916 and 1970 and ending in 2006 (Mote et al. 2008).

- **Shifts in timing of peak runoff.** Timing of the peak mass in annual river runoff in snowmelt basins has shifted to between 0-20 days earlier in much of the PNW between 1948 and 2002 (Stewart et al. 2005).

These patterns are expected to continue or become exacerbated in the years to come. The impacts of climate change in the Pacific Northwest are predicted to impact public health and safety, water security and ecological conservation, with effects to include the following:[13]

- **Increasing occurrence of natural disasters:** Local climate trends will reflect continued increases in both average air and water temperatures. Additionally, sea level rise is likely to occur faster than global averages, and earlier snowmelt may cause changes in river and stream flows. Sea level rise and increased seasonal flooding could incur considerable costs as these phenomena pose risks to property, infrastructure, and human life.

[13] Casola, Kay, Snover et. al.*Climate Impacts on Washington's Hydropower, Water Supply, Forests, Fish, and Agriculture*. Climate Impacts Group, University of Washington. 2005. http://www.cses.washington.edu/db/pdf/kc05whitepaper459.pdf

Planning for Climate Impacts
Uncertainty of the exact impacts a warmer climate will bring to the Pacific Northwest adds an additional set of challenges to long-term planning. In addition to existing changes projected for the region, such as demographic shifts, population growth, and a constrained economic outlook, planners are now also factoring in how to build resilience to climate impacts and respond to a warming climate over time.

Planners already anticipate projected changes, sometimes with limited data, and climate resilience and adaptation are a rapidly increasingly area of focus. Critical water, energy, and transportation infrastructure may require new siting guidelines due to sea level rise or increased flooding. Disaster and disease preparation may be appropriate for areas that have never dealt with such issues before. And the regional food system may not currently be adequate to feed the population in the event that long-distance transportation of food becomes interrupted or crop yields decline due to flooding or drought.

Uncertainty is part of a planner's – and a local government's – daily reality. Uncertainly should not prevent action; local governments can start to plan for potential impacts to prevent potential crises. Therefore, the City of Everett can take a proactive approach and begin the long-term process of integrating climate resilience and adaptation planning into its existing processes.

- **Degradation of water supply**: Water quality and quantity are also at risk to be diminished as a result of changing temperatures. With warmer average temperatures, more winter precipitation will fall in the form of rain instead of snow, shortening the winter snowfall season and accelerating the rate at which the snow pack melts in the spring. These patterns increase the threat for spring flooding and decrease the storage of the natural water tower in the Cascades, meaning less water will be available for agricultural irrigation, hydro-electric generation and the general needs of a growing population.

- **Permanent migration of critical species:** The local native plants and animals are also at risk as temperatures rise. Scientists are reporting more species moving to higher elevations or more northerly latitudes. Nearby shore habitat such as coastal wetlands and salt marshes are at risk of being inundated by rising sea levels. Increased flow and salinity of water resources would also seriously affect the food web and mating conditions for fish that are of economic and recreational importance to residents.

- **Increase in unhealthy living conditions and disease vectors:** Increased temperatures also pose a risk to human health because they increase ozone levels and air pollution toxicity, which are tied to increased rates of asthma and other pulmonary diseases. Furthermore, the anticipated intensity and frequency of hotter days poses heat-stroke risks that are of particular concern to vulnerable populations like the elderly, young, those already sick, and also to people who work outdoors. Warming temperatures and increased precipitation can also accelerate the breeding of mosquitoes, thus engendering diseases for which mosquitoes are vectors, such as the West Nile virus.

B. Legislative Context

In 2008, the Washington State legislature set a series of economy-wide GHG emissions reduction targets, using the baseline year of 1990 to measure reductions. The reduction targets establish a return to 1990 levels by 2020, 25 percent below 1990 levels by 2035, and 50 percent below 1990 levels by 2050.[14]

The State has implemented several legislative measures in support of these reductions, including the areas of emissions reporting, development of biofuels and other renewable energy capacity, energy efficiency, transportation, and other emissions reduction strategies. A few of these measures with implications for local government are described in more detail below.

By measuring its emissions and employing strategies to reduce its emissions profile, the City of Everett is well poised to comply with existing and upcoming State regulatory measures, along with potential future federal measures.

In the 2008 *Local Solutions to Global Warming* bill,[15] the State Legislature directed the Department of Commerce to draft a stakeholder report that provided policy recommendations for local governments to reduce GHG emissions through local land use and transportation plans. In addition, this report provides a list of the existing available tools in Washington State to assist local governments in analyzing and reducing their carbon footprint.[16]

In addition, the following emissions reduction strategies have been enacted by the State Legislature:[17]

Transportation

- Adoption of the California "Clean Car" Greenhouse Gas Tailpipe Standards;[18]
- Minimum renewable fuel content requirements and fuel quality standards;
- Starting in 2010, new vehicles must disclose greenhouse gas emissions;
- Electric vehicles planning and infrastructure provisions;
- Commute trip reduction program required from all large employers;
- Statutory benchmarks for reducing vehicle miles travelled (8 percent by 2020, 30 percent by 2035, and 50 percent by 2050).

[14] *Climate Action and Green Jobs* (HB 2815) – See RCW 70.235.020.
[15] See SSB 6580
[16] The full report is available here: http://www.ecy.wa.gov/climatechange/2008GMAdocs/2008LUCC_finalreport.pdf. Accessed 2.4.11
17 The RCW numbers for all of the following regulations are available on the Department of Ecology website: http://www.ecy.wa.gov/climatechange/laws.htm.
[18] HB1141 exempted local governments from the alternative fuel requirements in HB1303.

Electricity and Buildings

- State Energy Codes adopted from 2013 through 2031 must incrementally move towards achieving a seventy percent reduction in annual net energy consumption for new residential and commercial buildings by 2031;
- The High Performance Public Building Act requires all new and major renovated state-funded buildings over 5,000 square feet to meet green building standards, known as LEED Silver Certification;
- Energy efficiency standards for appliances and other products, such as ice makers, compressors and various lighting;
- Counties may enact "energy overlay zones" to facilitate siting of renewable energy projects based on feedstock availability, infrastructure and environmental impacts (eligible technologies include wastewater treatment gas);
- Municipalities may aggregate energy audits and implement cost-effective energy conservation measures among multiple government entities.

Community Emissions Reduction

- Promote compact high-density urban development by providing incentives to cities to adopt optional elements and regulations, prepare non-project environmental impact statement (EIS), establish a transfer development rights (TDR) program, collect fees to recover EIS cost, and receive 10 years immunity to SEPA appeals.

Green Economy Jobs

- Authorize financing of the upfront costs of renewable energy and energy-efficiency improvement projects and establish the Sustainable Energy Trust Program;

Climate Change Adaptation

- Ecology and other State agencies are required by December 2011, to develop a response strategy to assist the state and local governments in preparing for and adapting to impacts from climate change.

Financing and Tax Incentives

- Municipal electric utilities and public utility districts providing electricity may give financial assistance for energy conservation projects.

Executive Order 09-05, *Washington's Leadership on Climate Change*, requires the State to work with the five largest metropolitan planning organizations to increase transit options, and prepare for rising sea levels and the risks to water supplies caused by climate change impacts, among other directives.

Finally, in 2010, the Washington State Department of Ecology passed a mandatory rule for reporting GHG emissions from two sources:

- "[Any] single facility, source, or site that emits at least 10,000 metric tons of greenhouse gases annually in Washington", or

- "[Any] supplier of liquid motor vehicle fuel, special fuel, or aircraft fuel that supplies products equivalent to at least 10,000 metric tons of carbon dioxide annually in Washington."[19]

C. Everett and the ICLEI Five Milestone Process

Everett recognizes that in order to have an impact on reducing global GHG emissions, each community must take responsibility for its local actions. The steps that Everett has taken so far include the following:

- In 2007, the City of Everett became a signatory to the U.S Mayor's Climate Protection Agreement, joining over 1,000 communities in 50 states and reaffirming its commitment to reduce GHG emissions in a manner consistent with the international targets set by the Kyoto Protocol.
- In order to implement these resolutions, in 2007 the City of Everett joined more than 600 U.S. local governments and 1,200 local governments worldwide as a member of ICLEI-Local Governments for Sustainability. In partnering with ICLEI, Everett has committed to ICLEI's Five Milestone Process to fight global warming. The Five Milestones and the City of Everett's progress towards reaching them are described below.
- The City of Everett is also in the process of implementing dozens of strategies to reduce greenhouse gas emissions, which are summarized in this plan.

Milestone One: Conduct a baseline emissions inventory and forecast.

- This step was completed in 2007, and the city drafted but did not finalize a Greenhouse Gas Inventory Report. The report measured the emission from municipal operations – services operated or owned by the City of Everett. The municipal inventory is considered a subset of the larger community-wide inventory, which catalogues all of the emissions that occur within the geo-political boundaries of the City.
- The 2001 analysis was considered the *baseline year*, against which emissions in all future years will be compared.
- The 2006 analysis was considered the *interim year*, which can be used to calculate the rate of change between 2001 and 2006.

19 See RCW 70.94.151 - changed in 2010 (see 6373-S.SL).

Milestone Two: Adopt an emissions reduction target.

- Everett City Council may elect to adopt an emissions reduction target for municipal operations based on the framework developed in this document.

Milestone Three: Develop a Climate Action Plan for reducing emissions.

- The City of Everett Climate Action Plan for Municipal Operations provides options for implementing a Climate Action Plan for government operations and will bring the City closer to achieving Milestone Three. The City has indicated that it will likely want to develop a community-wide climate action plan after adopting the municipal plan.

Milestone Four: Implement the Climate Action Plan.

- The City implements the policies and measures contained in the Climate Action Plan for Municipal Operations by incorporating the approved actions into appropriate department budgets and work plans, and achieves tangible reductions in GHG emissions.

Milestone Five: Monitor and Verify Plans.

- Monitoring and verifying progress on the implementation of measures to reduce or avoid GHG emissions is an ongoing process. Monitoring should begin once measures are implemented and continue for the life of the measures. This information provides important feedback that can be use to improve the measures over time.

DRAFT

3. Municipal Greenhouse Gas Emissions Inventory and Forecast

A. Inventory Results and Future Emissions Scenarios

The City of Everett's municipal GHG emissions are not fixed. Population growth, coupled with increasing per capita energy use and the City's efforts to match services with growth, result in an overall increase in annual emissions. However, as described in detail below, this increase is slight relative to the City's population gain, and can be attributed to increases from specific sectors. For example, emissions from Transit increased, although an overall reduction in VMT (vehicle miles traveled) may have occurred if residents chose to use the transit system instead of driving their cars. On the other hand, energy use and associated GHG emissions from Water Delivery Facilities actually declined. The emissions increase from the City of Everett's municipal operations in the five-year period between municipal inventories is actually less than some other cities in the Puget Sound region.

Emissions Reductions in 'No Action' and 'Business as Usual' Scenarios

The municipal operations inventories for 2001 and 2006 were used to understand growth in actual emissions and to forecast future emissions. Both of these inventories provide important snap-shots of emissions at a certain point in time, and establish the actual trend of emissions growth. The forecast from 2010 forward represents the prediction of how GHG emissions will change over time under two scenarios: 'No Action,' and 'Business As Usual.' Before detailing the respective forecasts of future emission levels, it is important to clarify these terms. No Action simply means that this analysis projected future emissions from a 2001 baseline as if the city had taken no action since 2001 to reduce GHG emissions. Business as Usual, in this context, means projecting future emissions that *include* the emissions reduction work the City undertook between 2001 and 2010, but not any further action. These trends were forecasted out to the year 2050;[20] however, three years are highlighted in this plan for potential future target years: 2015, 2020, and 2030. Having three potential target years facilitates a more complete approach, by allowing for immediate-term, short-term, and longer-term goals. Target setting is discussed in more detail in the section, *C. Setting a GHG Emissions Reduction Target*.

[20] The year 2050 is used because it represents a target year commonly used by the global scientific community; according to the IPCC, this is the year by which global GHG emissions must be reduced by 80 percent from current levels in order to hold global temperature increase to 2 degrees C. (Also expressed as 450 PPM – parts per million.)

A Tale of Two Inventories

When the City of Everett first conducted its GHG inventory in 2007, electricity use data was gathered from the local utility, the Snohomish Public Utility District (PUD). The utility provided to the city both electricity usage and GHG emissions associated with creating that electricity (i.e. energy production) in both the baseline year (2001) and the interim year (2006).

GHG emissions from electricity are derived from an amount of CO_2e emitted per kWh of electricity used, called the GHG emissions **coefficient**. Since the region's hydroelectric power supply is abundant, this coefficient is a low number compared to regions of the country that rely more heavily on coal or other fossil fuels for their electricity production. As a result, comparatively few GHG emissions are produced to create electricity within the Pacific Northwest.

However, ICLEI's Local Government Operations Protocol, which determines the process for how local governments produce a municipal operations emissions inventory, does not allow for self-reporting from local utilities without third-party verification. Therefore ICLEI uses a regional electricity coefficient, derived from the EPA, which is higher than the local number supplied by the PUD. Using this higher number increased the City's apparent GHG emissions from electricity, from 15,584 to 26,503 (2001), and from 17,613 to 27,130 (2006).

Additionally, this change is the electricity coefficient made electricity a proportionally larger source of emissions than it seemed before, compared to vehicle fuel use, or natural gas, for example. Use of the new EPA-derived electricity coefficient changed the rate of increase between the baseline year (2001) and the interim year (2006), from a 13 percent increase to a 2.5 percent increase. This small increase over 5 years owes in large part to the sustainability efforts of the City of Everett during this time.

B. Summary of Baseline Inventory

Base Year Emissions Inventory (2001)

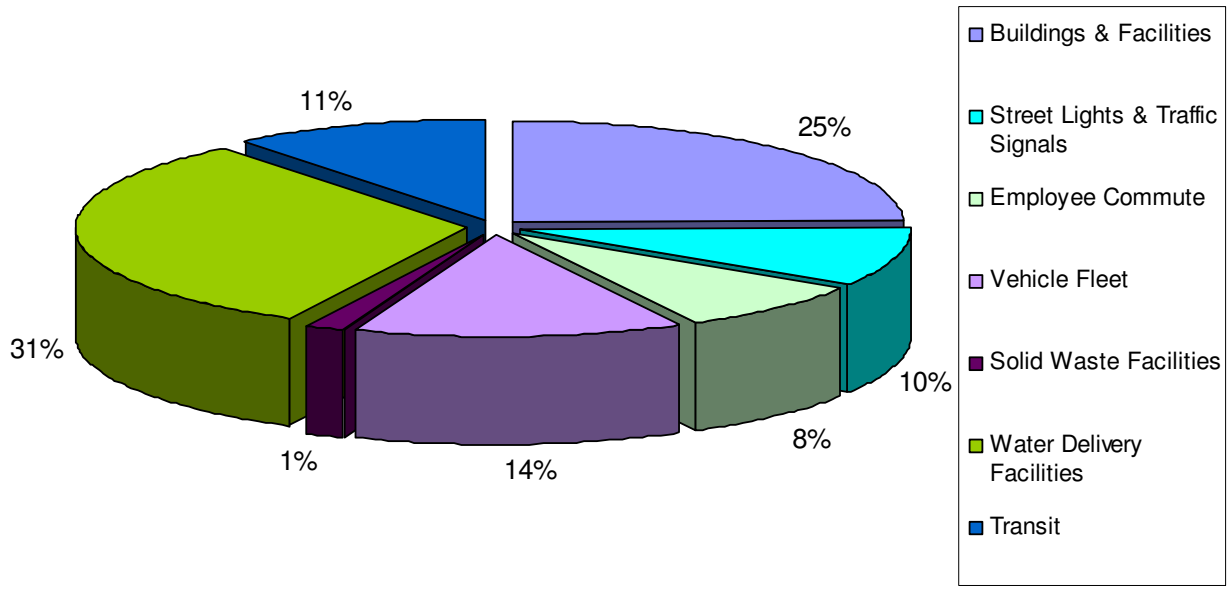
In the base year of 2001, Everett's municipal operations generated 26,503 metric tons of CO_2e ($MTCO_2e$).

Emissions by Largest Sector:

The following sectors contributed the most significantly to the City's inventory: Water Delivery had the largest single sector emissions share, accounting for 31 percent (8,473 $MTCO_2e$) of Everett's municipal emissions. Vehicle Fleet and Buildings & Facilities were the second and third largest emitters, producing 24.3 percent (6,430 $MTCO_2e$) and 24.6 percent (6,523 $MTCO_2e$) of municipal emissions, respectively.

'Vehicle Fleet' combines the transit and non-transit fleets; when separated, they account for 10.7 percent (2,825 $MTCO_2e$) and 13.6 percent (3,605 $MTCO_2e$) of emissions, respectively.

Chart 1. City of Everett 2001 GHG Emissions by Sector



Interim Year Emissions Inventory (2006)

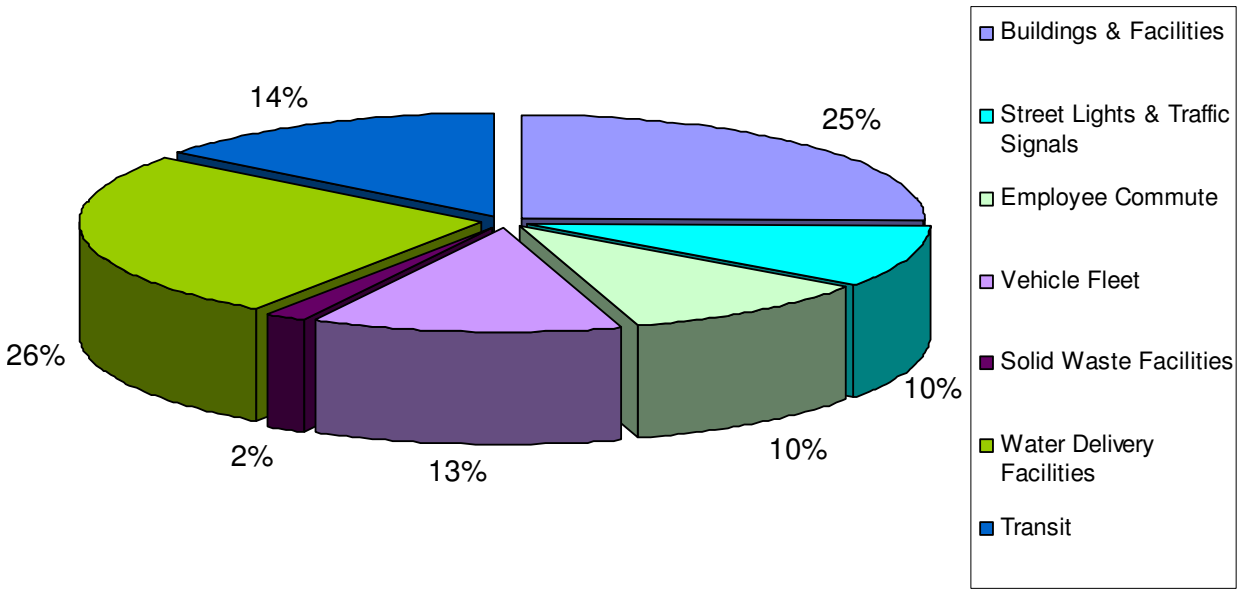
In the base year of 2001, Everett's municipal operations generated 27,130 metric tons of CO_2e ($MTCO_2e$), an increase of 2.5 percent over 2001.

Emissions by Largest Sector

The following sectors contributed the most significantly to the City's inventory: by 2006, Vehicle Fleet became the largest source of emissions, at 27.1 percent (7,343 $MTCO_2e$) of total municipal emissions. 'Vehicle Fleet' combines the transit and non-transit fleets; separately, they accounted for 14.4 percent (3,919 $MTCO_2e$) and 12.6 percent (3,424 $MTCO_2e$) of total emissions, respectively.

Water Delivery and Buildings & Faculties were the second and third largest emitters, producing 26.1 percent (7,092 $MTCO_2e$) and 25.4 percent (6,878 $MTCO_2e$) of municipal emissions, respectively.

Chart 2. City of Everett 2006 GHG Emissions by Sector



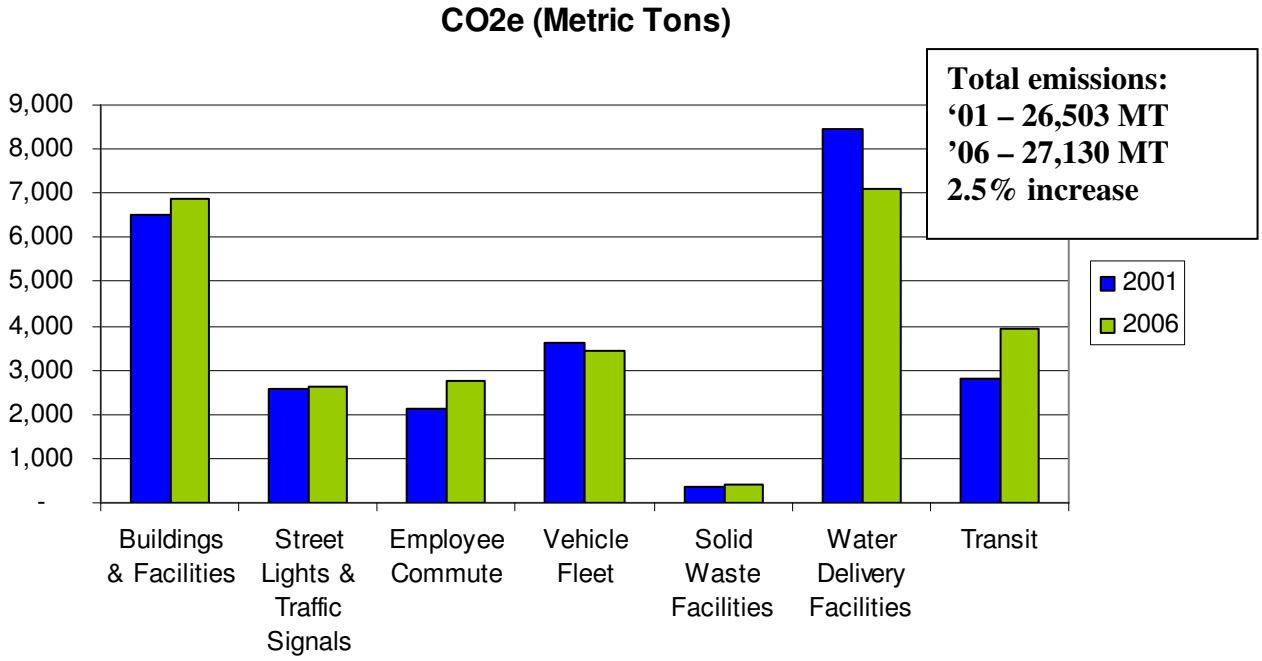
C. Comparison Between Base and Interim Year Inventories

As illustrated below in Chart 3, between 2001 and 2006 GHG emissions from City of Everett municipal operations increased by about 2.5 percent.

- The largest proportional increases in emissions were from Employee Commute, which rose by almost 40 percent, and from Transit, which also rose by just under 40 percent.[21]
- Emissions from the Vehicle Fleet (not including transit) actually went down over this five year period – likely due to actions that the Motor Vehicle Department undertook to reduce the environmental impact of their operations.
- Water Delivery Facilities showed the greatest decrease – over 16 percent – over this period, likely due to increased efficiency in the water delivery system (pumping stations, etc.), as well as public water conservation efforts that reduced overall demand. In 2001 implementation began on the City's 2000 Comprehensive Water System Plan, which was updated in 2006, and will be updated again in 2012.

[21] See Section III. A. below for a discussion on the implications of increased emissions from public-facing municipal operations, such as Everett Transit.

Chart 3. City of Everett GHG Emissions by Sector – 2001 and 2006 Comparison



It is important to note that in this comparison, the emissions total for 2006 does not include GHG emissions from the wastewater treatment plant; when these emissions are included, the 2006 total increases to 29,145 $MTCO_2e$ – a ten percent increase over 2001 emissions. However, it is incorrect to make such a comparison, since wastewater emissions were not included in the 2001 baseline due to lack of data. Therefore, anywhere comparisons between 2001 and 2006 are made, the wastewater emissions are deducted so that the comparison between years is being made between like sectors. If 2001 data for the wastewater treatment plant GHG emissions becomes available, the inventory could be updated to include the new 2001 total with the complete 2006 total. This would have the effect of slightly increasing the 2001 baseline, which in turn would slightly decrease the net impact of the measures in this plan. The total impact would likely be small.

For purposes of this plan, since all emissions reductions estimates for future measures are made from the 2001 baseline, this discrepancy for 2006 does not in any way affect the implementation of measures included in this plan.

D. Setting a GHG Emissions Reduction Target

GHG emissions reduction targets assist policymakers, elected officials, and City staff in decision making and provide a framework for celebrating accomplishments. However, the thoughtful selection of an emissions reduction target is a complex task. Some external considerations for emissions reduction target-setting include:

- The Kyoto Protocol (1997): An internationally constructed framework which set a negotiated target of **7 percent below 1990 levels** for all Annex-1 (industrialized) countries. Although this target was agreed to by the United States in principle at the 1997 United Nations Council of Parties meeting, the Treaty was not ratified by the U.S. Congress. The United States is responsible for approximately 33 percent of the global 1990 emission of all Annex I countries that are parties to the Convention.[22] Numerous industrialized nations, including Canada, Russia, and the European Union ratified this treaty and enacted it into law.
- The IPCC Fourth Assessment Report (2007): Research by the world's pre-eminent scientific body on climate, the Intergovernmental Panel on Climate Change (IPCC), suggests that, worldwide, a **60 percent to 80 percent reduction below 1990 levels** will be needed in order to prevent catastrophic impacts from climate change.[23] The most recent report of this organization, the *IPCC Fourth Assessment Report* was ratified by the United States in 2007.
- The Copenhagen Accord (2009): in December 2009, the 15th UN Conference of Parties (COP15) was held in Copenhagen, Denmark. The meeting was held to discuss continuation of the Kyoto Protocol, or creation of a replacement agreement, when it expires in 2012. The outcome of COP15 was the Copenhagen Accord, a non-binding agreement to continue the Kyoto Protocol and for industrialized nations to adopt economy-wide emissions targets for the year 2020. The US adopted the target of a **17 percent reduction below 2005 emissions levels by 2020**.
- Cancun Agreement (2010): In December 2010, Mexico hosted the 16th Conference of the Parties (COP16), in Cancun. This meeting saw some further formalization of the agreements made in Copenhagen in 2009. The agreement does not set any new targets, but formalized some of the mechanisms by which the targets will be achieved, including "a verification system, an adaptation framework, deforestation reduction [via the REDD program (Reducing Emissions from Deforestation in Developing countries)], a funding mechanism, and a commitment to near-term and long-term climate financing for the least developed countries."[24]

Some additional context is provided by looking at the targets adopted in Washington State:

- The 2008 Washington State goals, as established by HB 2815, set the targets for reducing State emissions as follows: 1990 levels by 2020, 25 percent below 1990 levels by 2035, and at least 50 percent below 1990 levels by 2050.
- Neighboring jurisdictions have adopted the following goals:
    - The cities of Seattle, Spokane, and Tacoma have adopted a reduction target of 7 percent below 1990 levels by 2012 for both municipal operations and the community at- large.

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[22] United Nations Framework Convention on Climate Change. http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/ghg_table_06.pdf. Accessed 2.11.11

[23] United Nations Intergovernmental Panel on Climate Change (IPCC) *Climate Change 2007: The Physical Science Basis. Summary for Policy Makers*. http://www.ipcc.ch/SPM2feb07.pdf.

[24] For the text of the agreements, see the COP 16 website: http://unfccc.int/meetings/cop_16/items/5571.php. Accessed 2.11.11

- The City of Bellingham has adopted a municipal operations reduction goal of 64 percent below 2000 levels by 2012 and 70 percent by 2020, and a community-wide reduction goal of 7 percent below 2000 levels by 2012 and 28 percent below 2000 levels by 2020;
- Snohomish County has adopted an emissions reductions goal of 20 percent below 2000 levels by 2020 for municipal operations and the county at large.

As a signatory to the U.S. Mayors' Climate Protection Agreement (MCPA), the City of Everett has resolved to "strive to meet or exceed the Kyoto Targets" by reducing emissions in both municipal operations and the community at-large. While the goal articulated by the MCPA applies to community-wide emissions, as noted above, the vast majority of jurisdictions that have become signatories to the U.S. Mayors' Climate Protection Agreement also strive to meet or exceed this target for reducing emissions in municipal operations to demonstrate success and build a foundation for broader community-wide engagement. This is the approach taken by the City of Everett, which has commissioned this Municipal Operations Climate Action Plan in order to first identify opportunities for internal emissions reductions, before addressing opportunities for community-wide emissions reductions.

Setting a Target for Everett's Municipal Operations

The City of Everett's GHG emissions from municipal operations rose only 2.5 percent between 2001 and 2006, due in part to the various sustainability projects and policies implemented by the City during that time. ICLEI's analysis of these projects and policies – detailed below in Part 3, Section B – showed that Everett's emissions decreased eleven percent, compared to a scenario in which the City took no action to reduce emissions.

Under a 'No Action" scenario, annual emissions are projected to reach nearly 30,000 metric tons CO_2e by the year 2020 (from a 2001 baseline). However, taking the 11 percent reduction into account, that figure drops to about **27,150 metric tons CO_2e.**

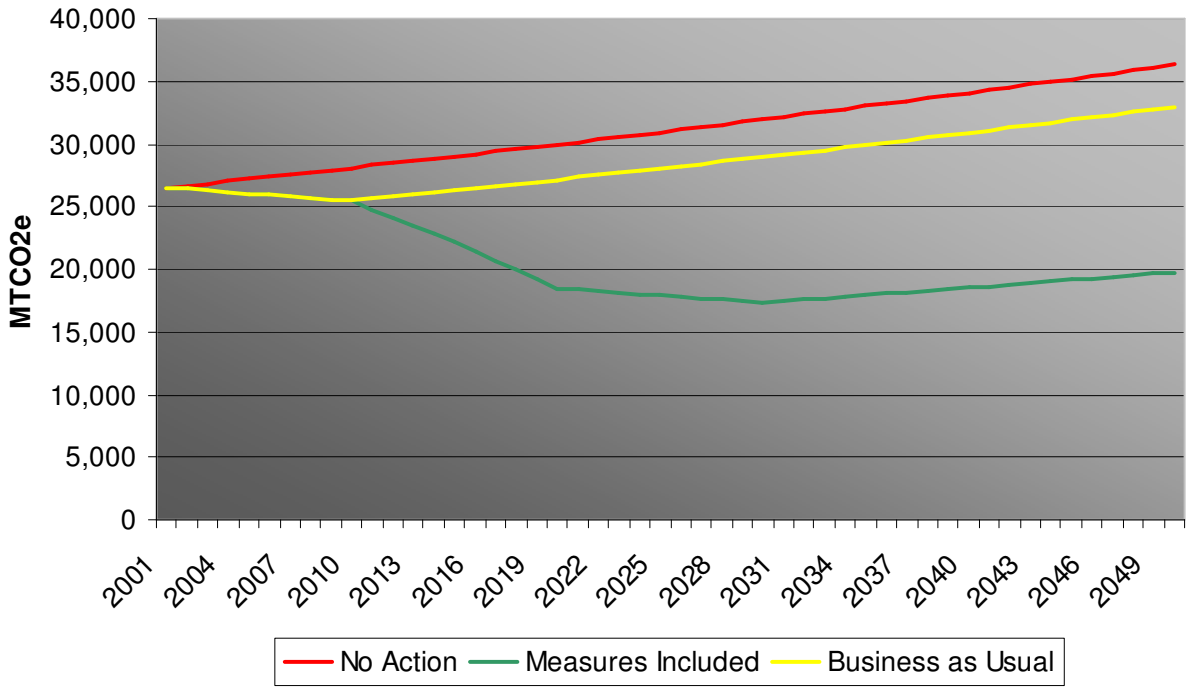
With the additional decrease from the recommendations contained in this plan, including both an expansion of existing measures coupled with proposed new measures, the City's projected future annual emissions drop an additional 35 percent by 2020, to just over **18,450 metric tons CO_2e.**

Projecting annual operational GHG emissions out to 2030 shows an estimated **17,370 metric tons CO_2e**, an annual reduction of over 45 percent from the 'No Action' scenario. This indicates that a future emissions reduction target for municipal operations would fall between **25 percent**, on the conservative side, and **40 percent**, on the ambitious side.

Setting an emissions reduction target is always a balance between setting the target too low and too high. Too low, and the City risks being seen as not serious in its efforts to combat global climate change; too high and the City risks setting an unachievable target and then failing to meet its own environmental objectives. ICLEI therefore recommends

identifying a target within the range described above – 25 and 40 percent reduction from 2001, by 2030 (or between 15 percent and 20 percent by 2020) – and determining whether to aim for the more conservative or ambitious edge of that range. Given the economic constraints that the City is currently operating under, it would be appropriate to set a more conservative near-term target (2015 or 2020), and a more ambitious long-term target (2030) to inspire future action.

Chart 4. City of Everett Emissions Forecast – 2001 to 2050



4. Climate Action Plan for Municipal Operations

A. Summary of Plan Elements

This Climate Action Plan does not represent a new direction for the City of Everett, but rather a continuation and an expansion of its current environmental and sustainability practices. Everett is already undertaking a broad array of environmental measures and best practices in nearly every department, and this plan helps to codify and quantify some of those existing actions. The existing measures that were analyzed for this plan are described in this section as 'Group I'.

This plan also contains proposals for new measures that the City is not currently implementing and analyzes their potential for GHG emissions reductions. These new measures are separated into two different subsections: 'Group II' represents measures that expand or build on actions the City is already taking, and 'Group III' represents new actions that the City could take. These three subsections are described in more detail below.

- **Group I: Existing Municipal Measures**: This subsection contains explanation and quantification of actions that were implemented prior to 2010, when this planning process was begun. These measures include current implementation of stimulus-funded Energy Efficiency and Conservation Block Grant (EECBG) projects. Measures are categorized by sector.
- **Group II: Building on the City's Existing Actions**: This subsection contains analysis of the potential impact of expanding on actions already being implemented.[25] Many of the measures in this section may be faster or easier to implement, they build on the foundation of existing programs. Measures are categorized by sector.
- **Group III: New Municipal Actions/Activities**: Group III measures describe activities or projects that may require longer time horizons or greater financial or institutional resources to implement. Some are longer-term, and will impact the City's emissions more ten or even twenty years from now. However, they all represent actions that can be implemented with existing technology and municipal authority. Measures are categorized by sector.

The analysis of both existing and new measures evaluated measures using the same shared criteria, including reductions below actual emissions (as opposed to below projected emissions), cost effectiveness (typically measured as dollars per metric ton CO_2e), and anticipation of State and Federal regulation and requirements.

[25] The analysis of Existing Measures includes projects funded through the federal Energy Efficiency and Conservation Block Grant (EECBG) program. Some of these projects are still underway (as of March 2011), and the final results of those projects may differ from this analysis. The modeling on all EECBG projects was conducted using data current as of December 2010.

ICLEI utilized several criteria for selecting new measures for recommendation, including implementation cost, cost-effectiveness, estimated return on investment timeline, certainty of GHG reductions, and co-benefits. These criteria can be complementary; for example, energy efficiency retrofits are an investment that saves money, have both relatively low up front cost and quick return on investment, and reduce GHG emissions. Such measures are deemed the 'low hanging fruit' and the City is implementing many of these now.

The Multiple Benefits of Climate Action
Co-Benefits are sometimes also referred to as 'effect multipliers' or 'cascading' or 'compounding' benefits. The idea is a simple one: that many of the potential actions taken to mitigate GHG emissions can also contribute to other community goals, like strengthening the local economy, reducing other types of pollution, improving public health, and increasing local quality of life. Actions taken to mitigate GHG emissions can also strengthen a community's resilience and increase its adaptive capacity to respond to the impacts of climate change.

It is easy to identify examples of potential actions contained in this plan with co-benefits: reduction in fuel use from the fleet and employees commuting to work help to improve local air quality; a more efficient water delivery system will help keep utility bills lower for city residents; and of course money saved from higher building efficiency can be spent on critical city services, such as schools, fire, and police.

Several measures were analyzed in the preliminary stages of this process but were not modeled, such as renewable energy production. While renewable energy production has clear economic and GHG reduction benefits over time, the initial cost and return on investment (ROI) timeline are too great to justify inclusion at this time. The Pacific Northwest's abundant (and carbon-free) hydropower provides residents and businesses with some of the lowest electricity rates in the nation. This low cost combined with comparatively low solar potential means that the installation of on-site solar energy production typically has a very long ROI. In other examples, the energy sources are simply not technologically ready (in the case of tidal or wave power). Even relatively abundant sources such as waste heat and geo-thermal require infrastructure that may not yet be cost effective to install. It is anticipated that in the near future, perhaps as early as the period 2015-2020, renewable energy costs and technology will be more cost effective than fossil fuels, but it too uncertain for inclusion at this time.

New Measures Classifications

To assist the City in developing one or more implementation pathways for the proposed new measures – Groups II & III – new measures are classified into three groups, identified in the tables below with acronyms corresponding to three levels of potential impact: 'Low-Hanging Fruit' (LHF); 'Measured Progress' (MP); or 'High Impact' (HI). These designations represent just one criteria category that the City can utilize in developing priorities for the implementation of the various measures contained in this plan. *Low Hanging Fruit* are measures that have relatively low impact but relatively low cost and returns on investment (ROI) of less than three years. The *Measured Progress* category includes measures that have medium-term ROI, such as 2-5 years, with slightly higher capital costs, and may have known funding opportunities or pathways. *High Impact* measures have either high capital costs or longer-term ROI (more than ten years), but have significant emissions reductions.

Potential implementation pathways, using these designations, are described in more detail in Section 5: Next Steps.

B. Climate Action Plan Development Process

The City of Everett Climate Action Plan for Municipal Operations (CAP) was developed over a period of 12 months, with regular input from City staff. The CAP was divided into five main tasks: an update of the existing GHG emissions inventory; provision of a framework for choosing an emissions reduction target; quantitative analysis of the City's existing measures, quantitative analysis on proposed new measures; and delivery of a final Climate Action Plan.

During all five major components of the process, City staffers were engaged to provide key information and feedback, including data on existing measures and their impacts to municipal operations, feedback and guidance to refine the proposed new measures and assess their impact on city operations, and feedback on the CAP itself. Regular updates were also provided, and feedback requested, from the Mayor's Office, as well as the City's Chief Financial Officer.

C. Group I: Existing Municipal Measures

This section describes the cumulative positive impact of some of the City of Everett's existing and ongoing actions to make city operations more environmentally and economically sustainable, including the aggregate reduction in GHG emissions from these activities. These measures constitute an excellent first step towards significant reduction of GHG pollution and already have resulted in annual reductions of **2,880 metric tons CO_2e** from the 2001 baseline. This means that if these measures had not been put into place, Everett would have been emitting nearly 11 percent more emissions annually. These actions have been classified by sector and are outlined below.

It is important to note that the total emissions reduction – 2,880 metric tons, 11 percent of total operational emissions – slightly underestimates the City's actual reduction totals. We know the real number is slightly higher because not all of the City's actions to reduce emissions (as well as operational costs) were analyzed. There are a number of actions from every sector listed below which were not included in this analysis. The reasons they were not included are various, but typically fall into four separate categories:[26]

1) Not Quantifiable
2) No GHG Reduction
3) No data available
4) Community Emissions

[26] A full list of measures submitted by the city but not selected for analysis was provided to the city as part of this process.

'Not Quantifiable' indicates that there is no widely agreed upon, scientifically accurate means for measuring the emissions reductions from a particular measure. For example, the Motor Vehicles Division implemented a best practice of extending the oil-change intervals of all appropriate fleet vehicles, reducing the amount of motor oil used by hundreds of gallons per year. While this measure has clear economic and environmental benefits, *quantifying* the GHG emissions benefits would require an upstream lifecycle analysis of the relationship between motor oil use in Everett and crude oil production. Although experts are currently developing models to quantify the lifecycle impacts of a measure like this one, there is currently no model to use to conduct this kind of analysis.

'No GHG Reduction' indicates that although the measure may yield a positive environmental and economic impact to the City's operations, that impact is not primarily related to greenhouse gas emissions.[27]

An example of this is the Fire Department's recent implementation of purchasing best practices in switching to more environmentally-friendly cleaning products. While 'green' cleaning products

Understanding Community vs. Municipal Operations Emissions

It is important to distinguish between GHG emissions generated by the City of Everett's municipal operations, including emissions generated from city-owned and operated buildings, the municipal vehicle fleet, libraries, and other sources, and those emissions generated by the broader community-at-large. The community emissions for the City include those generated by homes, businesses, commuters, etc. and include emissions sources and activities over which the City of Everett does not have direct control. Generally speaking, municipal operations emissions account for between 2-10% of the total emissions profile for a City.

This plan addresses emissions generated from municipal operations, but does not address emissions generated by the community-at-large. Emissions from municipal operations are a small subset of the community's emissions; however, the City of Everett is demonstrating leadership by addressing its own GHG emissions and working to reduce both the environmental impacts and the costs of providing services to the community.

Since the City government provides services that benefit the broader community, it may choose to increase its own emissions in order to reduce the community's overall emissions. From the perspective of municipal emissions, this looks like a step in the wrong direction, since the municipal emissions profile is actually increasing. However, in some instances an increase in the Municipal Operations emissions could actually result in an emissions reduction overall.

Perhaps the clearest example of this is Everett Transit. Mass transit is recognized as an essential component of reducing a city's emissions, as a mass transit vehicle is capable of transporting people far more efficiently than a personal automobile. However, buses running on diesel fuel still produce GHG emissions. As Everett Transit expands their fleet, the amount of diesel being consumed rises, and associated GHG emissions rise with it. When analyzed purely from an internal operations perspective, the City's emissions are going up instead of down.

However, as Everett Transit expands to serve more residents and commuters, fewer people are driving their own vehicles. In this way, VMT (vehicle miles traveled) decreases as fewer personal automobiles are used in favor of bus transit –a more efficient form of transportation. This public transport mode shift will actually reduce the community GHG emissions and when analyzed, this decrease in emissions from the community as a whole should be greater than the increase coming from City operations (from increased diesel use).

[27] It is worth noting that some actions may have had a slight GHG impact, but it was so slight that it would not show up in the analysis, and its primary impact was in another area. In these cases, the action was not included.

undoubtedly have clear environmental benefits, there is not a strong correlation with GHG emissions reduction.

'No Data Available' indicates that a measure may have emissions reduction potential, but not enough data was available to model or estimate its impact.

'Community Emissions' indicates that the action does have emissions reduction potential, but that *even though the action is taken by the City*, any associated reductions would result in community-wide reductions from Everett citizens or businesses, and not from municipal operations. For example, if a City was to introduce a Green Building Law that applies to commercial buildings and requires more energy efficient buildings, the resulting GHG emissions would happen in the commercial sector and would not result in municipal operations GHG emissions reductions. Since this climate action plan is focused exclusively on municipal operations, these kinds of actions were not analyzed.

Table 1. Net Annual Impact of Existing Measures Analyzed

Impact of Existing Measures Analyzed	
Total Annual GHG Reduction - $MTCO_2e$	2,880
Total 2001 Emissions - All Sectors	26,503
GHG Emissions Reduction as percent of 2001 Total	11%
Forecast Emissions Increase Through 2010	2,497
Forecast Emissions Increase Through 2010 as percent of 2001 Total	9%

Table 2. Summary of Existing Measures Analyzed

Existing Measures Analyzed
Buildings and Facilities
(1) <u>High Efficiency Lighting</u> *<u>Emissions Reduction:</u>* 320 metric tons of CO_2e per year *<u>Measure Description:</u>* In order to make energy efficiency a priority in building improvements, staff have instituted an extensive relighting program that replaces Metal Halide fixtures with T-5 or T-8 fixtures. Metal Halides burn at 400+ watts where the T-5's and T-8's burn at 24 to 35 watts per lamp, thus saving considerable amount of energy. This calculation covers retrofits at The Wall Street Building, Police HQ, Facilities Shop, MVD Shop, and Transit Maintenance. *<u>Resource Savings:</u>* This measure is estimated to save over 680,000 kWh annually for

Existing Measures Analyzed

replaced metal halide lamps, and over 100,000 kWh annually for fluorescent lamps (in the Wall Street Building). At a base cost of $.07 per kWh,[28] the anticipated annual cost savings from these efficiency measures is approximately $54,600.
Analysis Approach: Data received from City of Everett indicate retrofits of 2700 T-12 fixtures to 2250 T-8 fixtures and 707 Metal Halide fixtures with 337 T-8 fixtures. For this analysis, each fixture type was assigned an assumed wattage based on average for the fixture type. Total energy consumption and subsequent emissions were calculated in both the pre-retrofit and post retrofit case. This allowed for differences in the total number of fixtures to be captured. Reductions were calculated as the difference between the two cases.

(2) EECBG HVAC Retrofits
Emissions Reduction: 67 metric tons of CO_2e per year
Measure Description: As a component of their EECBG projects, the City of Everett has planned HVAC retrofits at both the Police Headquarters and Service Center.
Resource Savings: These actions are expected to result in an annual savings of approximately $11,000 from reduced electricity consumption.
Modeling Description: This total includes the projects as described in the City's EECBG report to DOE, covering proposed HVAC projects at the Police Headquarters and Service Center. Total electricity reduction estimates from EECBG Reports were multiplied by EPA's eGRID emission factors to obtain the total reduction.

(3) EECBG Lighting Retrofits
Emissions Reduction: 199 metric tons of CO_2e per year
Measure Description: The City of Everett has planned lighting retrofits as a component of their EECBG projects. These lighting projects are at additional facilities from those described in other lighting measures.
Resource Savings: These retrofits are expected to result in an annual savings of approximately $33,865 from electricity consumption.
Analysis Approach: This total includes the projects as described in the 10/25/2010 EECBG report covering proposed projects at The Main Library, EverPark, Fire Administration, Performing Arts Theater, and Service Center Buildings. The lighting project at the waste water treatment plant was not included as it has been marked as "dropped" on the latest EECBG report. Total electricity reduction estimates were multiplied by eGRID emissions factors to obtain the total reduction.

Fleet

(4) Commute Trip Reduction Program

[28] Electricity analyses costs used throughout this document are based upon Snohomish PUD's 2010 commercial electricity rate of $0.07/kWh. Snohomish PUD Rate Information: http://www.snopud.com/AboutUs/Rates.ashx?p=1166

Existing Measures Analyzed

Emissions Reduction: 583 metric tons of CO_2e per year
Measure Description: As required by State law, the City manages the citywide Commute Trip Reduction (CTR) program, which includes promotions and employee incentives for reduced single-occupancy vehicle (SOV) commute trips. Below are the City's of Everett's CTR Employee Commute Survey results for the years 2007-2009:

Downtown
Number of Employees = 590
CTR Survey Response Rate = 51 percent
Percentage of SOV Commuters = 84 percent
Non-SOV = 16 percent
Average Vehicle Miles Traveled (VMT) per trip = 12.8 miles

Cedar St
Number of Employees = 541
CTR Survey Response Rate = 60 percent (Pub Works)
Percentage of SOV Commuters = 83 percent
Non-SOV = 17 percent
Average Vehicle Miles Traveled (VMT) per trip = 12.8 miles

Resource Savings: Commute Trip Reduction does not result in direct savings to the City; however, it could result in indirect cost savings from co-benefits such as reduced impact to traffic infrastructure, and reduced parking need at municipal sites.
Analysis Approach: The total number of employees from these two sites is 1,131. Using an average non-SOV rate of 16.5 percent for all employees, and the average VMT of 12.8 miles, yields an estimated 170 employees not driving alone to work, which equals 6,400 miles per employee per year avoided, and 1,085,760 total miles avoided annually. This is estimated to reduce emissions from employee commuting by 583 metric tons CO_2e annually.

(5) ULS Diesel/B-5 Biodiesel Blend
Emissions Reduction: 234 metric tons of CO_2e per year
Measure Description: The City uses a 'B5' biodiesel blend (95% diesel, 5% biodiesel) with Ultra-Low Sulfur Diesel (ULSD) at the Service Center, saving approximately 23,000 gallons of regular ULSD annually. According to a study from the EPA, this also results in reduced emissions of Hydrocarbons (HC), Carbon-Monoxide (CO), and Particulate Matter (PM) by 5 percent, compared to using only ULSD.
Resource Savings: While the price of fuel is not static, for purposes of this analysis we used to price of $2.90 per gallon.[29] Saving 23,000 gallons of ULSD therefore saves the city $67,045 per year. However, that must be offset by the cost of the biodiesel, estimated at $113,390 per year, for a total cost to the City of $46,390 per year.
Analysis Approach: 23,000 gallons per year, times an emissions factor of 10.15 kg of CO2 per gallon of ULSD, equals an annual reduction of 233.45 metric tons of CO2 reduced annually. Note that non-CO2 GHGs (Methane & Nitrous Oxide) were not modeled.

[29] Based on current price, provided by the City of Everett (current as of January 2011).

Existing Measures Analyzed

(6) Hybrid Vehicles Purchases

Emissions Reduction: 33 metric tons of CO_2e per year

Measure Description: All departments are encouraged to consider hybrid vehicles whenever possible. Since 2001, the City has purchased 30 hybrid and electric vehicles, saving approximately 3,750-gallons of fuel, which totals approximately $9750.

Resource Savings: At gasoline process of $2.60 per gallon,[30] the current annual savings of 3,750 gallons per year results in a savings of approximately $9,750. However, increased gasoline prices will significantly increase the annual savings of this measure.

Analysis Approach: Non-CO2 GHGs (N2O, CH4) were not modeled and are not included in the savings total. Replacement hybrid vehicles are assumed to be 100 percent passenger cars.

(7) Streamlined Equipment Use

Emissions Reduction: 30 metric tons of CO_2e per year

Measure Description: The City monitors vehicle use in all departments and identifies underutilized equipment to be either moved or sold off, in order to maximize the City's use of its vehicle fleet.

Resource Savings: At an average cost of approximately $2.75 per gallon,[31] this streamlining of the vehicle fleet saves the City approximately $9,000 annually in gasoline costs alone; this does not include savings from reduced maintenance and repair. Increased gasoline prices will significantly increase the savings from this measure.

Analysis Approach: Eight gasoline vehicles identified and removed from the active fleet have resulted in savings of 3,360 gallons of gasoline. Multiplied by emissions factors for gasoline for CO2, N2O, and CH4, this streamlining results in approximately 245 metric tons of CO_2e reduced.

(8) Hybrid Transit Buses

Emissions Reduction: 76 metric tons of CO_2e per year

Measure Description: In 2009, the City was awarded $1.1 million to facilitate the purchase of three hybrid buses, and in 2010 was awarded (via 3 different grants) $2.5 million for approximately five more.

Resource Savings: Using the figure of $2.90 per gallon for diesel fuel, this measure would save the City over $7,200 per bus per year. Factoring in the additional cost of purchasing a hybrid bus, which currently has an increased marginal cost of approximately $212,500, it would require almost 30 years for the fuel savings alone to pay for the difference.[32] These buses still therefore require subsidy.

Analysis Approach: The improved efficiency of each hybrid bus saves roughly 2,500 gallons of diesel fuel annually, based on approximately 40,000 miles driven per year. For three

[30] Based on savings estimates provided by the City of Everett (current as of January 2011).
[31] Based on savings estimates provided by the City of Everett (current as of January 2011).
[32] It should be noted that increases in the cost of diesel fuel, and reductions in the increased marginal cost of the hybrid buses would drive this return on investment period down.

Existing Measures Analyzed

buses, this equals roughly 7,500 gallons saved, or approximately 76 metric tons CO_2e. The addition of five more buses would save approximately 12,500 more gallons of fuel annually, for a total reduction of about 200 metric tons CO_2e.

Public Works

(9) 2000/2006 Comprehensive Water System Plan

Emissions Reduction: 578 metric tons of CO_2e per year with the savings that resulted from the 2000 Comprehensive Water System Plan. This number increases to 1,014 metric tons of CO2e per year once the additional savings expected by 2012 are accounted for.

Measure Description: Currently, the City is in the second phase of implementation of its water conservation program. Planned and implemented on 6-year cycles, the first plan was begun in 2001 with the 2000 Comprehensive Water System Plan. That plan saves the City an estimated 2.25 million gallons of water a day (MGD). The City is in the process of implementing the next 6-year program that was included in the City's 2006 Comprehensive Water System Plan. The City, together with its' wholesale water purveyors have developed a plan that will save am additional 1.7 MGD by 2012. This benefits the environment, as well as playing a key role in ensuring the Everett Water System can meet the future needs of an expanding population.

Resource Savings: By the City's estimate, these efforts save $195,000 per year in avoided utility costs; a number that increases to over $327,000 per year once the additional savings expected by 2012 are accounted for. In electricity savings alone, the City saves roughly $98,295 annually, which should increase to $172,560 by 2012.

Analysis Approach: For this analysis, energy cost in $/CCF were obtained from table 5-5 in the 2007 Comprehensive Water System Plan for each of the four broad areas of the complete water delivery and treatment system; potable water treatment, delivery, wastewater treatment, and lift stations. Assuming that the vast majority of that energy was in the form of electricity and a utility rate of $0.07 / kWh, those cost values were converted and summed to produce a value of 305.5 kWh / Million Gallons of water passing through the system. This was multiplied by daily savings as reported for the programs and by 365 days per year. Cost savings were calculated similarly, though without the conversion to energy units.

(10) Recycling and Waste Prevention - City Facilities

Emissions Reduction: 3 metric tons of CO_2e per year

Measure Description: In 1993, the City of Everett began a comprehensive internal recycling program for all City departments. The program diverts approximately 100 tons per year of recyclable materials (paper, cardboard, newspaper, tin, aluminum, glass and plastic).

Resource Savings: Recycling is not necessarily a financial saving measure. Whether it is more or less costly than landfilling depends on the current landfill tipping fees as well as prices for recycled content feedstocks, which are both variable over time. In either case, recycling is a good practice for conserving global resources and is a good measure.

Analysis Approach: For this measure the 100 tons of mixed waste was entered into the

Existing Measures Analyzed

ICLEI CAPPA Excel tool. This tool is unique in that it only estimates the benefits of reduced landfill emissions and not emissions associated with upstream processes. It also approximates the annual impact of a reduction in landfilled material rather than the emissions avoided as waste breaks down in a landfill over time.

(11) EECBG Water Filtration Plant Pump Replacement
Emissions Reduction: 51 metric tons of CO_2e per year
Measure Description: The City of Everett has planned pump retrofits at the Water Filtration Plant. This project will replace three 75 HP pumps with soft starts and three premium efficiency motors. These retrofits are projected to reduce energy use by 125,000 kWh annually.
Resource Savings: Based on an electricity price of $.07 per hour, this measure is projected to save the City approximately $8,750 annually.
Analysis Approach: Total electricity reduction estimates produced for the City's Energy Efficiency and Conservation Block Grant (EECBG) Reports to the Department of Energy (DOE) were multiplied by EPA eGRID emission factors to obtain the total reduction.

Parks

(12) EECBG Park Lighting Projects
Emissions Reduction: 38 metric tons of CO_2e per year
Measure Description: The City of Everett has planned outdoor park lighting retrofits as a component of their EECBG projects.
Resource Savings: Based on an electricity price of $.07 per hour, this measure is projected to save the City approximately $6,500 annually.
Analysis Approach: This measure includes EECBG lighting retrofit projects as described in the City's EECBG Reports to DOE, covering proposed projects at Kasch, Langus, Rotary, Walter E Hall, Hauge Homestead, and TA Sullivan Parks. Total electricity savings (kWh) were multiplied by EPA eGRID emission factors to obtain the total reduction.

(13) Boiler Replacement
Emissions Reduction: 15 metric tons of CO_2e per year
Measure Description: The Forest Park swim center boiler/chiller replacement project of 2009 achieved significant energy efficiency improvements, earning a Puget Sound Energy conservation grant to help defray acquisition costs. Efficiency ratings improved to over 88 percent from the previous 84 percent.
Resource Savings: Based on an electricity price of $.07 per hour, this measure is projected to save the City approximately $2,500 annually.
Analysis Approach: Puget Sound Energy estimates (provided in the conservation grant) for electricity savings (kWh) are 36,390 kWh per year. Multiplying by EPA eGRID emission factors yields an annual emissions reduction of approximately 15 metric tons CO_2e.

(14) Energy Conservation

Existing Measures Analyzed

Emissions Reduction: 3 metric tons of CO_2e per year
Measure Description: The Parks Department uses an insulating blanket to cover the outdoor wading pool at the Forest Park Swim Center at night, thereby reduce heat loss and saving energy.
Resource Savings: Based on an electricity price of $.07 per hour, this measure is projected to save the City approximately $500 annually.
Analysis Approach: Puget Sound Energy estimates for electricity savings (kWh) from the insulating blanket are 7,700 kWh per year. Multiplying by EPA eGRID emission factors yields an annual emissions reduction of approximately 3 metric tons CO_2e.

(15) New Waste Facilities
Emissions Reduction: 23 metric tons of CO_2e per year
Measure Description: The City acquired and installed 34 'BigBelly" solar powered trash compactors in mid-2010, funded through an EECBG grant in the amount of $137,900. Reductions in carbon dioxide emissions result from reduced service needs (compared to existing waste receptacles), and therefore fewer vehicle miles traveled to collect garbage in the parks system.
Resource Savings: At $2.60 per gallon for diesel fuel, this measure will save the city approximately $5,860 per year in avoided fuel costs. The City also estimates a labor savings of over $58,000.
Analysis Approach: The total number of waste receptacles in the City of Everett is estimated at 300 (500 during summer months), of which 34 equals eleven percent. Waste collection vehicles travel approximately 12,800 miles per year (plus two smaller vehicles, traveling approximately 3,000 miles during summer months. Reduced service needs are estimated to reduce 6,760 miles off of collection routes annually. An average three miles per gallon for diesel collection trucks results in roughly 2,250 gallons of diesel avoided per year, for a total emissions reduction of about 23 metric tons.

(16) New Boiler
Emissions Reduction: 17 metric tons of CO_2e per year
Measure Description: Parks replaced the boiler system at the American Legion Park greenhouses in 2010. The current sealed combustion boiler will be replaced with a condensing boiler.
Resource Savings: This measure is estimated to save the City approximately $3,350 per year from reduced use of natural gas.[33]
Analysis Approach: The new boiler is projected to save over 3,150 therms of natural gas per year through increased heating efficiency; this would reduce annual GHG emissions by nearly 17 metric tons CO_2e.

[33] Natural Gas is provided by Puget Sound Energy (PSE), for an average of $1.06/therm. Information provided by Snohomish PUD.

Existing Measures Analyzed

Fire Dept

(17) Compressed Work Week
Emissions Reduction: 12 metric tons of CO_2e per year
Measure Description: Office personnel have been encouraged to utilize four day work weeks, reducing commuting trips for these personnel by 20 percent. This program is run independently of the City's Commute Trip Reduction program, and applies only to the Fire Department.
Resource Savings: While fuel costs savings are realized by employees, the compressed work week may yield indirect benefits to the City, such as reduced office lighting and operations costs.
Analysis Approach: The fire department has 17 employees eligible for this reduced work week; with an average daily VMT per employee of 12.8 miles, a 20 percent reduction in commuting equals approximately 21,750 fewer vehicle miles traveled annually.

(18) Work Schedule Adjustments
Emissions Reduction: 200 metric tons of CO_2e per year
Measure Description: The Fire Department adjusted the work schedule of all employees in fire suppression, resulting in a reduction in commuting trips by 50 percent. This amounts to 14,560 fewer commuting trips per year.
Resource Savings: While fuel costs savings are realized by employees, the compressed work week may yield indirect benefits to the City, such as reduced office lighting and operations costs.
Analysis Approach: 14,560 fewer trips per year, with an average commute VMT of 12.8 miles, results in a total annual reduction of almost 373,000 miles.

(19) Building Upgrades
Emissions Reduction: 398 metric tons of CO_2e per year
Measure Description: The Fire Department is in the process of a series of energy efficiency upgrades to its administration building, as well as six fire stations. Upgrades include new energy efficient windows and a more efficient HVAC system.
Resource Savings: Based on an electricity price of $.07 per hour, this measure is projected to save the City approximately $67,700 annually.
Analysis Approach: The projected annual savings from the suite of energy efficiency upgrades is 967,090 kWh. This equals an annual reduction of almost 400 metric tons CO_2e.

B. Group II: Building on the City's Existing Actions

The Group II measures are those that can be implemented without a significant investment of resources. These actions include expansions of actions that the City is already undertaking, and which are already providing GHG emissions reduction benefits. In many

cases, the planning and/or development of pilot programs for these suggested actions have already been initiated by City of Everett employees.

It should be noted that conservative assumptions were used in making estimates of GHG savings from all measures. Where there is a range of resource and financial savings from a particular action, the lower end of the emissions savings and the higher end of the capital costs were assumed. In instances where there is currently not enough information to make a reliable estimation of emissions or cost savings, no estimate was provided. Instead, a recommendation was made to secure such data in the future.

Implementation of all Group II actions would account for a reduction of 1,422 metric tons of CO_2e by 2015 (approximately 2,968 MTCO_2e by 2020, and 5,585 MTCO_2e by 2030). These measures have been broken down by sector and are outlined below.

Table 3. Summary of Proposed Expansion Measures Analyzed

Proposed Expansion Measures	
Buildings and Facilities	**Class.**
(1) <u>High Performance HVAC</u> *<u>Emissions Reduction:</u>* 2015: 485 metric tons of CO_2e per year 2020: 971 metric tons of CO_2e per year 2030: 971 metric tons of CO_2e per year *<u>Measure Description</u>:* Retrofit HVAC systems in buildings with most efficient technology available. *<u>Resource Savings:</u>* The estimated payback period for this measure is 5-10 years. *<u>Analysis Approach:</u>* Determine the number of viable candidate facilities and estimate their heating and cooling loads, and reduce heating and cooling demand as appropriate for the technology. Set an implementation target of 50 percent complete by 2015, and 100 percent by 2020. Estimated electricity savings from this measure is 837,755 kWh, and estimated natural gas savings is 11,770 MMBtu.	**MP**
(2) <u>High Efficiency Lighting Expansion</u> *<u>Emissions Reduction:</u>* 2015: 320 metric tons of CO_2e per year 2020: 703 metric tons of CO_2e per year 2030: 1,405 metric tons of CO_2e per year *<u>Measure Description</u>:* Complete indoor lighting retrofits of all buildings to fluorescent by 2015. Complete indoor lighting retrofits to all solid state, LED lighting by 2020. *<u>Resource Savings:</u>* The estimated payback period for this measure is less than 2 years. *<u>Analysis Approach:</u>* Data received from City of Everett indicate retrofits of 2700 T-	**MP**

Proposed Expansion Measures	
12 fixtures to 2250 T-8 fixtures and 707 Metal Halide fixtures with 337 T-8 fixtures. For this analysis, each fixture type was assigned an assumed wattage based on the average for the fixture type. Total energy consumption and subsequent emissions were calculated in both the pre-retrofit and post retrofit case. This allowed for differences in the total number of fixtures to be captured. Reductions were calculated as the difference between pre and post-retrofit. Expansion is based on replicating the same type of retrofits to cover the remaining indoor lighting across facilities for 2015, recalculated for 50 percent LED in 2020 and 100 percent in 2030.	
Fleet	**Class.**
(3) <u>Expand Purchasing of Hybrid and Electric Vehicles</u> *<u>Emissions Reduction:</u>* 2015: 92 metric tons of CO_2e per year 2020: 205 metric tons of CO_2e per year 2030: 382 metric tons of CO_2e per year *<u>Measure Description</u>:* Phase in the purchase of Hybrid and Electric vehicles where appropriate to meet the use of a retiring vehicle. *<u>Resource Savings:</u>* Financial recovery on this action is specific to each vehicle and the changing cost of fuel over time. Those that are utilized greatly and travel more miles pay for themselves more quickly. Other vehicles that are seldom used may not pay for themselves in a reasonable timeframe. The average payback period calculated across the vehicles analyzed was 11 years, though many are under 5 and 10 years. *<u>Analysis Approach:</u>* For this analysis City of Everett fleet records were examined to first locate vehicles that would be potential candidates for a hybrid or electric vehicle. Using a vehicle replacement schedule provided by fleet department, vehicles were traded for a hybrid or electric model in the year they are expecting to retire. Fuel savings were calculated by applying the average miles traveled by each vehicle to the improved fuel economy of the hybrid model, or eliminated in the case of the electric model. Electric models were gradually phased in over time; one in 2015 and 2016, two in 2017 and made up a larger percentage of the vehicles purchased each year over time.	**MP**
(4) <u>Expand Purchasing of Hybrid Buses</u> *<u>Emissions Reduction:</u>* 2015: 138 metric tons of CO_2e per year 2020: 253 metric tons of CO_2e per year 2030: 1,835 metric tons of CO_2e per year *<u>Measure Description</u>:* Continue the purchase of hybrid buses so that by 2020, 100 percent of new bus purchases are hybrids. Maintain a policy of buying the most efficient available models thereafter. *<u>Resource Savings:</u>* Financial savings are dependent on the changing cost of fuel over the life of the bus. ICLEI analyzed the present value of the additional cost of	**HI**

Proposed Expansion Measures	
a hybrid bus with the projected increase in diesel fuel costs over the 15 year lifespan of a bus. It is estimated that the City would achieve a positive financial return on new buses beginning in the year 2018 according to the Reference Case fuel price projections, produced by the Energy Information Administration of the Department of Energy. Those positive financial flows occur in 2020 for the "low price" scenario and 2016 in the "high price" scenario. *Analysis Approach:* Calculate fuel use in each year by vehicle fuel economy and distance traveled, estimated at 40,000 miles per year. The annual fuel savings from one bus is approximately 2,600 gallons per year. This analysis accounts for future increase in total miles traveled from system expansion. Currently it is assumed that the marginal cost of a hybrid bus over a conventional bus remains at its current rate; however, this is likely to decline over time, improving the financial benefits of this measure. This analysis also assumes the current technology for future vehicle models; improvements to hybrid bus technology would improve both the financial and environmental benefits of this measure. Payback periods were analyzed using low and high future fuel price scenarios.	
(5) Employee Commute (Commute Trip Reduction) *Emissions Reduction:* 2015: 138 metric tons of CO_2e per year 2020: 277 metric tons of CO_2e per year 2030: 277 metric tons of CO_2e per year *Measure Description:* This measure estimates the impact of the City of Everett reaching its goal of 76% single occupancy vehicles for employee commute, from a current level of 84%. *Resource Savings:* There is no financial return to the City for this action. *Analysis Approach:* For this analysis the total change in miles traveled was calculated. The total number of employees from these two sites where this program is practiced is 1,131. The difference in the total number of miles traveled was calculated by estimating the number of employees that would need to change modes to meet the goal of 76% SOV (90 employees). Using an average VMT of 12.8 miles, the total reduction in annual miles for two trips on 250 workdays is 579,072 miles. This figure was entered into the ICLEI CACP Measures Module to calculate the emissions impact of 277 MTCO2e per year. It is assumed that only 50% of this total could be achieved by 2015.	**LHF**
Public Works	**Class.**
(6) Water Delivery Efficiency *Emissions Reduction:* 2015: 155 metric tons of CO_2e per year 2020: 466 metric tons of CO_2e per year 2030: 622 metric tons of CO_2e per year *Measure Description:* Retrofit 75 percent of water system lift stations to high efficiency, variable speed pumps by 2020, and 100 percent by 2030.	**MP**

Proposed Expansion Measures	
Resource Savings: The estimated payback period for this measure is 5-10 years. *Analysis Approach:* Characterize pumps used in lift stations and other facilities used for water conveyance. Analysis based on system optimization potential of 20 percent. Pump System energy use estimated by summing total usage at facilities with the primary purpose of pumping. No differentiation made for other miscellaneous loads at each facility (i.e. lighting). Facilities included are "3 Line Valves", Evergreen Pump Station, "Lift Stations", North Creek PS 1&2, "Reservoirs", South Lake Detention Pond, and "Tanks." This measure does not include potentially significant pumping savings at treatment facilities.	
(7) Greenwaste Composting *Emissions Reduction:* 1 metric ton of CO_2e per year 1 metric ton of CO_2e per year 1 metric ton of CO_2e per year *Measure Description:* Plant debris and animal bedding from the Streets and Parks departments is currently being combined with biosolids and composted. *Resource Savings:* The City currently pays for the processing of this material. A positive financial return will depend on the City's ability to market the resulting compost as a soil amendment. *Analysis Approach:* For this analysis the volume of material that is currently composted was converted into mass units, using typical bulk densities for grass and wood waste. The biosolids were not included in this analysis because no factors exist to model the emissions from landfilling this waste type. The mass of plant waste was entered into the ICLEI CAPPA Excel tool to convert to emissions impact. This tool is unique in that it only estimates the benefits of reduced landfill emissions and not emissions associated with upstream processes. It also approximates the annual impact of a reduction in landfilled material rather than the emissions avoided as waste breaks down in a landfill over time.	**MP**
Parks and Recreation	**Class.**
(8) Swim Center Pool Cover *Emissions Reduction:* 2015: 93 metric tons of CO_2e per year 2020: 93 metric tons of CO_2e per year 2030: 93 metric tons of CO_2e per year *Measure Description:* The large pool at the Everett Swim Center looses heat primarily as water evaporates from the surface. Covering the pool during off hours would reduce the amount of evaporation that occurs, thereby reducing heat loss saving natural gas and reducing amount of dehumidification that is necessary, and saving electricity. *Resource Savings:* The estimated payback period for this measure is 2 -5 years. *Analysis Approach:* For this analysis the worksheet provided by the City of Everett	**LHF**

Proposed Expansion Measures	
to calculate savings from the measure was configured to determine the reduced evaporation that would occur if the pool were covered each night after the swim center closes according to the daily hours of operation, obtained from Swim Center Staff.	

C. Group III: New Municipal Action/Activities

Group III actions are entirely new actions that the City is not currently undertaking. These actions may include greater effort or expense, and may be candidates for implementation along longer timelines than other measures. These measures may, for example, require regulatory changes, new staff or financial resources, or the need to establish and maintain long-term, organizational coordination and management systems.

Implementation of all Group III measures could collectively account for approximately **241 metric tons CO_2e reduction by 2015** (approximately 3,307 metric tons CO_2e by 2020, and 3,600 metric tons CO_2e by 2030). These measures have been broken down by sector and are outlined below.

Table 4. Summary of New Proposed Measures Analyzed

Proposed New Measures	
Buildings and Facilities	**Class.**
(1) <u>Plug Load Reduction Policy</u> *<u>Emissions Reduction:</u>* 2015: 10 metric tons of CO_2e per year 2020: 21 metric tons of CO_2e per year 2030: 21 metric tons of CO_2e per year *<u>Measure Description</u>:* Create a comprehensive plug load reduction policy that includes a combination of employee education and controls for office equipment. Make current energy reporting to facility managers actionable with either performance metrics or recognition for reducing energy use. Outfit each workstation with more control devices such as smart strips for peripheral devices to reduce "phantom loads." *<u>Resource Savings:</u>* The estimated payback period for this measure is less than two years. *<u>Analysis Approach:</u>* Estimate number of workstations and phantom load from typical configuration; reduce by the total annual phantom load from hours not in use. Phantom loads for typical office equipment calculated using data from Lawrence Berkeley National Labs.	**LHF**

Proposed New Measures	
(2) <u>Vending Misers</u> *<u>Emissions Reduction:</u>* 2015: 11 metric tons of CO_2e per year 2020: 11 metric tons of CO_2e per year 2030: 11 metric tons of CO_2e per year *<u>Measure Description</u>:* Install "vending-misers" on vending machines at city owned facilities, including parks. *<u>Resource Savings:</u>* The estimated payback period for this measure is less than 2 years. *<u>Analysis Approach:</u>* Count the total number of vending machines. Calculate total usage based on typical vending machine usage; reduce 30 percent as experienced in multiple other locations.	**LHF**
(3) <u>IT Consolidation</u> *<u>Emissions Reduction:</u>* 2015: 0 metric tons of CO_2e per year 2020: 132 metric tons of CO_2e per year 2030: 132 metric tons of CO_2e per year *<u>Measure Description</u>:* Co-locate all City of Everett servers and large IT equipment in a single location with precise temperature controls and an optimal cooling configuration. Consider "cloud" based solutions for any future expansion of IT infrastructure. *<u>Resource Savings:</u>* The estimated payback period for this measure is 5-10 years. *<u>Analysis Approach:</u>* Count and characterize current server configurations, estimate cooling load. Recalculate with optimal configuration. Estimated savings from high efficiency servers is 30 percent; estimated savings from optimal cooling load configuration is 15 percent. Based on 75 total servers and 3 virtual machines across all facilities.	**MP**
(4) <u>Green Purchasing</u> *<u>Emissions Reduction:</u>* 2015: 35 metric tons of CO_2e per year 2020: 70 metric tons of CO_2e per year 2030: 106 metric tons of CO_2e per year *<u>Measure Description</u>:* Replace all non-Energy Star office equipment and appliances with Energy Star rated models. Require energy and water efficiency as a primary consideration for all future purchasing decisions. *<u>Resource Savings:</u>* The estimated payback period for this measure is less than two years. *<u>Analysis Approach:</u>* Determine extent of existing Energy Star rated office equipment and appliances in inventory; expand to other equipment and appliance types as applicable and calculate savings. This analysis assumes a fixed level of efficiency from Energy Star rated equipment and appliances in the future; however, efficiencies are likely to continue improving, which would increase the financial and environmental benefit of this measure. Equipment inventory provided by City of Everett.	**LHF**

Proposed New Measures	
Fleet	**Class.**
(5) Route Optimization *Emissions Reduction:* 2015: 138 metric tons of CO_2e per year 2020: 138 metric tons of CO_2e per year 2030: 138 metric tons of CO_2e per year *Measure Description:* Utilize GIS-based route optimization software such as ArcLogistics to plan the most efficient routes minimizing total distances traveled by vehicles with regular routes. *Resource Savings:* The estimated payback period for this measure is less than one year. *Analysis Approach:* The analysis of route optimization was limited to the Everett Paratransit Service, vehicles which typically have multiple stops each time they go out, but without an established route. To model the effect of this measure, total miles annual for each of these vehicles was conservatively reduced by 15%. ESRI, the software provider of the software estimates up to a 20% reduction in mileage. Using the vehicles current fuel economy, a volume of gasoline savings was calculated and emissions reduction computed from that figure.	**MP**
Public Works	**Class.**
(6) Water Pollution Control Facility Anaerobic Digester *Emissions Reduction:* 2015: 0 metric tons of CO_2e per year 2020: 2,720 metric tons of CO_2e per year 2030: 2,977 metric tons of CO_2e per year *Measure Description:* Retrofit wastewater treatment plant to utilize anaerobic digestion for solids stabilization. Collect biogas for fuel in a combined heat and power application at the facility. Target completion date is 2030. *Resource Savings:* The estimated payback period for this measure is less than 15 years. *Analysis Approach:* Estimate total biogas potential based on the size of the population served. Determine electricity production potential with best available technology and fossil-based heating displacement. Population served determined from City of Everett 2006 Comprehensive Sewer Plan. Calculation assumes that 60 percent of incoming solids result in sludge during primary settling and total solids produced are double amount from primary settling. Biogas production assumes 75 percent of incoming biosolids are volatile, 50 percent destruction efficiency of volatile solids, and 15 standard cubic feet of biogas produced per pound of destroyed volatile solids. Energy Generation assumes energy content of 619 Btu/scf of biogas. All assumptions and calculation methods derived from EPA Process Design Manual for Sludge Treatment and Disposal, Chapters 4 and 10.	**HI**

Proposed New Measures	
Police	**Class.**
(7) <u>Cruiser Idle Reduction</u> *<u>Emissions Reduction:</u>* 2015: 0 metric tons of CO_2e per year 2020: 149 metric tons of CO_2e per year 2030: 149 metric tons of CO_2e per year *<u>Measure Description</u>:* Purchase and install backup power supply technologies in all police cruisers, allowing critical electrical systems to remain in use and battery charged without needing to run the engine. The Everett Police Department has looked into this technology previously and determined it is not sufficiently developed to be reliable. For this reason a potential emissions reduction is not included until the year 2020, when the technology has had more time to mature. *<u>Resource Savings:</u>* The estimated payback period for this measure is less than five years. *<u>Analysis Approach:</u>* For determining the reductions associated with this idle reduction technology, the current fuel economy of the fleet of police cruisers was increased 18% in line with manufacturer claims. This new fuel economy was applied to the distances that each cruiser travels to obtain a total amount of fuel consumed with the devices. This number was subtracted from the original total fuel consumption to compute the reduction in fuel use and subsequent emissions reduction.	**MP**
(8) <u>Increase Bicycle Police</u> *<u>Emissions Reduction:</u>* 2015: 9 metric tons of CO_2e per year 2020: 9 metric tons of CO_2e per year 2030: 9 metric tons of CO_2e per year *<u>Measure Description</u>:* Increased bicycle mounted police patrols to reduce marked cruiser patrols, and associated fuel use. It is assumed that an additional 3 patrols could be accommodated given weather and other constraints. *<u>Resource Savings:</u>* The estimated payback period for this measure is immediate. There are ample existing bicycles in the police inventory to support additional use of this type of policing. *<u>Analysis Approach:</u>* It was assumed that the average bike officer travels 20 miles per patrol. Combined with an average fuel efficiency of a cruiser of 10 MPG, a volume of gasoline reduced and subsequent emissions were calculated.	**LHF**
(9) <u>Motorcycle Mounted Police</u> *<u>Emissions Reduction:</u>* 2015: 38 metric tons of CO_2e per year 2020: 57 metric tons of CO_2e per year 2030: 57 metric tons of CO_2e per year *<u>Measure Description</u>:* Increase the number of Police Patrols using motorcycles as opposed to marked cruisers. *<u>Resource Savings:</u>* As motorcycles are considerably cheaper than police cruisers,	**LHF**

Proposed New Measures	
the estimated payback period for this measure is less than one year. *Analysis Approach:* Analyze potential for increasing more fuel-efficient motorcycles in place of police cruiser trips. Based on average weather-contingent mileage for current motorcycle patrols. Assumes six motorcycle patrols (from three currently) by 2015, and nine by 2020.	

D. Summary of Measures Impact

The table below shows the total projected annual reduction possible from implementation of all measures described in this document.

Table 5. Net Annual Impact of All New Proposed Measures

Impact of Proposed Measures – $MTCO_2e$	2015	%	2020	%	2030	%
Total Annual Reduction from Expansion Measures	1,423	5%	2,968	11%	5,585	21%
Total Annual Reduction from New Measures	241	1%	3,307	12%	3,600	14%
Total Annual Reduction from All New Measures	1,664	6%	6,275	24%	9,185	35%

As seen in the above chart, the net annual impact of the 18 proposed new actions is an estimated GHG reduction of over 1,660 metric tons CO_2e by 2015. This would equal an approximately six percent decrease in annual emissions, from the 2001 baseline year, in addition to the 11 percent reduction gained from existing measures. The impact of the potential new measures increases with time, as more projects come online; in 2020 the projected annual emissions savings is 6,275 metric tons CO_2e; this represents roughly 24 percent of the City's 2001 baseline emissions. By 2030, the annual GHG reduction from new measures is projected to be 9,185 metric tons CO_2e, which is about 35 percent of the City's 2001 baseline emissions.

5. Next Steps

Consideration of whether to formally adopt this Climate Action Plan is at the discretion of the elected leaders of the City of Everett. Implementation of some or all of the measures described within this document will depend on their integration into existing work plans and budgets by Everett City staff. Some of the measures described in this document are short-term and may be implemented within the next few years, while others are appropriate for consideration and inclusion in medium or longer-term planning documents, but will not be implemented in the near future.

Measures that are implemented can be tracked and their performance measured against anticipated outcomes; since conservative estimates were deliberately used throughout, some measures may perform better than estimated.

To determine which measures to pursue in the near term, the City can look to measures described in Section III, Group II, which build and expand on actions the City is already undertaking. The City can consider mechanisms for capturing some of the economic savings from investments in efficiency and conservation, and leverage this cost savings to implement the next round of improvements. Similarly, the City's existing efforts place it in an advantageous position to attract grant funding for implementation of future projects that reduce GHG emissions, save energy, and demonstrate other beneficial environmental outcomes.

As a longer term next step, the City of Everett may choose to begin the GHG inventory process – and eventually the Climate Planning Process – for the wider community. This step often follows the municipal operations work, and the City of Everett would be joining many of its peers around the region, and around the country, if it choses to follow this path. A Community Inventory and Climate Action Plan offer a more comprehensive and farther-reaching opportunity to reduce Everett's GHG emissions, and ultimately will help the City build a more livable community both today and in the future.

To assist the City in developing one or more implementation pathways for the proposed new measures – Groups II & III – new measures are classified into three groups, identified in the tables below with acronyms corresponding to three levels of potential impact: 'Low-Hanging Fruit' (LHF); 'Measured Progress' (MP); or 'High Impact' (HI). These designations represent just one criteria category that the City can utilize in developing priorities for the implementation of the various measures contained in this plan. *Low Hanging Fruit* are measures that have relatively low impact but relatively low cost and quick returns on investment (ROI). The *Measured Progress* classification includes measures that have medium-term ROI, such as 2-5 years, but do not have immense capital costs, or have known funding opportunities or pathways. *High Impact* measures have either high capital costs or longer-term ROI (over 10 years), but would produce large emissions reductions.

There are multiple implementation pathways the City can pursue in putting these measures into practice. For example, bundling and implementing just the *Low Hanging Fruit* measures yields an annual GHG reduction of approximately 335 metric tons CO_2e within the next five years, with an assumed ROI of less than two years for most measures. These measures, taken together, represent actions the City can take without extensive new funding or reallocation of City funds or staff resources. Expanding on the City's ongoing efforts offers an implementation pathway that leverages existing staff familiarity with the types of processes and technologies under consideration. Expansion also allows the City to utilize funding mechanisms such as revolving loan funds to capture savings from existing work and use it to fund expanded work without additional draw-down from general funds. This is particularly germane to expansion measures that build on existing activities funded through the Energy Efficiency and Conservation Block Grant (EECBG) program, or other stimulus (ARRA) funded projects and programs.

An alternative approach would be to target the *High Impact* measures and spend the capital now to realize maximum GHG emissions reductions, with the return on that investment coming over time. Implementation of the two designated *High Impact* measures would mean very high up-front costs, but would reduce annual emissions by nearly 3,000 metric tons CO_2e within ten years; however the ROI would likely not be realized for another ten years beyond that.

City staff can best identify where existing or available resources – such as grant funding, internal revolving loan funds, or budget allocations – match with the opportunities presented in this Climate Action Plan, and assemble the short, medium, and long-term implementation pathways that the City will pursue.

6. Conclusion

Global climate change has been described as the single greatest environmental threat facing civilization. It presents governments at all levels with complicated challenges, from managing their own operations and the associated economic impact of rising energy costs, to protecting their citizens and planning for an uncertain future. In particular, local governments globally have stepped forward to meet these challenges by preparing for the impacts of climate change that are unavoidable (referred to as 'climate adaptation' and 'community resilience') and also by taking responsibility for reducing the emissions levels under their jurisdiction (referred to as 'climate mitigation'). The City of Everett's municipal GHG emissions, totaling 26,503 metric tons CO_2e (as of 2001), are a piece of the global picture and by joining other leading communities to reduce its emissions profile, the City of Everett will expand the impact of collective action. By committing to reducing the GHG emissions generated by its own municipal operations, the City is not only helping to solve a global problem, but it is also setting an example for its homeowners, local businesses, children and every person who comprises the Everett community. The commissioning of this report demontrates a recognition from the City that by doing its part, it is establishing a commitment to a more sustainable future for its own citizens, for the Pacific Northwest, and the global community.

Choosing to develop and implement a Climate Action Plan can have ancillary benefits that extend beyond direct GHG emissions reductions. For example, the City is now well poised to respond to and implement future state or federal regulations that will mandate the reporting of municipal GHG emissions. Many of the measures detailed in this plan will also result in costs savings for the City government once implemented, which can help to balance the budget and potentially free up local funds for city services like fire or police. Additionally, a GHG inventory and emissions reduction plan is also a proven advantage in securing funding for future sustainability programs and infrastructure. These advantages will serve Everett in the future.

Based on our analysis, the sectors with the greatest reduction potential are the City's water delivery system and wastewater treatment, for electricity reductions, and the City's municipal fleet, including Everett Transit. While some changes may come from technological advances and may not be realized for ten or more years from now, some reductions can be realized in the immediate future. This document is a starting point for identifying opportunities.

When implemented, the GHG emissions reduction strategies contained in this report would reduce the City's annual operational emissions by approximately 1,664 metric tons CO_2e within the next five years and by over 9,000 metric tons CO_2e by 2030. By setting goals for the future, the City can benchmark reductions against its baseline emissions, and set future targets that build and expand upon this plan. The municipal Climate Action Plan, like any plan, is a living document; new information, new laws and regulations, and new technologies will alter our perception of what is possible to achieve. Even as the City works

to reduce emissions, external forces such of population growth, economic growth, and changing energy supplies can continue driving emissions up. However, based on this analysis, after implementation of this entire plan, the City's annual operational emissions are anticipated to decrease to approximately 17,370 metric tons CO_2e by 2030, a decrease of 40 percent compared to the City taking no further action to reduce emissions.

This plan therefore is a crucial first step in tackling the challenges of climate change, but only a first step. In the long-term, the City's largest contributions to community-wide emissions reductions will not be achieved exclusively through the operational changes described in this document. The City can have the greatest impact on GHG emissions by focusing on the ways in which the municipality can affect the trajectory of community-wide emissions, predominantly through the local and regional transportation system. While this depends on the behaviors and decisions of the community, there are numerous levers and channels through which the City can exert influence, including its regulatory, planning, education, and partnership functions.

The City of Everett and its residents and businesses had already demonstrated a commitment to environmental sustainability before the creation of this plan; this effort builds off a long list of ongoing efforts to improve the health and quality of life of Everett's citizens. These efforts will improve community livability today and ensure that the present generation is able to pass on a vibrant, healthy community to its children.

Appendix A: List of Acronyms

ARRA: American Recovery and Reinvestment Act
CACP: Clean Air and Climate Protection Software
CAPPA: Climate and Air Pollution Planning Assistant
CAP: Climate Action Plan
CCP®: Cities for Climate Protection
CH_4: Methane, a greenhouse gas
CIG: Climate Impacts Group (University of Washington)
CPU: Central Processing Unit
CTR: Commute Trip Reduction program
CO_2e: Carbon dioxide equivalents; e.g., carbon dioxide, methane, nitrous oxide
DOE: Department of Energy
EECGB: Energy Efficiency and Conservation Block Grant
EPA: Environmental Protection Agency
FTE: Full Time Employee
GHG: Greenhouse Gas; e.g. carbon dioxide, methane, nitrous oxide
GWP: Global Warming Potential
HPS: High Pressure Sodium
HVAC: Heating, Ventilation and Air Conditioning
ICLEI: International Council for Local Environmental Initiatives
IPCC: International Panel on Climate Change
IT: Information and Technology
kWh: kilowatt hours
LCD: Liquid Crystal Display
LED: Light Emitting Diode
LEED: Leadership in Energy and Environmental Design
MGD: Million Gallons per Day
N_2O: Nitrous Oxide, a greenhouse gas
PSE: Puget Sound Energy
PUD: Public Utility District
SOV: Single Occupant Vehicle
TBD: To Be Determined
TDM: Transportation Demand Management
VMT: Vehicle Miles Traveled
WSDOT: Washington State Department of Transportation

Appendix B: Definitions

Atmosphere—The atmosphere is the gaseous envelope surrounding a planet. The Earth's atmosphere consists primarily of nitrogen (79.1 percent by volume) and oxygen (20.9 percent by volume), with carbon dioxide (CO_2) representing approximately 0.03 percent. In addition, the atmosphere contains traces of argon, krypton, xenon, neon, and helium, plus water vapor, traces of ammonia, organic matter, ozone, various salts, and suspended solid particles.

Baseline—A hypothetical scenario for what GHG emissions, removals or storage would have been in the absence of the GHG project or project activity typically determined by a base year.

Base Year— CCP participants are encouraged to select an emissions analysis base year by finding the earliest year for which they can get efficiently collect comprehensive and reliable data. The year 2001 was selected as the Base Year for the Bellevue analysis.

Biodiesel—Biodiesel is a domestically produced, renewable fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant greases. Biodiesel is safe, biodegradable, and reduces greenhouse gases and other air pollutants such as particulates, carbon monoxide, hydrocarbons, and air toxics. Blends of 20 percent biodiesel with 80 percent petroleum diesel (B20) can generally be used in unmodified diesel engines; however, users should consult their OEM and engine warranty statement. Biodiesel can also be used in its pure form (B100), but may require certain engine modifications to avoid maintenance and performance problems and may not be suitable for wintertime use. Users should consult their engine warranty statement.

Carbon Cycle—The carbon cycle is a general term used to describe all reservoirs and flows of carbon on Earth. The flows tend to be cyclic in nature. For example, carbon removed from the atmosphere (one reservoir) and converted into plant tissue (another reservoir) is returned back into the atmosphere when the plant is burned or decomposes.

Carbon Dioxide—Carbon dioxide, abbreviated CO_2, is essential to living systems and released by animal respiration, decay of organic matter and fossil fuel burning. It is removed from the atmosphere by photosynthesis in green plants. The amount of CO_2 in the atmosphere has increased by about 25 percent since the burning of coal and oil began on a large scale. Atmospheric carbon dioxide varies by a small amount with the seasons, and the ocean contains many times the amount of the gas that exists in the atmosphere.

Carbon Dioxide Concentration—The atmospheric carbon dioxide concentration, at 353 parts per million on a volume basis (ppmv) in 1990, is now about 25 percent greater than the pre-industrial (1750-1800) value of about 280 ppmv, and higher than at any time in at least the last 160,000 years. Carbon dioxide is currently rising at about 1.8 ppmv (0.5 percent) per year due to human-caused emissions and currently accounts for approximately 84 percent of U.S. GHG emissions.

Chlorofluorocarbons (CFCs)—CFCs are compounds of carbon that contain some chlorine and some fluorine. CFCs do not occur naturally; they are synthetic products used in various industrial processes and also as propellant gas for sprays. CFCs are typically used in refrigerants, solvents, foam-makers and for use in aerosol sprays. CFCs are significant contributors to ozone depletion and also contribute to global warming.

Climate—The term climate represents average weather together with its variability of representations of the weather conditions for a specified area during a specified time interval (usually decades or longer).

Criteria Air Pollutants —The term criteria air pollutants refers to pollutants that are regulated under the U.S. Clean Air Act. As with carbon dioxide, the major sources of these pollutants are fossil fuels. Most measures that reduce carbon dioxide emissions also reduce criteria air pollutants. Criteria air pollutants include nitrogen oxides (NOx), volatile organic compounds (VOCs), carbon monoxide (CO), sulfur oxides (SOx), and particulate matter smaller than ten microns in diameter (PM-10). The CACP software provides estimated emissions of criteria air pollutants as well as GHGs for emissions analyses and reduction benefits of measures.

Equivalent Carbon Dioxide (CO_2e)—Equivalent carbon dioxide, abbreviated as CO2e and also known as global warming potential (GWP), is a unit that allows emissions of greenhouse gases of different strengths to be added together and framed in terms of comparative units. For carbon dioxide itself, emissions in tons of CO_2 and tons of CO2e are identical, whereas for methane, an example of a stronger greenhouse gas, one ton of methane emissions has the same GWP as 21 tons of CO_2. Thus 1 ton of methane emissions can be expressed as 21 tons CO2e.

Emissions Analysis—The emissions analysis represents the first milestone in ICLEI's Cities for Climate Protection methodology. It includes both base year inventories and forecasts of GHG growth for municipal operations and the community as a whole.

Ethanol Blend (E85)—Ethanol is an alcohol-based alternative fuel produced by fermenting and distilling starch crops that have been converted into simple sugars. Feedstocks for this fuel include corn, barley, and wheat. Ethanol can also be produced from "cellulosic biomass" such as trees and grasses. Ethanol is most commonly used to increase octane and improve the emissions quality of gasoline. Ethanol can be blended with gasoline to create E85, a blend of 85 percent ethanol

and 15 percent gasoline. E85 and blends with even higher concentrations of ethanol, E95, for example, qualify as alternative fuels under the Energy Policy Act of 1992 (EPAct). Vehicles that run on E85 are called flexible fuel vehicles (FFVs) and are offered by several vehicle manufacturers. See the EERE's ethanol vehicles page for more information on FFVs. In some areas of the United States, lower concentrations of ethanol are blended with gasoline. The most common low concentration blend is E10 (10 percent ethanol and 90 percent gasoline). While it reduces emissions, E10 is not considered an alternative fuel under EPAct regulations.

Forecast Year—Any future year in which predictions are made about emission levels based on growth multipliers applied to the base year.

Global Warming—Global warming describes the recent trend of increasing average global surface and tropospheric temperatures that scientists believe is caused by increased emissions of human-induced greenhouse gases. The greenhouse gases (CO_2, methane, nitrous oxides and CFCs) are emitted into the atmosphere and increase the atmosphere's "entrapment" of heat.

Greenhouse Gases and the Greenhouse Effect—The Earth's climate is determined by a delicate balance between the solar energy that arrives from space and the heat energy that the Earth creates from the sun's rays. The energy that arrives from space should always equal the energy that the Earth emits back to space. When something disturbs this balance, our climate adjusts by cooling or warming the Earth to return things to normal. A portion of outgoing heat energy is absorbed in the atmosphere by greenhouse gases such as water vapor, carbon dioxide, methane, and nitrous oxide. If these trace gases were not present, the average temperature on the Earth's surface would be -32 degrees Fahrenheit, and life as we know it would not have evolved here. But the natural greenhouse effect keeps the average global surface temperature at a comfortable 59 degrees Fahrenheit.

Today, the atmospheric concentration of the most important greenhouse gas, carbon dioxide, is higher than it has been in the past 650,000 years. Scientists participating in the British Antarctic Survey have succeeded in charting the atmospheric concentration of carbon dioxide over the last 800,000 years. Their research has shown that temperature unfailingly rises and falls in response to carbon dioxide levels. This increase is the result of an increased reliance on fossil fuels and deforestation, which has caused an imbalance between the absorption and release of carbon dioxide by vegetation. Other greenhouse gases, also found in the atmosphere in increasing amounts, are methane, nitrous oxide and the chlorofluorocarbons (CFCs).

IPCC—Intergovernmental Panel on Climate Change—The Intergovernmental Panel on Climate Change (IPCC) was jointly established in 1988 by the World Meteorological Organization and the United Nations Environment Programme to:

• Assess available scientific information on climate change;

• Assess the environmental and socio-economic impacts of climate change; and
• Formulate response strategies.

The IPCC does not conduct research, but provides a process for climate experts from the world's leading universities and government institutions to synthesize the most recent scientific findings every five to seven years. The IPCC has issued comprehensive assessments for political leaders in 1990, 1996, 2001 and 2007.

The Fourth Assessment Report (AR4) was released in February of 2007 and represents the most comprehensive synthesis of climate change science to date. Experts from more than 130 countries have contributed to this assessment over a six year period. More than 450 lead authors have received input from more than 800 contributing authors, and an additional 2,500 experts peer-reviewed the draft documents.

Findings and Projections from the 2007 IPCC Report:

- "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level."
- "Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly **as a result of human activities** since 1750 and now far exceed pre-industrial values."
- "The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land-use change, while those of methane and nitrous oxide are primarily due to agriculture."
- "The observed widespread warming of the atmosphere and ocean, together with ice mass loss, support the conclusion that it is *extremely unlikely* that global climate change of the past fifty years can be explained without external forcing [including anthropogenic sources], and *very likely* that it is not due to known natural causes alone."

(Source: IPCC WGI Fourth Assessment Report Summary for Policy Makers)

Interim Year—Any year for which an emissions inventory is completed that falls between the base year and the target year. Completing an emissions inventory for an interim year is useful in determining a jurisdiction's progress towards meeting their emission reduction goals.

Inventory—The quantification of all emissions within the jurisdiction's boundaries during a particular year.

Kyoto Protocol—The Kyoto protocol was adopted by consensus at the third session of the Conference of the Parties (COP-3) in December 1997 in Kyoto, Japan. When ratified by a certain percentage of participating countries, it contains legally binding emissions targets for developed countries in the post-2000 period. By arresting and reversing the upward trend in greenhouse gas emissions that started in these countries 150 years ago, the Protocol promises to move the international

community one step closer to achieving the Convention's ultimate objective of preventing "dangerous anthropogenic [human-induced] interference with the climate system."

According to the Protocol, developed countries commit themselves to reducing their collective emissions of six key greenhouse gases by at least 5 percent. This group target will be achieved through cuts of 8 percent by Switzerland, most Central and East European states, and the European Union (the EU will meet its target by distributing different rates among its member states); 7 percent by the US; and 6 percent by Canada, Hungary, Japan, and Poland. Russia, New Zealand, and Ukraine are to stabilize their emissions, while Norway may increase emissions by up to 1 percent, Australia by up to 8 percent, and Iceland 10 percent. The six gases are to be combined in a "basket", with reductions in individual gases translated into "CO_2 equivalents" that are then added up to produce a single figure. In 2005, the Kyoto Protocol went into effect after 141 countries signed on to the agreement.

Measures—For the purposes of this standard, measures are any action taken to reduce GHG emissions.

Methane—Methane, abbreviated CH_4, accounted for about 8.6 percent of U.S. GHG emissions in 2005. Methane is produced by anaerobic decomposition of solid waste in landfills and sewage treatment facilities, wetlands and rice paddies, as a byproduct of fossil fuel energy production and transport and also from outgassing in livestock. It is also the principle constituent of natural gas and can leak from natural gas production and distribution systems and is emitted in the process of coal production. The methane concentration in the atmosphere has been rising steadily for several centuries, keeping pace with the increase in the world population and expansion of the world economy.

Metric Ton (Also referred to as a Tonne) **—**Common international measurement for the quantity of GHG emissions, equivalent to 1000 kilograms, about 2,204.6 pounds or 1.1 short tons.

Nitrous Oxide—Nitrous oxide or N_2O (not to be confused with nitrogen oxides or NOx) is a potent greenhouse gas accounting for about 5.1 percent of U.S. CO_2e emissions in 2005. Main sources for this GHG are nitrogen fertilization of agricultural soils, agricultural run-off and motor vehicles equipped with catalytic converters.

Ozone—An ozone molecule consists of three atoms of oxygen. Ozone is much more reactive than oxygen and is toxic to human beings and living matter. At ground level it forms smog and causes damage to forests and humans. (In the stratosphere, it functions mainly as a filter for ultra-violet radiation and to a lesser extent as a greenhouse gas.) Ground level ozone formation is closely connected to climate change since the primary sources of emissions that cause it (e.g., motor vehicle use) also produce global warming pollutants. Additionally the formation of ground level

ozone requires not only pollutants but also heat and sunlight. As regions get hotter due to global warming, local ozone smog problems tend to be exacerbated.

Target Year—The year by which the emissions reduction target should be achieved. See also "Forecast Year."

Tonne(s) (Also referred to as a Metric Ton)**—**Common international measurement for the quantity of GHG emissions, equivalent to 1000 kilograms, about 2,204.6 pounds or 1.1 short tons.

Ultra-low Sulphur Diesel—Ultra-low sulfur diesel (ULSD) has begun to replace conventional diesel fuel. This new fuel contains 97 percent less sulfur than conventional diesel, is cleaner burning, and produces less particulate emissions in all engine types.

UNFCCC—The United Nations Framework Convention on Climate Change is the foundation of global efforts to combat global warming. Opened for signature at the Rio Earth Summit in 1992, its ultimate objective is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-induced] interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."