# Greenhouse Gas Inventory

## County Operations Emissions for 2008-2014

Washington County Oregon Sustainability Program for the Generations

Published June 2016

# Table of Contents



# List of Figures



# List of Tables

# Introduction

## Washington County has made a commitment to analyze the environmental impacts associated with internal operations.

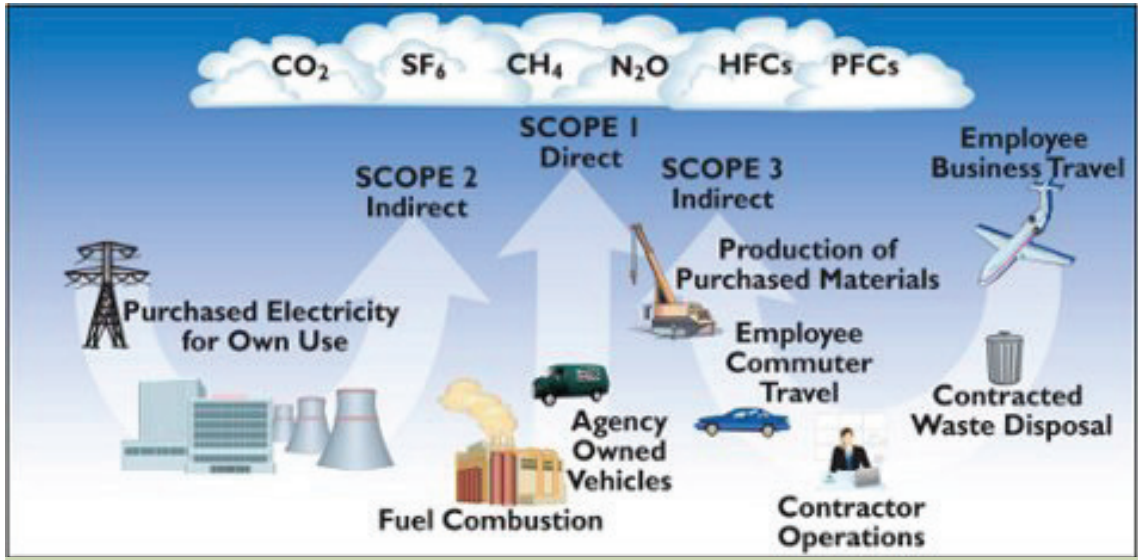
Specifically, the County measured the greenhouse gas (GHG) emissions generated by five primary sources: building energy, building operations, transportation, employee commute and supply chain purchases. In 2011, the County conducted a baseline GHG inventory using 2008 data from all County department operations, which includes everything from public safety services to construction permitting to road maintenance to libraries. The current inventory builds on the 2008 baseline, and adds 2009-2014 data to show trends over time.

As a way to mitigate against climate change, many corporations, government agencies, universities, non-profits and even individuals have proactively sought to reduce their GHG emissions through operational changes, efficiency upgrades, occupant engagement and management improvements. Emissions from local government operations are significant, so reduction efforts have important positive impacts. The County would like to reduce the negative impacts of GHG emissions on human health, economies and the environment for current and future generations. This report will be used to engage County leaders to help manage risk, reduce climate impacts and inform investment decisions to reduce emissions.

# Inventory Boundaries

Sources of GHG emissions are classified based on whether the emissions are direct or indirect. Direct emissions are those that stem from sources owned or controlled by an organization. Indirect emissions occur as a result of an organization's mission-critical activities for which the direct source of emissions is controlled by a separate entity. Another way to think about these emissions is that the direct emissions are "owned" by the organization and indirect emissions are "shared" with other entities. To distinguish between direct and indirect emissions, three scopes are defined in the GHG accounting protocol.

Figure 1: Greenhouse Gas Emissions Scopes — Source: US Department of Energy




**Scope 1** - Direct sources of GHG emissions that originate from equipment and facilities owned or operated by Washington County, such as mobile combustion (i.e., fleet vehicles) and stationary combustion (i.e., natural gas and generator diesel).

**Scope 2** - Indirect GHG emissions from purchased electricity for Washington County facilities.

**Scope 3** - All other indirect sources of GHG emissions that may result from the activities of Washington County, but occur from sources owned or controlled by someone else (e.g., business air travel, material goods purchased, services contracted by the County, employee commute and landfilled solid waste).

# Executive Summary

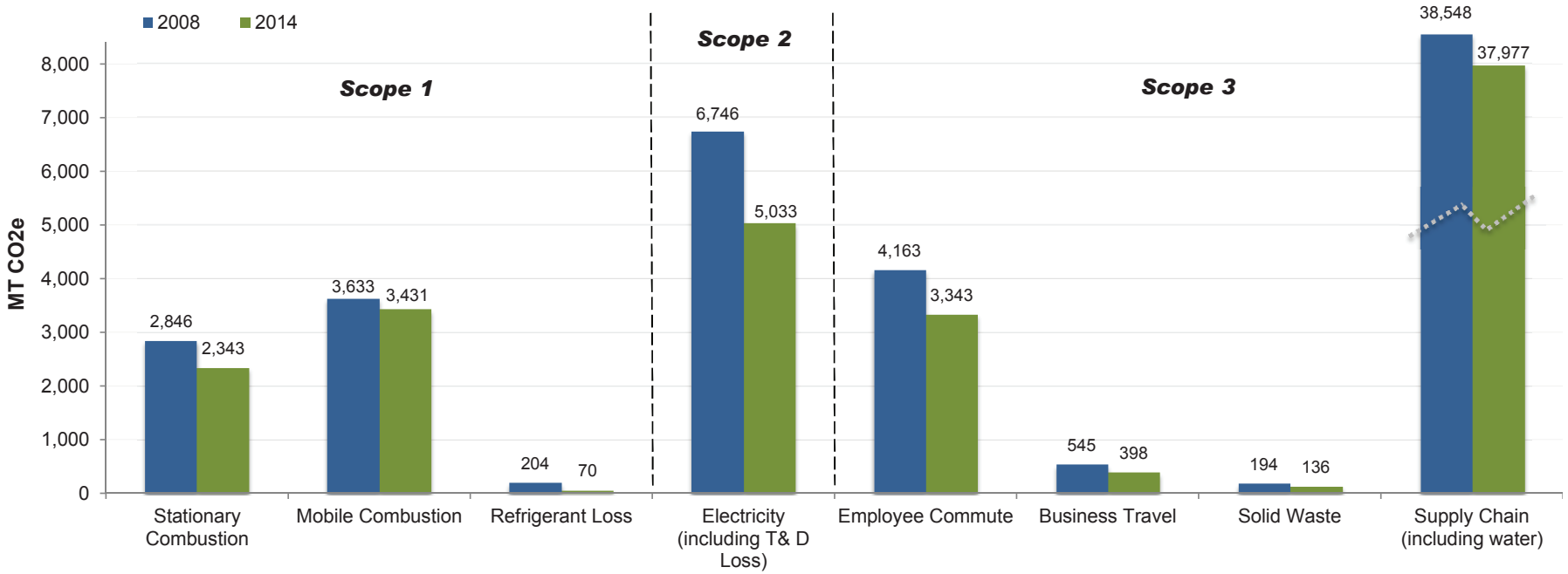
All GHG emissions sources dropped from 2008 to 2014. Total emissions for Washington County operations in 2014 were calculated at 52,732 MT CO2e. Scopes 1 and 2 yield 10,877 MT CO2e. Scope 3 emissions (including an estimate of supply chain emissions) were calculated at 41,855 MT CO2e[1].

Key highlights include:

- Total GHG emissions showed a -7% drop from 2008 to 2014
- Emissions intensity per Full-Time Equivalent (FTE) County Employee showed a -10% drop from 2008 to 2014
- Scope 1 emissions are calculated at 5,844 MT CO2e for 2014, a -13% drop from 2008 to 2014
- Scope 2 emissions are calculated at 5,033 MT CO2e for 2014, a -25% drop from 2008 to 2014
- Scopes 1 and 2 combined emissions total dropped -19% from 2008 to 2014
- Scope 3 emissions total showed a -4% drop from 2008 to 2014

All emissions are reported in metric tons of carbon-dioxide equivalent (MT CO2e). The analysis covers carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and the groups of high Global Warming Potential (GWP) gases, hydrofluorocarbons (HFCs). Overwhelmingly, Washington County's direct and indirect GHG emissions are CO2 from combustion of fossil fuels.

## Figure 2: Greenhouse Gas Emissions Comparison between 2008 and 2014




[1] Because calculating supply chain emissions is relatively time-consuming, that component of Scope 3 emissions is not calculated for every year in the inventory. The missing years are estimated based on the average of the calculated years (2008, 2009 and 2011).

The table below includes a year-over-year summary of the County's GHG emissions. For a sense of scale, the calculated emissions for Scopes 1 and 2 in 2014 are equivalent to 1,496 homes' electricity use for one year.[2] The 2014 Scope 3 emissions are equivalent to 5,757 homes' electricity use for one year. Looking at the GHG trends by source each year shows reductions across the board. Actions taken by the County to improve the sustainability of operations are having a positive impact on reducing emissions. The total emissions reduction from 2008 to 2014 (4,148 MT CO2e) is equivalent to growing 106,359 trees for 10 years.

## Table 1: 2008-2014 Greenhouse Gas Emissions Summary (reported in MT CO2e)

| Emissions Category | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | % Change 2008 to 2014 |
|---|---|---|---|---|---|---|---|---|
| **Scope 1 Totals** | **6,683** | **6,848** | **6,497** | **6,408** | **6,113** | **5,948** | **5,844** | **-13%** |
| **Stationary Combustion** | 2,846 | 3,140 | 2,917 | 2,752 | 2,585 | 2,542 | 2,343 | -18% |
| **Mobile Combustion** | 3,633 | 3,504 | 3,580 | 3,656 | 3,528 | 3,406 | 3,431 | -6% |
| **Fugitive Emissions** | 204 | 204 | 0 | 0 | 0 | 0 | 70 | -66% |
| **Scope 2 Totals** | **6,746** | **6,761** | **6,518** | **6,227** | **4,764** | **4,759** | **5,033** | **-25%** |
| **Electricity** | 6,746 | 6,761 | 6,518 | 6,227 | 4,764 | 4,759 | 5,033 | -25% |
| **Scope 1 + Scope 2 Subtotal:** | **13,430** | **13,609** | **13,015** | **12,635** | **10,877** | **10,707** | **10,877** | **-19%** |
| **Scope 3 Totals** | **43,450** | **33,819** | **41,635** | **49,103** | **41,581** | **41,530** | **41,855** | **-4%** |
| **Employee Commute** | 4,163 | 3,690 | 3,253 | 3,079 | 3,118 | 3,126 | 3,343 | -20% |
| **Business Travel** | 545 | 422 | 270 | 321 | 351 | 297 | 398 | -27% |
| **Solid Waste** | 194 | 138 | 134 | 128 | 126 | 130 | 136 | -30% |
| **Supply Chain** | 38,548 | 29,568 | 37,978 | 45,575 | 37,985 | 37,977 | 37,977 | -1% |
| **Total Emissions:** | **56,880** | **47,428** | **54,651** | **61,738** | **52,458** | **52,237** | **52,732** | **-7%** |

[2] EPA Greenhouse Gas Equivalencies Calculator: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

# Inventory Results Detail

Overall County operations emissions show a -7% drop from 56,880 MT CO2e in 2008 to 52,732 MT CO2e in 2014. Factors for the changes include:

- **Stationary Combustion:** Natural gas use decreased due to improved building energy efficiency and warmer average winter temperatures.
- **Mobile Combustion:** Vehicle fuel emissions decreased due to strategic fleet vehicle replacement which increased the average fuel efficiency of the fleet. Additionally, since 2012 many departments have implemented idle reduction plans with practices to reduce fuel use.
- **Refrigerant Loss:** The decrease shown in 2014 is due to improved tracking of refrigerant amounts used.
- **Electricity:** Electricity use decreased some due to improved building energy efficiency, lighting upgrades, building systems improvements and occupant engagement. However, the primary driver for the significant decrease in electricity emissions between 2008 and 2014 is increased availability of hydro and wind-generated electricity on the regional grid.[3]
- **Employee Commute:** Reductions in employee commute emissions correlate with an increase in active commuting, such as walking and biking, telecommuting and shorter commutes by employees who drive. Employees are encouraged to utilize transportation options.
- **Business Travel:** Reductions in air travel and personal vehicle use for business purposes (largely budget-driven) led to lower emissions.
- **Solid Waste:** Solid waste decreased due to efforts to improve recycling and increase diversion of garbage from the landfill. Employees are regularly trained on best practices in recycling, reuse and waste reduction.
- **Supply Chain:** Based on the large scope of supply chain emissions and the fact that 2014 figures are estimates, there is very little change noted. Purchased services (e.g., contracts, consultants) are the largest source of County supply chain emissions.

Emissions intensity is the average emission rate of a given pollutant, from a given source, relative to the intensity of a specific activity. Comparing emissions intensity factors is a way to normalize data from year to year, accounting for changes that can impact service requirements. The following table provides three different metrics for emissions intensity. County emissions normalized by population served, facility square footage and County FTEs all show reductions from 2008 to 2014. While county population and total number of FTEs have grown since 2008, emissions have dropped.

## Table 2: 2008-2014 Emissions Intensity Summary

| Emissions Intensity Metric | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | % Change 2008 to 2014 |
|---|---|---|---|---|---|---|---|---|
| **Per Population Served** | | | | | | | | |
| *Washington County Population* | 518,581 | 525,641 | 531,070 | 536,370 | 542,845 | 550,990 | 560,465 | 8% |
| ***Total Per Capita (MT $CO_2e$ / person)*** | ***0.110*** | ***0.090*** | ***0.103*** | ***0.115*** | ***0.097*** | ***0.095*** | ***0.094*** | ***-14%*** |
| **Per 1,000 Square Feet** | | | | | | | | |
| *County Facility Square Footage (x 1,000)* | 1,345.5 | 1,345.5 | 1,345.5 | 1,343.3 | 1,343.3 | 1,343.3 | 1,345.5 | 0.0% |
| ***Facility-Related Per 1,000 sq ft (MT $CO_2e$ / 1,000 sq ft)*** | ***7,281.4*** | ***7,510.7*** | ***7,012.8*** | ***6,684.6*** | ***5,471.3*** | ***5,435.5*** | ***5,534.5*** | ***-24%*** |
| **Per County Employee** | | | | | | | | |
| *Full-Time Equivalent Employees* | 1,804 | 1,772 | 1,802 | 1,874 | 1,859 | 1,851 | 1,866 | 3.4% |
| ***Total Per Employee (MT $CO_2e$ / FTE)*** | ***31.5*** | ***26.8*** | ***30.3*** | ***32.9*** | ***28.2*** | ***28.2*** | ***28.3*** | ***-10%*** |

[3] The carbon intensity of electricity on the grid fluctuates from year to year in our region based on the water and wind resources available to generate electricity.

Figure 3: 2008-2014 Emissions Summary (Not Including Supply Chain)

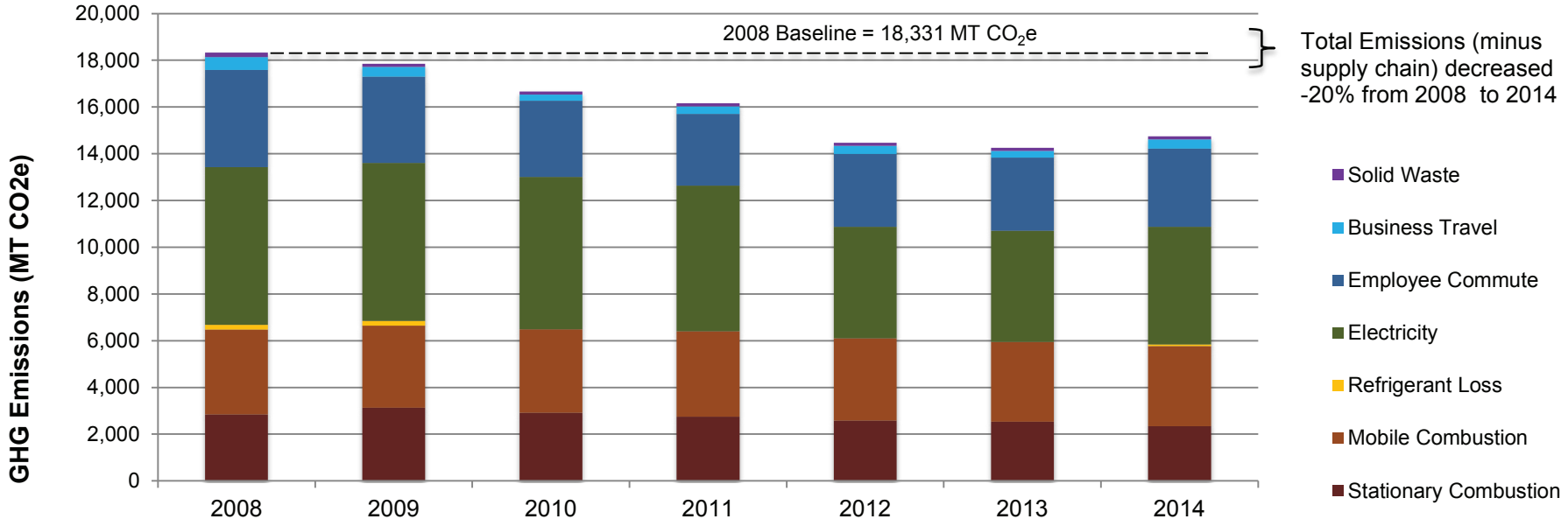
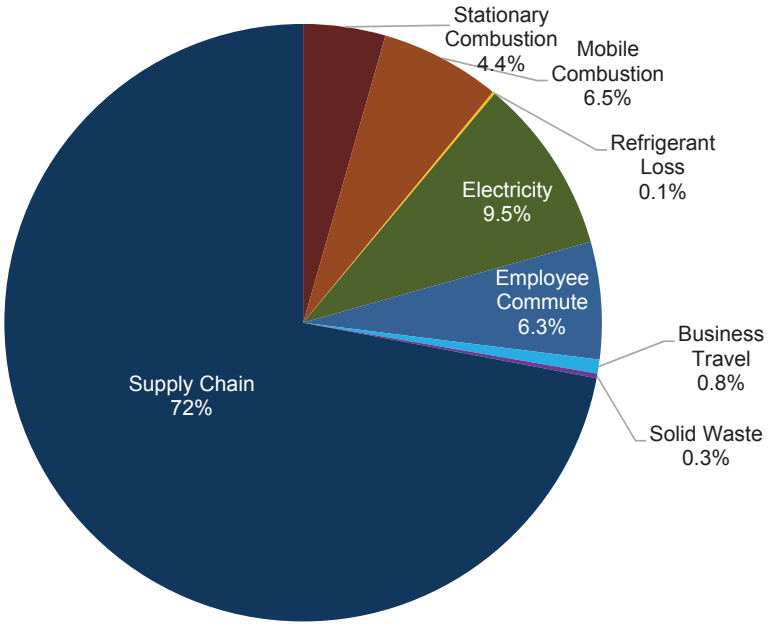


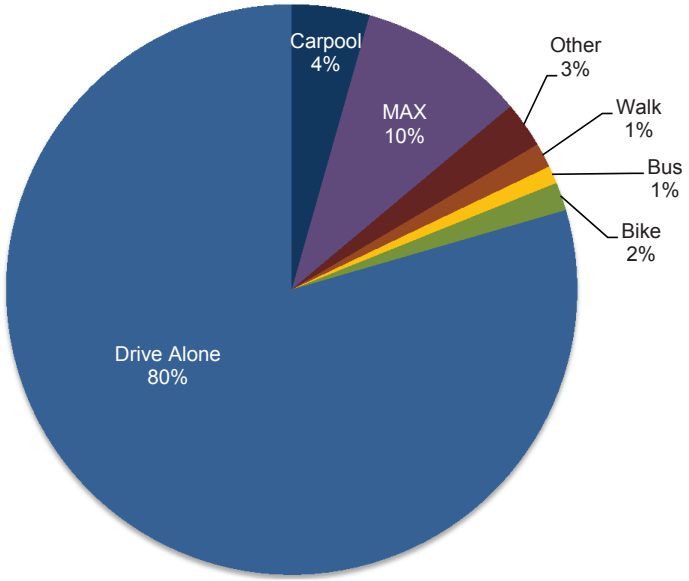

Figure 4: 2014 Greenhouse Gas Emissions by Source



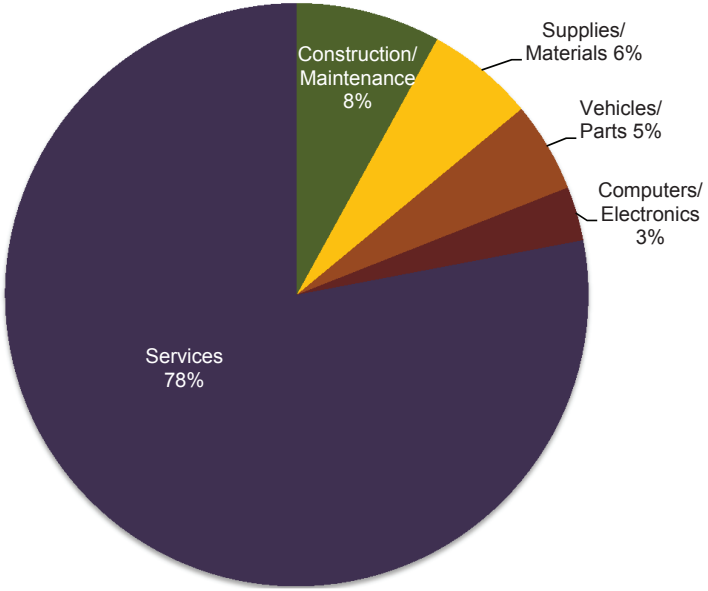

In 2014, 11% of emissions are Scope 1, 10% of emissions are Scope 2, and 79% of emissions are Scope 3 sources. Due to the County's efforts focusing on improving energy efficiency of our facilities and the fuel efficiency of our fleet, both Scope 1 and 2 emissions have been reduced since 2008. In addition to infrastructure changes, all departments and employees have been engaged specifically to help with reducing electricity, fleet vehicle fuel, solid waste and emissions from single occupant vehicle commuting. This effectively makes Scope 3 the biggest piece of the County emissions pie.

Key components of County Scope 3 emissions are detailed on the page 8 and the County's efficiency and conservation efforts are described on page 9.

## Figure 5: 2014 County Employee Commute Mode Split




## Figure 6: Supply Chain Breakdown




Washington County promotes all transportation options for commuting through training, education and employee engagement activities. In addition, the County pays for annual transit passes as an employee benefit. Several County work locations are convenient to TriMet public transit systems, therefore 11% of employees take public transit to get to work. However, most County employees commute to work by driving alone, for a variety of reasons.

The "Other" commute modes include telecommuting and working a compressed work schedule, such as four 10-hour days. These help to reduce the emissions impact of travel to work. Finally, an increasing number of employees are more regularly using active commute modes such as walking and biking.

The top reasons employees report for using transportation options such as walking, biking, transit and carpooling are:

1. Save money and use less fuel
2. Convenience and accessibility
3. Improve physical health
4. Lower stress
5. Environmental concern

To characterize supply chain emissions, a life-cycle GHG analysis using Carnegie Mellon's Economic Input-Output Life-Cycle Assessment model was conducted for all County purchases including goods and services for 2008, 2009 and 2011. Because calculating supply chain emissions is relatively time-consuming, the missing years are estimated based on the average of the calculated years for this inventory.

Emissions embodied in supply chain are defined as those generated from the resource extraction, manufacture and distribution of purchased goods and services. The responsibility for these emissions is shared between manufacturers, service providers, and the County as the organization demanding the products and services. Purchased services (e.g., contracts, consultants) are the largest source of County supply chain emissions.

The methodology used here is based on average emissions factors for various sectors of the U.S. economy, and it is not detailed enough to capture emissions reductions from implemented sustainable purchasing policies. However, it provides prioritization guidance on where to focus future sustainable procurement efforts. Taking a closer look at the County's purchased services will be a good starting point for addressing reductions in supply chain emissions.

# Conservation and Efficiency Efforts at Washington County

Reductions in electricity and natural gas use represent the County's largest source of emissions decreases. When the County's Sustainability Program was established in 2009, special emphasis was put on energy. The guiding resolution for the program includes the following objectives: 1) Realize economic and resource savings through the construction, operation and maintenance of high performance public buildings and landscapes; 2) Prioritize energy efficiency and increase the use of renewable energy. As a result, County leadership and staff have focused on energy efficiency and conservation projects to help achieve these objectives.

This 65 kW thin film solar array is installed on the roof of the Washington County Public Services Building.

The County has worked closely with the Energy Trust of Oregon (ETO) to plan and implement projects showing a good return on investment. In 2010, Washington County was awarded federal grant funds[4] for energy efficiency retrofits and a rooftop solar array installed on the Public Services Building. In 2011, Washington County joined the first cohort of regional businesses participating in ETO's Commercial Energy Improvement Project focused on strategic energy management. Participation resulted in the adoption of the County's energy policy, the creation of the Employee Engagement Energy Team, on-site building energy audits and an energy action plan.

Since 2004 the County has implemented dozens of energy projects resulting in an estimated 493,778 MMBTU in lifetime energy savings and $5.4 million in net cost savings as noted in the table below. ETO offers incentive payments as a way to encourage investment in energy reductions and help reduce installation costs. Key projects completed at County facilities include upgrades and replacements of building controls, chillers, boilers, variable frequency drives and LED lighting.

## Table 3: 2004-2014 Energy Efficiency Projects Implemented

| Electricity Projects | | | Natural Gas Projects | | | All Projects | | |
|---|---|---|---|---|---|---|---|---|
| Project Count | Lifetime Savings (kWh) | Lifetime Savings (MMBTU) | Project Count | Lifetime Savings (therms) | Lifetime Savings (MMBTU) | Installation Cost | Avoided Energy Cost | Net Savings from EE Projects |
| **65** | **67,009,603** | **228,470** | **24** | **2,653,080** | **265,308** | **$1,554,000** | **$7,000,000** | **$5,446,000** |

The County's2014 Sustainability Plan includes a goal of cutting building energy use -20% from 2008 to 2018. By the end of fiscal year 2015, the County met the goal. However, there is still work to do to maintain this reduction and look for future savings opportunities. Keeping buildings cool, as Oregon experiences hotter summer temperatures, has been a specific challenge and has caused summer electricity use to rise. Natural gas used for heating is dropping due to the warmer temperatures, pushing overall energy use down. The County is in the process of installing robust building management systems to ensure facilities run optimally through smart power management. In 2016 Washington County launched a major energy conservation campaign to engage all levels of the organization in efforts to save energy. This project emphasizes the daily choices staff can make to help cut energy use, reduce electricity bills and improve organizational sustainability.

[4] The Energy Efficiency and Conservation Block Grant program, funded by the American Recovery and Reinvestment Act of 2009, provided grants for projects that reduce energy use and improve energy efficiency nationwide. Washington County received approximately $2.6 million and completed several projects by 2012.

# Benchmarking Against Nearby Communities

By performing this greenhouse gas inventory and implementing climate action projects throughout the County, we are helping meet the goals set at the State level. The County does not currently have any emissions reduction goals, but will decide whether or not to set specific targets for reducing emissions. Oregon set the following climate change goals by passing House Bill 3543 in 2007:

- Arrest growth of GHG emissions through 2010;
- By 2020, achieve a 10% reduction below 1990 levels;
- By 2050, achieve a climate stabilization level of at least 75% below 1990 levels.

Several peer jurisdictions in the area have also conducted their own GHG inventories and set goals for reducing emissions as noted in this table. The majority of peer organizations in our region have a goal of 75% to 80% reductions by 2050 with various intermediate goals. Most of the organizations have set goals that include Scope 1, 2, and 3 emissions minus supply chain.

Table 4: Emissions Reduction Benchmarking

| Jurisdiction | Scopes / Emission Sources | Base Year | Reduction Size | Goal Date |
|---|---|---|---|---|
| **City of Beaverton** | Scope 1, 2, & 3 (Excluding Supply Chain) | 2008 | Interim: 20% \| **Final 75%** | 2020 \| **2050** |
| **City of Corvallis** | Scope 2 | 2004 | **15%** | **2020** |
| **City of Eugene** | Scope 1 & 2 | 1990 | **100%** | **2020** |
| **City of Gresham** | Scope 1, 2 & 3 | 2008 | Interim: 20% / 40% / 60% **\| Final: 80%** | 2020 / 2030 / 2040 \| **2050** |
| **City of Hillsboro** | Mayors Climate Protection Plan (Kyoto target) | - | 7% | - |
| **City of Lake Oswego** | Scope 1, 2 & 3 (Excluding Supply Chain) | 2000 | Interim: 10% / 40% \| **Final: 75%** | 2020 / 2035 \| **2050** |
| **City of Portland / Multnomah County** | Scope 1, 2 & 3 (Excluding supply chain) | 1990 | Interim: 40% \| **Final: 80%** | 2030 \| **2050** |
| **City of Salem** | No Targets | - | - | - |
| **City of Vancouver, WA** | Mayors Climate Protection Plan (Kyoto target) | 2006/7 | 7% | - |
| **Metro** | Scope 1, 2, & 3 (Excluding Supply Chain) | 2008 | Interim: 25% / 40% \| **Final: 80%** | 2020 / 2025 \| **2050** |
| **State of Oregon** | Scope 1, 2 & 3 | 1990 | Interim: 10% \| **Final: 75%** | 2020 \| **2050** |

# Future Opportunities in Sustainability

The information contained in this report will be used to guide future practices throughout the organization with the intention of reducing the GHG emissions associated with operations. The inventory data will also be used to identify opportunities for operational cost savings, new sustainability practices and employee engagement. The County will continue to prioritize efforts to improve the energy efficiency of County facilities, increase the fuel efficiency of the County fleet and other resource conservation activities in order to reach sustainability goals and objectives. The County will also seek ways to reduce the impacts of indirect emission sources without reducing customer service or inconveniencing staff or constituents. The County may also wish to set targets for GHG reductions similar to our regional peers, and then establish a strategic plan with specific activities to reach the goals.



# Acknowledgements

The staff of Washington County conducted this inventory. Numerous current and former County staff graciously contributed data to the GHG inventory including: Tom Baylis, Kristie Bollinger, Dan Bryant, Eva Calcagno, Andy Cameron, Gary Casaus, Ronda Chapman-Duer, Karen Crawford, Joan Flesks, Stephanie Freeman-Montes, Bill Gamble, Indira Hadziosmanovic, Florina Jones, Margarita Kasinger, Patricia Longua, Martin Granum, Zane Hadzick, Janet McFarland, Calandra McKinstry, Zach Morton, Candi Paradis, Jan Paris, Darla Pike, Joeli Schillereff, Arleen Trott, Doug Stoller, Scott VanDomelen, Susan Walker, Deborah Wood, Teresa Wilson and Jenny Wright.

Good Company, a sustainability consulting firm based in Eugene, Oregon, supported Washington County's work on this project. They facilitated the use of their proprietary calculation tool (Good Company's Carbon Calculator, or G3C), provided technical assistance related to and quality checks of the calculator's use, offered support and guidance in data gathering and the development of estimation methods, and provided graphical and editing assistance for this report.

Robin Straughan prepared this report with expert guidance from Aaron Toneys at Good Company. Writing and editing assistance was provided by Leah Schrodt and Andy Cameron.

# Appendix

## METHODS: DATA AND PROTOCOLS

The Inventory was carried out using high-consensus public-domain protocols and tools. While many national GHG inventory protocols require reporting of emissions only in Scopes 1 and 2, this inventory has gone further to include several shared emissions categories from Scope 3. The use of additional high-quality public domain tools to estimate Scope 3 emissions provides a more comprehensive inventory than those focused only on direct emissions and purchased electricity. Including Scope 3 emissions in a GHG inventory presents a more accurate picture of an organization's carbon footprint and better illustrates the potential regulatory and financial risks associated with carbon emissions. While Washington County may not have complete or direct control over all Scope 3 emissions, it can influence all emissions sources to varying degrees. Some data sources, such as embodied emissions in purchases, were estimated by combining available procurement data with careful assumptions, while others, such as natural gas use, had more direct data including billing information. Upstream emissions from mobile combustion and electricity are not included in the current inventory, but may be factored into Scope 3 in a future inventory.

## CURRENT REGULATORY REQUIREMENTS

**Mandatory Reporting in Oregon**
Oregon Department of Environmental Quality (DEQ) is requiring GHG reporting for a wide range of entities, beginning in 2010 for the 2009 calendar year. The threshold for reporting is currently set at 2,500 MT CO2e annually. In general, the sources and entities required to report are holders of Title V air pollution permits or Air Contaminant Discharge Permits (ACDP), with at least one discrete permitted source emitting above the threshold.

As currently articulated, these requirements do not require reporting from many organizations that have aggregate emissions from multiple sources (building energy, fleet fuel, etc.) that together exceed the reporting threshold. Municipal governments will likely fall into this category of non-reporters. As a result, only a few Oregon municipalities will have regulatory reporting burdens, but many are likely to have total emissions from local government operations that well exceed 2,500 MT CO2e annually.

**Mandatory Reporting at the Federal Level**
The U.S. Environmental Protection Agency (EPA) has also issued mandatory reporting guidelines, finalized in September 2009 with the threshold at 25,000 MT CO2e per year. It is possible that federal climate legislation will require participation by some large entities in carbon trading and auctions for emissions allowances. Given the current structure of proposed legislation, very few Oregon entities—and probably no local government agencies—will have such responsibilities.

## GLOSSARY

**Carbon Dioxide Equivalent (CO2e):** The common unit used to measure the six greenhouse gases regulated under the Kyoto Protocol. Since each gas contributes a different level of atmospheric warming, CO2e is calculated by multiplying each gas by its global warming potential.

**Carbon Intensity:** The amount of carbon by weight emitted per unit of energy consumed.

**Climate Change:** A change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

**Emission Intensity:** The average emission rate of a given pollutant from a given source relative to the intensity of a specific activity; for example grams of carbon dioxide released per megajoule of energy produced, or the ratio of greenhouse gas emissions produced to gross domestic product.

**Energy Efficiency (EE):** Using less energy to provide the same service.

**Fossil Fuel:** A general term for organic materials formed from decayed plants and animals that have been converted to crude oil, coal, natural gas, or heavy oils by exposure to heat and pressure in the earth's crust over hundreds of millions of years.

**Greenhouse Gas (GHG):** A gas that absorbs radiation at specific wavelengths within the spectrum of radiation (infrared radiation) emitted by the Earth's surface and by clouds. The gas in turn emits infrared radiation from a level where the temperature is colder than the surface. The net effect is a local trapping of part of the absorbed energy and a tendency to warm the planetary surface. Carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulfur hexafluoride (SF6), Hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) are the six primary greenhouse gases.

**Global Warming Potential (GWP):** Global Warming Potential factors represent the heat-trapping ability of each greenhouse gas relative to that of carbon dioxide.

**Kilowatt hour (kWh):** A derived unit of energy equal to 3.6 megajoules. Electrical energy is sold in kilowatt hours. If the energy is being used at a constant rate (power) over a period of time, the total energy in kilowatt hours is the product of the power in kilowatts and the time in hours.

**Light-emitting diode (LED):** A light-emitting diode is a two-lead semiconductor light source. LEDs have many advantages over incandescent light sources including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching.

**Metric Ton (MT):** Common international measurement for the quantity of greenhouse gas emissions. A metric ton is equal to 2205 pounds or 1.1 short tons.

**Million BTU (MMBTU):** 1 MMBTU is equal to 1 million BTU (British thermal unit). The BTU is a traditional unit of work equal to about 1055 joules. It is the amount of work needed to raise the temperature of one pound of water by one degree Fahrenheit. The BTU is most often used as a measure of power in the power, steam generation, heating, and air conditioning industries.

**Renewable Energy (RE):** Energy resources that are naturally replenishing such as biomass, hydro, geothermal, solar, wind, ocean thermal, wave action, and tidal action.

**Scopes 1, 2 and 3:** The World Resource Institute and World Business Council on Sustainable Development developed a classification system for different types of GHG emissions for GHG accounting purposes. Scope 1 emissions come directly from owned equipment and buildings. Scopes 2 and 3 are indirect emissions from sources shared by the reporting institution with other entities.

**Therms:** The therm is a unit of heat energy equal to 100,000 British thermal units (BTU). It is approximately the energy equivalent of burning 100 cubic feet (often referred to as 1 CCF) of natural gas. Since natural gas meters measure volume and not energy content, a therm factor is used by natural gas companies to convert the volume of gas used to its heat equivalent, and thus calculate the actual energy use.

**Transmission and Distribution (T & D) Loss:** Electric power that is lost between sources of energy generation and points of distribution to customers.

Sustainability Program *for the Generations*

## Contact information:

Robin Straughan, Sustainability Coordinator
155 N First Ave, Suite 270, Hillsboro, OR 97124
503-846-8857
robin_straughan@co.washington.or.us
www.co.washington.or.us/Sustainability