



## GREENHOUSE GAS INVENTORY

Department of County Assets  
Fiscal Year 2014



The Department of County Assets  
Multnomah County  
**GHG Inventory of Local Government Operations for FY 2014**  
December 2015

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## EXECUTIVE SUMMARY

This baseline greenhouse gas emissions inventory (GHG inventory) provides a profile of GHG emissions for the Department of County Assets (DCA), and serves as a management tool to support the Department's equity goal. Greenhouse gases, also called carbon emissions, are the primary driver of climate change.

Consensus statements from the Intergovernmental Panel on Climate Change (IPCC) suggest that human-caused emissions must be reduced significantly by mid-century, perhaps more than 50 percent globally, and by 90 percent in wealthier nations that produce the most emissions, in order to avoid the worst potential climate impacts on human health and well-being.

In FY14 DCA produced 47,421 MT of CO<sub>2</sub>e (metric tonnes of carbon dioxide equivalent) emissions, the equivalent of 9,983 passenger vehicles driven for one year. The DCA senior management team will select a goal to reduce carbon emissions in the range of 2% to 4% per year. At this rate, GHG emissions will be reduced by 80% by the year 2050 (and reduce 40% by 2030).

The three primary sources of emissions are electricity and fuels for buildings and fleet, and the embodied emissions in the purchase of goods and services. Together they account for about 80% of DCA's emissions.

The transition to low-carbon operations is realistic and feasible. The DCA has already achieved significant successes. To build on this worthy progress, these areas have the greatest potential:

1. Energy efficiency
2. Renewable energy
3. Purchasing policies
4. Space utilization

While considering the entire lifecycle of goods and services (production, use, and disposal), a two-fold strategy is proposed: Select activities that:

1. reduce consumption and maximize use of goods, services, and energy
2. purchase less carbon-intensive goods and services

While it is instructive to look at carbon intensity per person (employee) and per dollar (expenses) to get a year-to-year comparison, what matters most is the absolute amount of carbon in the atmosphere not the "emissions intensity" of our operations. The overall long-term goal is to reduce absolute emissions despite growth in operations.

The efforts outlined in this report document a new milestone for the county. DCA will be the first county department to commit to quantifiable, department-specific carbon reduction goals as outlined in the Climate Action Plan.

## 1. INTRODUCTION

The DCA senior leadership is committed to contributing to social equity as a core outcome of its work. They established carbon emissions reduction as an equity goal because the effects of climate change, environmental degradation, and pollution that endangers human health, disproportionately impact resource poor and vulnerable communities locally and globally. The County has a special responsibility to act in the best interest of the community and to avoid doing anything that would undermine their well-being.

The DCA has County-wide responsibility for managing facilities and property, information technology, records, archives, fleet, motor pool, distribution, and strategic sourcing. It also delivers the administrative support functions of finance, budget, human resources, procurement, and contracting.

While DCA does not deliver services directly to the community, its operations have a direct impact locally, nationally, and across the biosphere. The goal to reduce carbon emissions demonstrates good stewardship of financial resources, and the environment. It is fundamentally about social equity.

It puts in action the department's sustainability value:

*"We believe in a sustainable future and the triple bottom line: equity, economy, and environment. We champion sustainable practices in all areas of our work."*

The County faces the socio-economic, financial, and regulatory risk of climate change. Given impending State and Federal regulations, reducing emissions is also a prudent risk-mitigation strategy.

## 2. POLICY CONTEXT

The Intergovernmental Panel on Climate Change (IPCC) is the leading international body that assesses climate change and regularly convenes climate scientists. It has identified human activity as the primary cause of the climate change that has occurred over the past few decades and quickened in recent years.

To avoid the worst impact on human life, the planet must not increase its temperature by more than 2 degrees Celsius above pre-industrial levels. This is the threshold considered the tipping point to catastrophic results. In 2015 the planet reached the halfway point, rising 1 degree. Without significant new actions to begin to reduce global carbon emissions which continue to grow, global temperatures are expected to significantly exceed 2 degrees Celsius.

Many individual corporations, government agencies, universities, non-profits and individuals have sought to take on this challenge proactively. There has been much regulatory action recently regarding GHG emissions, as well as energy and transportation-related legislation and policy related to climate action. Action is taking place at the international, national, regional, state and local levels as shown in the table below.

In 2007, the United States Supreme Court unanimously ruled GHG emissions were pollutants under the Clean Air Act and that if they were found to endanger human health, the Environmental Protection Agency (EPA) could regulate them. In 2009 EPA published its “endangerment finding”, which stated that current and future emissions of six greenhouse gases were a threat to human health and welfare. In late 2014, President Obama, as part of a bilateral agreement with China, set a GHG reduction target for the United States of 26-28 percent below 2005 levels by 2025

Every US Federal government agency, including the military services and intelligence agencies, has plans to reduce carbon emissions and mitigate the negative effects of climate change. Climate change is disrupting agricultural production, human health, economic systems, military strategy and global politics.

For the last 15 years, Multnomah County has partnered with the City of Portland to respond to climate change locally. In 2001, the County and City adopted the Local Action Plan on Global Warming, setting an ambitious goal of reducing GHG emissions within the geographic boundaries of Multnomah County by 10 percent below 1990 levels by the year 2010. That goal has been met.

In 2009, the City and County adopted the Climate Action Plan (CAP), a comprehensive road map to reduce GHG emissions in Multnomah County by 80 percent below 1990 levels by 2050. The Climate Action Plan focuses on reducing three types of GHG emissions in Multnomah County:

- those generated directly by City and County operations (e.g. County buildings, fleet, and equipment);
- those generated by businesses and community members over which the City and County have a regulatory authority (e.g. land use and solid waste management); and
- those generated by private parties that are influenced by City and County investments and decision making (e.g. providing safe, accessible transportation options)

The June 2015 updated version of the plan serves as a road map for DCA by identifying a dozen possible actions to implement to advance the GHG mitigation goal. This new edition of the CAP adds a focus on equity.



**Figure 1: Overview of Policy Activity Related to Greenhouse Gas Emissions Management**

Scale	Recent activity
International	<p>The world's leaders have been meeting annually to determine what steps can be taken to address climate change on a global level. The climate talks in Doha, Qatar in December 2012 addressed two primary topics. The Kyoto Protocol added a second period to run from 2013-2020. Kyoto signatories agreed to modest second period goals of cutting emissions by 20% (based on a 1990 baseline) by 2020, but the door was left open to increase these reductions over time. Since the Kyoto Protocol only covers about 14% of global GHG emissions, the second outcome from the Doha meeting was a commitment to develop an international "legally binding" agreement to reduce GHG emissions by all nations by 2015, which is expected to come into effect by 2020. This will be the focus of climate talks that will take place in Paris, France in November 2015.</p>
Federal	<p>In 2007, the Supreme Court unanimously ruled GHG emissions were pollutants under the Clean Air Act and that if they were found to endanger human health, the Environmental Protection Agency (EPA) could regulate them. The six primary GHG emissions were declared to threaten human health in 2009. The EPA has since issued mandatory reporting guidelines for large emitters and has developed "new source performance standards" to establish acceptable emissions levels for new power plants and oil refineries. EPA's Clean Power Plan, finalized in August 2015, requires each state to develop a compliance plan that reduces the state's GHG emissions generated by existing fossil fuel power plants by an amount set by EPA. In late 2014, President Obama, as part of a bilateral agreement with China, set a GHG reduction target for the United States of 26-28 percent below 2005 levels by 2025. Other energy and economic stimulus legislation passed by the federal government has supported renewable energy development and other climate-related initiatives.</p>
Regional	<p>In 2007 Oregon joined the the Western Climate Initiative (WCI) along with California, Washington, Nevada and New Mexico. An additional 6 states and provinces later joined the WCI. The goal of the WCI is to align the carbon reduction strategies of partner states and provinces to achieve a 15 percent reduction in GHGs below 2005 levels by 2020. While the initial coalition no longer exists, WCI continues to serve as the basis for cross-jurisdictional carbon trading and verification between California and Quebec both of which have active cap and trade programs. If Oregon implements a carbon cap and trade system, it could participate in the WCI.</p> <p>California enacted the most significant climate legislation in the United States to date. Under AB-32, the California Global Warming Solutions</p>

	<p>Act, the state is required to reduce GHG emissions 30% below 1990 levels by 2020 and 80% by 2050. In order to achieve these reductions, the California Air Resources Board has been given the authority to enact a cap-and-trade program. The program began in 2012 with the first compliance period starting in 2013. The cap on GHG emissions applies to large emitters from industry and the electricity generating sector. It will eventually cover fuel distributors as well. Regulated businesses need to procure enough allowances (i.e. emissions credits) to cover their emissions and the number of available allowances (the cap) will decline annually.</p> <p>If it were a separate country, California would rank 18<sup>th</sup> in global GHG emissions. AB-32 is especially significant due to the scale of emissions it covers. It provides an example for the US federal government and for potential partnerships with other regulatory programs nationally (such as RGG and WCI) and internationally (Australia's carbon tax, British Columbia's carbon tax, etc.).</p>
State	In Oregon, recent legislation includes climate and energy bills targeting transportation fuels, renewable energy, and GHG emissions from land use and transportation. Statewide efforts support the widespread deployment of electric vehicles. The state is discussing putting a price on carbon via a carbon tax or cap and trade system. Dozens of states are taking these and similar actions.
Local	The County has a long history of sustainability work. The DCA's effort to benchmark its emissions builds on this organizational commitment and on employee successes already well underway. The City of Portland and Multnomah Climate Action Plan is one of many local GHG reduction strategies. Over 1,000 cities across the nation have signed the US Mayors Climate Protection Agreement, including 16 in Oregon.

The Department of County Assets contributed thirteen possible actions to a joint County-City 2015 Climate Action Plan to be completed by 2030. (See page 126 in the [CAP](#).)

19A Financing Energy Efficiency — Identify internal and external funding sources to finance energy-efficiency upgrades in City and County facilities. Explore “climate bonds” as one funding mechanism.

19B Efficiency Projects — Improve energy efficiency of City and County operations: b) Reduce energy use from City and County operations by 2 percent each year through capital projects and operational improvements.

19D Resource Management — Develop and implement utility performance tracking for all City- and County-owned buildings and facilities. Develop and implement a countywide strategic energy management plan

19E Lighting Upgrades — Implement energy-efficient outdoor lighting, including light emitting diodes (LED) and dimming technologies when appropriate. Complete the conversion of all streetlights to LEDs. Use Dark Skies best practices when possible to reduce light pollution and minimize bird strike hazards.

19G Waste Prevention and Recovery — a) Reduce total waste from City and County operations 12.5 percent below FY 09–10 levels.

19H Green Building — Target net-zero energy use by implementing the City and County's green building policies for new buildings and major retrofits. Support this work with dedicated staff time, and consider project location and contracting practices where the benefits are shared by low-income populations and communities of color.

19I Energy Performance Tracking — All City and County-owned buildings greater than 20,000 square feet will annually calculate energy-use intensity (kBtu per gross square foot) and eligible City and County-owned buildings will calculate an Energy Star score using the U.S. Environmental Protection Agency's Portfolio Manager.

19J Low-Carbon Fuels — Prioritize low-carbon fuels for fleet vehicles, including biodiesel, compressed natural gas, liquid natural gas, propane and electricity where appropriate.

19K Fleet Fuel Efficiency — Reduce carbon emissions from County fleet vehicles and equipment. b) Develop a County fleet strategy that incorporates carbon emission reduction, electric vehicle and low-carbon transportation fuel goals.

19L Electric and Hybrid Vehicles — Purchase electric, plug-in hybrid and hybrid vehicles whenever they meet the user's needs. Include installation of electric charging stations where appropriate.

19M Low-Carbon Purchasing — Conduct a carbon emissions inventory of City and County purchases. Based on the results, prioritize efforts to reduce carbon emissions associated with procurement decisions. Make the findings publicly available.

19N Sustainable Procurement — Advance the practice of including the sustainable practices of prospective vendors, contractors and service providers as evaluation criteria in procurement decisions.

19Q Teleconferencing — Establish video and/or web conferencing capability in all major City and County facilities and train staff to leverage these tools to reduce travel.



### 3. GHG INVENTORY TYPES AND EMISSIONS SOURCES

When a municipality decides to conduct a GHG inventory, there are two different types of inventories to consider: a local government operations inventory or a community inventory.

*A local government operations inventory* draws its boundaries around activities necessary for the government to fulfill its mission, even though all those activities are on behalf of the residents and businesses that live and work in the community.

This inventory conducted for DCA, and summarized in this report, is a local government operations inventory.

*A community inventory* draws its boundaries around a geographic location and includes all the activities and emissions sources needed to serve that area including government, citizen and business activities. Therefore, a local government operations inventory would be one component of a greater community-wide inventory.

The City of Portland and Multnomah County Climate Action Plan is a community inventory.

GHG emissions are grouped into two categories - direct emissions and indirect emissions. Direct emissions are those that are generated by DCA's owned facilities and equipment. Indirect emissions are those that result from DCA activities but not from DCA-owned sources. The County has greater control over direct emissions than indirect ones.

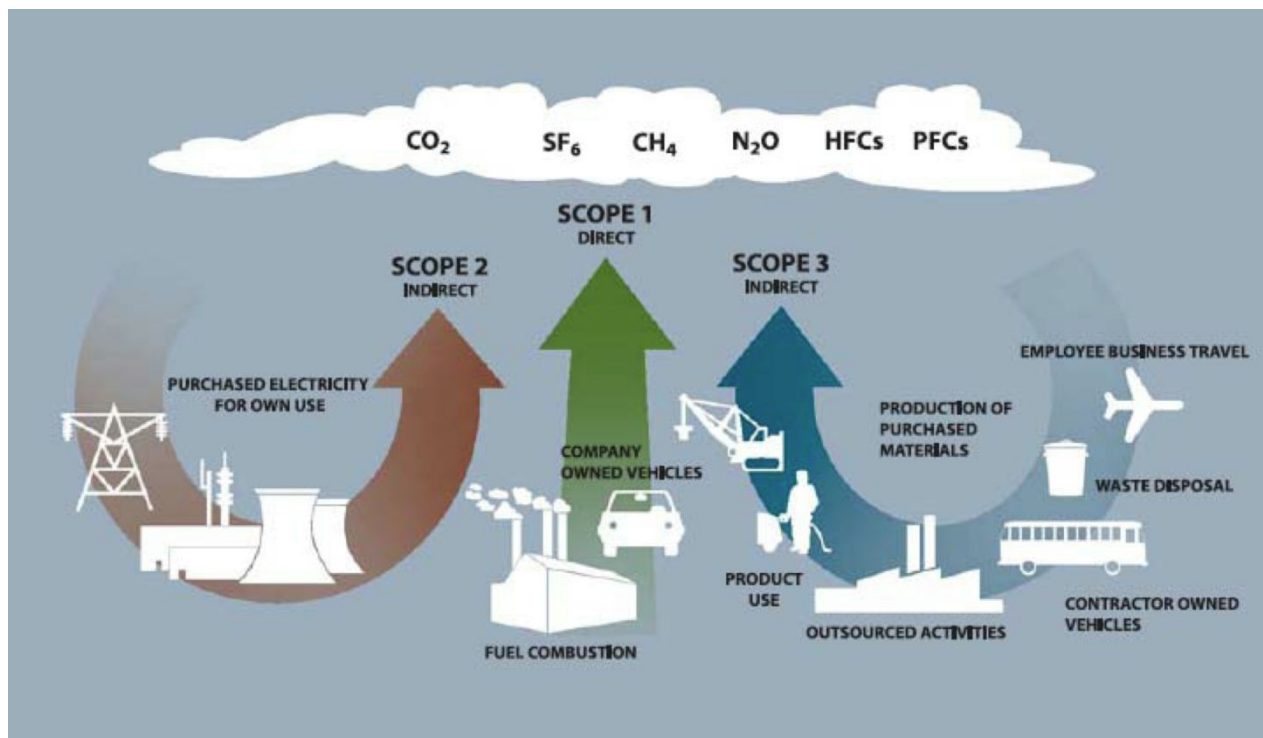
Three scope categories are defined and used in GHG accounting and reporting purposes to further classify direct and indirect emissions sources.

**Scope 1** – Direct sources of GHG emissions originate from equipment and facilities owned or operated by the Department of County Assets operations. Primary examples include natural gas for heat in County buildings and fuel for County vehicles.

**Scope 2** – Indirect GHG emissions are from purchased electricity, heat or steam.

**Scope 3** – All other indirect sources of GHG emissions that may result from the activities of the Department of County Assets but occur from sources owned or controlled by another company or entity, such as: business air travel; embodied emissions in material goods purchased by the Department of County Assets ; emissions from landfilled solid waste; and the commuting habits of employees.

DCA has the greatest levels of control over Scope 1 (direct) and Scope 2 (indirect). Scope 3 emissions are indirect and DCA will have less control over them, but quantifying and including these sources of emissions serves to clarify our organization's entire carbon footprint and illuminates the potential regulatory and financial risks we may face due to our carbon footprint.

**Figure 2: Greenhouse Gases and Accounting and Reporting Scopes**


Source: WRI/WBCSD Greenhouse Gas Protocol, Corporate Accounting and Reporting Standard (Revised Edition), Chapter 4.

#### 4. INVENTORY PROTOCOL, BOUNDARIES, AND DATA

DCA's GHG inventory includes Scope 1, Scope 2, and Scope 3 emissions sources. The inventory counts emissions produced directly by DCA as part of its operations. It also counts emissions produced by other County departments that use the services and resources managed by DCA. For example, it includes electricity consumed by all County buildings, not only buildings occupied by DCA, because it is DCA's responsibility to manage utilities (i.e. electricity and natural gas) by all County buildings and other facilities on behalf of the entire County. It also includes emissions from all vehicles, not only those operated by DCA, because it is DCA's responsibility to provide, manage and maintain all vehicles.

All County-owned and leased buildings, occupied and vacant (such as the Wapato Jail) are included. The Wickman building is excluded because it was sold.

The inventory does not include emissions from County operations that DCA does not manage, such as the emissions embodied in the goods and services (supply chain) purchased by other

departments. Only purchases coded to DCA cost objects were included even if the good or service was ultimately used by a non-DCA program.

The inventory includes emissions from employees commuting to work even though DCA does not manage or influence County-wide employee commute behavior. DCA administered a survey to DCA employees. Since the response rate was more than 60 percent, and because the results were very close to the national average, we determined that they were a good proxy for employees in all departments. This might underestimate the County-wide emissions. In subsequent years we may be able to survey the entire County. (The emissions calculator requires reporting employee commute either for all employees or for no employees).

The inventory includes all of DCA's emissions plus many non-DCA emissions. This chart shows the emission sources and whether the GHG inventory includes data from only DCA or from all County departments.

	<b>Emissions Source</b>	<b>DCA Only</b>	<b>All County (including DCA)</b>
1	Building Energy (electricity, natural gas, non-mobile propane, non-mobile diesel, solar power)		x
2	Transportation (mobile sources of gas, ethanol, biodiesel and diesel from owned vehicles)		x
3	Refrigerants (HFC 134a)		x
4	Solid Waste (except composting)		x
5	Employee Commute		x
6	Employee-owned vehicles used for official business travel	x	
7	Supply Chain (emissions embodied in goods and services)	x	
8	Official Business Travel (air, train, rental cars, bus)	x	

If the County would like to conduct a baseline inventory of all emission, three additional data sets are required :

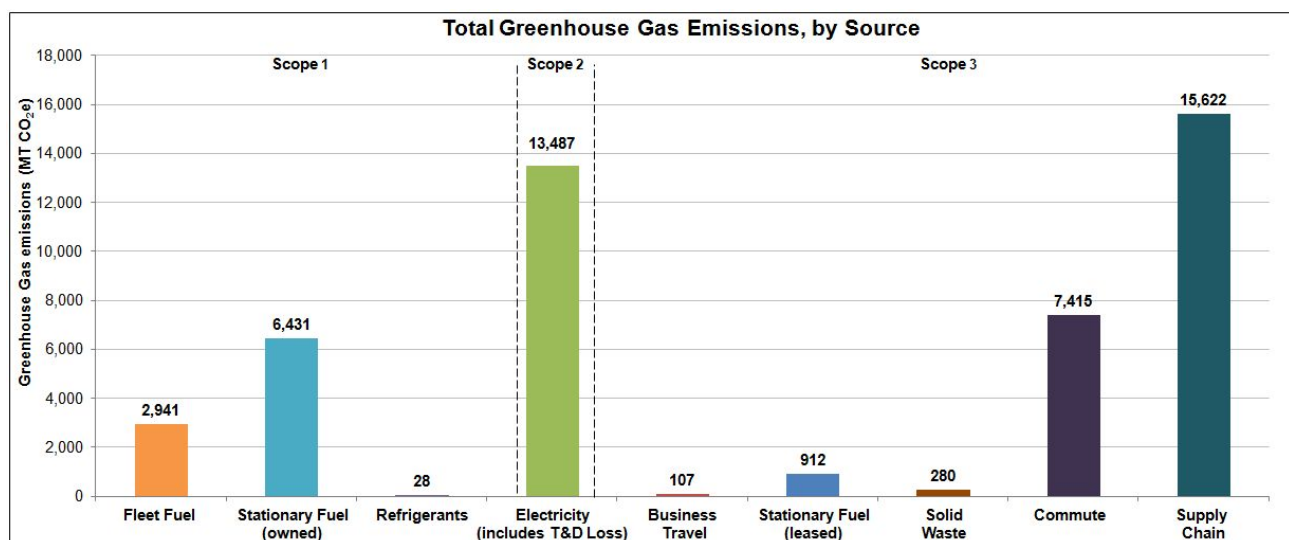
1. Supply Chain spend for all Departments (except DCA)
2. Business Travel for all Departments (except DCA)
3. Employee-owned vehicles used for official County business (except DCA)

## 5. OVERVIEW OF RESULTS

Emissions from fuels and electricity used by buildings and vehicles are 22,064 MT CO<sub>2</sub>e, described below as Scope 1 and Scope 2. In addition, this inventory identified an estimated 25,158 MT CO<sub>2</sub>e of other emissions from mission-critical activities related to Department of County Assets operations but outside of its direct control (Scope 3).

Normally, one would expect Scope 3 emissions to be two or three times as great as Scope 2 emissions. However, this inventory only includes supply chain data for the Department of County Assets. It excludes embodied emissions in purchases made by all other county departments. By contrast, the Scope 1 and 2 data is for the entire county.

**Figure 3: Department of County Assets' Greenhouse Gas Emissions from Local Government Operations (FY2014)**



*(The inventory was carried out according to high-consensus protocols and tools, and in accordance with the guidelines of Oregon Department of Environmental Quality. See Methods below for more detail.)*

Scopes 1, and 2 yield 22,064 MT CO<sub>2</sub>e (plus 199 MT from biogenic sources) For sense of scale, this is equivalent to<sup>1</sup>:

- 565,744 seedling trees grown for ten years.
- 2,013 homes' energy use for one year.

<sup>1</sup> EPA equivalency calculator: <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>

Scope 3 emissions yield 25,158 MT CO<sub>2</sub>e. For sense of scale, this is equivalent to:

- 5,296 passenger vehicles driven for one year
- Emissions from 9,017 tons of waste going to a landfill

Equivalencies calculated with EPA's GHG Equivalency Calculator:

<http://www.epa.gov/cleanenergy/energy-resources/calculator.html>

**Figure 4: Description of DCA's Greenhouse Gas Emissions Categories, FY2014**

WRI Scope	Emissions Category	MT CO <sub>2</sub> e	Description
<b>Scope 1 (Direct Emissions)</b>	Fleet	2,941.1 (plus 199 biogenic)	Multnomah County owns 752 fleet vehicles. Of these, 286 can be classified as sedans, while 219 are sport utility vehicles, vans, buses, or light trucks. There are 8 motorcycles. The remaining 239 vehicles are considered heavy-duty equipment (e.g. road construction equipment)  In FY 2014, County fleet vehicles consumed 251,361 gallons of gasoline, 27,929 gallons of ethanol, 68,780 gallons of ultra-low sulfur diesel, and 4,047 gallons of biodiesel.
	Natural gas	6,320	Multnomah County uses natural gas in 130 facilities for space heating and cooling, and water heating.
	Other fuels	111	Fourteen buildings use 8,124 gallons of diesel fuel for backup electricity generators. The County uses 4,970 gallons of propane in two buildings.
	Refrigerants	27.7	The County lost 28 pounds pounds of R-134a from its HVAC systems. R-134a has a GWP (global warming potential) of 1,300. This quantity is comparatively low thanks to extensive HVAC maintenance practices.
<b>Scope 2 (Indirect Emissions)</b>	Electricity	13,487	The County used 34,440,604 kWh of electricity in its 130 facilities. The emissions shown in this table were calculated using the Regional eGRID 2015 version 1.1 with year 2012 emissions factor for the Northwest Power Pool of 665.75 pounds of CO <sub>2</sub> per MWh. For a sensitivity analysis showing how this compares with the utility specific emissions factor for PGE and Pacific Power, please see



			Figure 4 below. (Includes T&D loss) Without T&D loss it is 12,664.
<b>Scope 3 (Indirect Emissions)</b>	Business travel	106.8	<p>This data includes emissions for only DCA employees:</p> <ul style="list-style-type: none"> <li>• 692,885 miles of air travel to attend training and conferences</li> <li>• 2861.79 miles driven in employee-owned vehicles used for business travel</li> </ul>
	Solid waste	279.6	1,471.59 short tons of solid waste was generated by the County. The destination landfills use CH <sub>4</sub> recovery and electric generation as methane management.
	Commute	~7	This data is for all County employees not just DCA employees. The average distance of employees' daily commute is 12.83 miles one way. Modes: 62.5% of employees commute by Single Occupancy Vehicle (SOV), 9.75 by Car Pool, 9.66% by Bus, and 5.71% by Light Rail. The remaining 12.38% commute by Bicycle and Walking combined. The DCA has no influence over non-DCA employees' commute behavior.
	Natural Gas (Leased)	~912	Per the Climate Registry, fuel consumed in leased spaces where the natural gas is not individually metered is considered a Scope 3 emissions source. The County has very little influence, if any, over this source.
	Embodied emissions in purchased goods and services	~15,622	These emissions represent emissions produced during the manufacture of goods or the delivery of services purchased by the County. These are upstream emissions embodied in the products and services. The DCA's purchases are grouped into eight categories: Appliances, Construction, Electronics, Furnishings and Supplies, Lighting and Fixtures, Other Manufactured Goods, Services, and Vehicles and Parts.

## 6. METHODS: DATA, PROTOCOLS, AND SENSITIVITY ANALYSIS

This inventory follows the Local Government Operations Protocol which provides the highest-consensus guidelines for minimum reporting scope. It was developed jointly by The Climate Registry and other organizations<sup>2</sup>.

However, the protocol only requires the reporting of emissions in Scopes 1 and 2 as defined by the World Resources Institute. Therefore, this inventory has gone further to include several shared emissions categories from Scope 3.

According to Good Company, this use of additional high-quality public-domain tools to estimate Scope 3 emissions makes this inventory more state-of-the-art than inventories focused only on mandatory or bare-minimum boundaries. This more integrated and holistic approach paints a more accurate portrait of total emissions associated with Multnomah County's way of doing business.

All emissions are reported in metric tons of carbon-dioxide equivalent (MT CO<sub>2</sub>e). The analysis attempts to cover all six "Kyoto gases" including: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), sulfur hexafluoride (SF<sub>6</sub>) and the groups of high global warming potential (GWP) gases, perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs). PFCs or SF<sub>6</sub>, gases are not included. Overwhelmingly, the direct and indirect CO<sub>2</sub>-equivalent emissions are CO<sub>2</sub> from combustion of fossil fuels.

This inventory is based on high-consensus public-domain calculation methods and emissions factors. Emissions from some sources (such as natural gas consumption) are based on highly accurate data and accepted emissions factors. However, emissions from other sources (such as employee commute) are estimated using a mix of actual data and proxies by conducting a survey of DCA employees and then applying the results County-wide. We believe that this commute data is an acceptable proxy for the entire County because it is very close to the national average, the survey had a 60% response rate, and DCA employees are distributed in four diverse locations throughout the geographic boundaries of the County.

Still others (such as embodied emissions in purchased goods and services) are calculated using estimated data and emissions factors based on state-level averages for the Oregon economy (provided by Oregon DEQ) used in conjunction with DCA's annual spend data. These are analysed and categorized into economic sectors based on the goods and services purchased. This resulted in more than 100 sectors that were then grouped into eight overall categories.

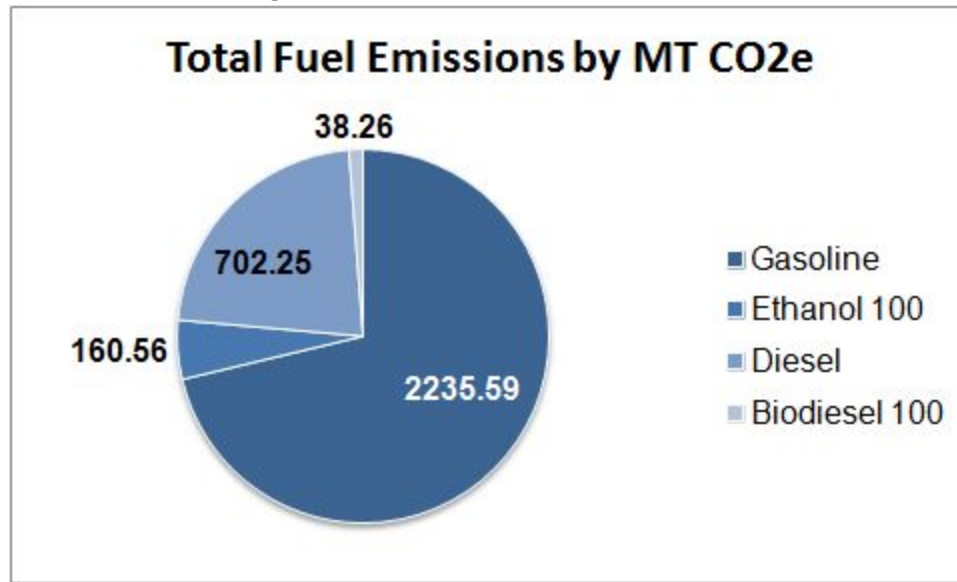
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<sup>2</sup> The Local Government Operations (LGO) Protocol was developed as a collaboration of The Climate Registry (TCR), the California Air Resources Board (CARB), the California Climate Action Registry (CCAR, now the Climate Action Reserve), and ICLEI Local Governments for Sustainability. The LGO Protocol follows the same format as The Climate Registry's General Reporting Protocol (GRP).

### Fleet - All County

This data is for all 752 fleet and motor pool vehicles for the entire County (including those used by DCA) Fleet inventory data is from the County's fleet management system Fleet Focus.

**Figure 5: Fuel Consumption FY2014**



### Other Stationary Fuels - All County

This data was extracted from the Fleet Focus database system via standard reports.

### Refrigerants - All County

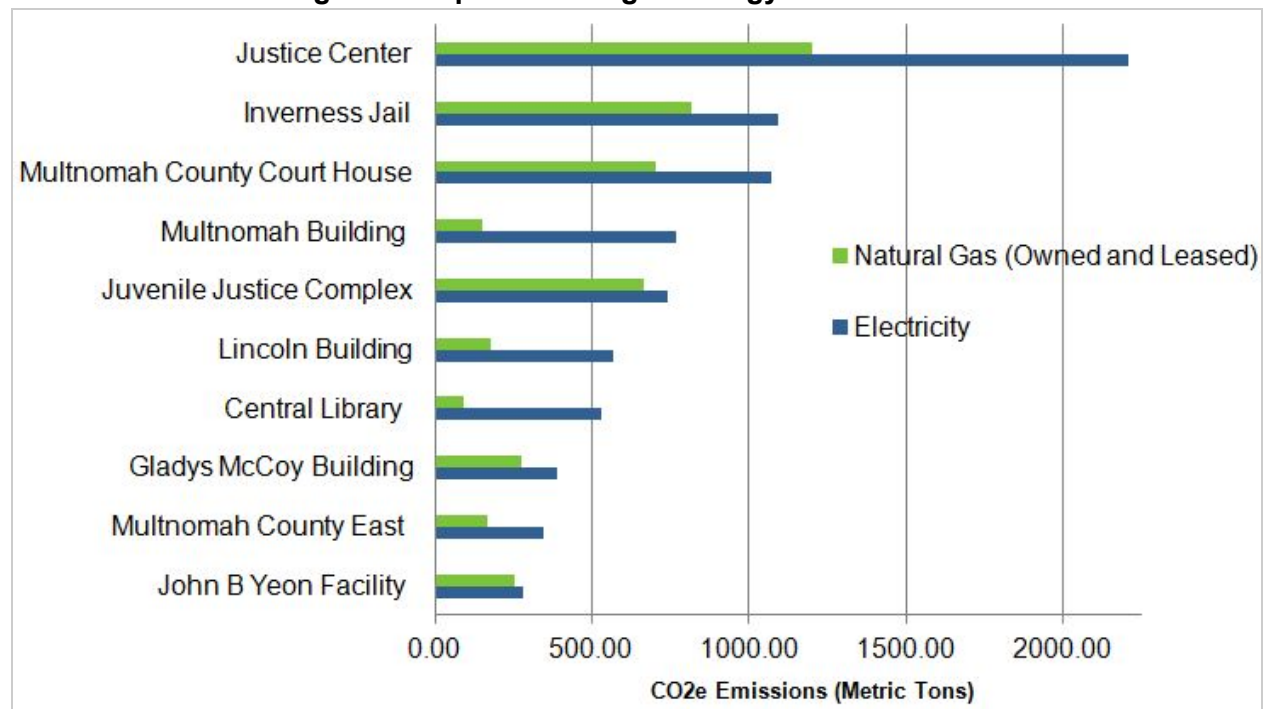
Refrigerant data was provided by our refrigerant vendor and verified by the Mechanical Engineer Program Supervisor. R-134a has a GWP (global warming potential) of 1,300. This quantity is comparatively low thanks for extensive HVAC maintenance practices.

### Natural Gas - All County

This consumption data was collected from vendor invoices and reports in SAP.

### Electricity - All County

Electricity consumption data for County-owned buildings was collected directly from DCA's electric utility companies: PGE and Pacific Power. For leased property, it was estimated by square feet occupied and by type of activity conducted in the location. We chose to use the location-based approach using regional data for the Northwest. The graph below provides additional perspective on the emissions associated with electricity consumption.

**Figure 6: Top 10 Buildings - Energy Used FY2014**

The best practice guidance for GHG inventories asks organizations to account for Scope 2 emissions using two different methods: location-based and market-based. Scope 2 emissions accounting in this inventory follows World Resource Institute's, *GHG Protocol Scope 2 Guidance*.

The location-based method uses an emissions factor (CO<sub>2</sub>e / kWh) that is based on an average for our regional electricity grid, the Northwest Power Pool. This accounting method provides a consistent accounting method for all utility service areas within a region to calculate the average carbon consequences of *using or not using* a kilowatt-hour of electricity.

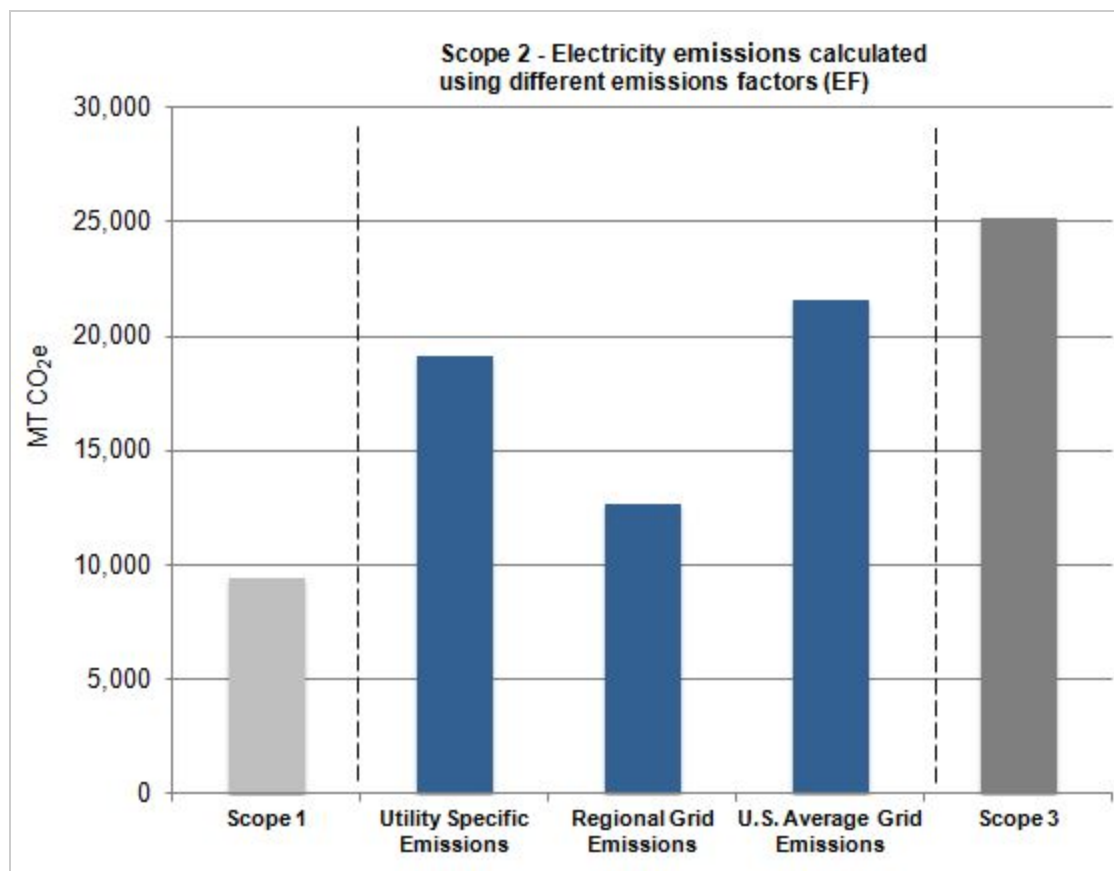
The market-based method considers specific energy contracts and their associated carbon intensities (e.g. power purchase agreements and renewable energy certificates). The market-based method also considers utility-specific carbon intensities. The location-based method is best for presenting results, but the market-based accounting allows organizations to identify their most carbon-intensive electricity providers.

Multnomah County is primarily served by PGE and Pacific Power, but also by owned roof-mounted PV solar installations and by Skamania County Public Utility District. PGE

<sup>3</sup> [http://ghgprotocol.org/files/ghgp/Scope%20%20Guidance\\_Final.pdf](http://ghgprotocol.org/files/ghgp/Scope%20%20Guidance_Final.pdf)

provides ~75% of total demand and Pacific Power provides the remainder. Other sources represent less than 1% of total. Figure 7 provides a comparison of electricity emissions as calculated with the two methods: location-based (i.e. regional grid emissions) and market-based (i.e. utility specific emissions). Utility specific emissions are ~50% greater than the regional average. This is because PGE and Pacific Power's emissions factors (CO<sub>2</sub>e / kWh delivered) are greater than the regional average. Details of use, emissions factors, and emissions as calculated with the market-based method are shown in Figure 8.

**Figure 7: Electricity Emissions Scenarios Using Utility Specific, Regional and U.S. Average Grid Emissions Factors (FY2014)**





**Figure 8: Comparison of Location-Based and Market-Based Electricity Emissions Accounting**

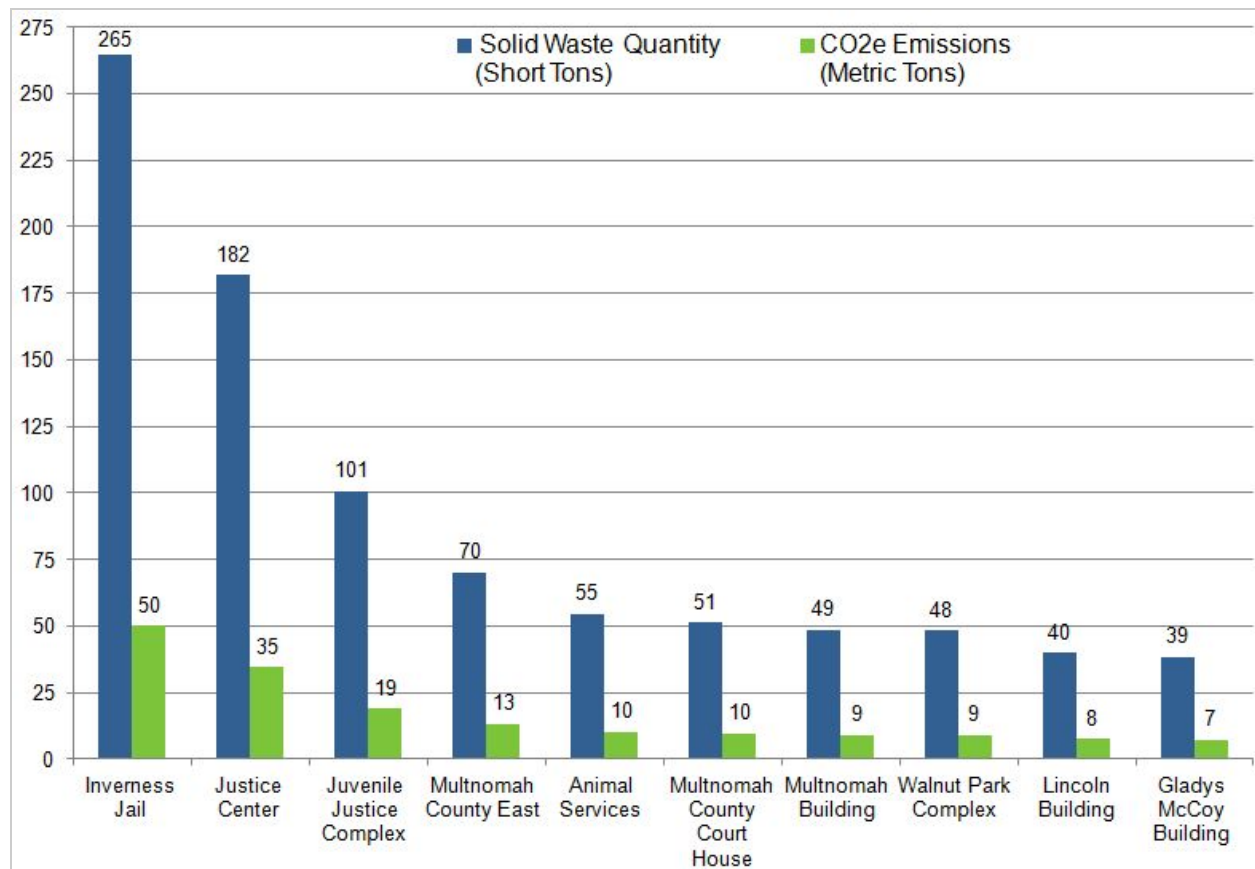
Location / Market	Quantity of Energy (MWh)	CO2e emissions rate (lbs. / MWh)	CO2e Emissions (MT CO2e)	Contract Type	Data Source
Northwest Power Pool (NWPP) eGRID subregion	34,441	669	12,664	None.	EPA, eGRID 2012, NWPP Subregion
<b>Location-Based Totals:</b>	34,441	0	<b>12,664</b>	0	
Facilities served by Pacific Power	7,963	1,557	6,908	Standard product offering in PP service territory.	ODEQ Investor-Owned Utility Greenhouse Gas Reporting (2013)
Facilities served by PGE	26,454	844	12,203	Standard product offering in PGE service territory.	ODEQ Investor-Owned Utility Greenhouse Gas Reporting (2013)
Skamania County Public Utility District	23	0	0	Standard product offering in PGE service territory.	Assumes primarily BPA hydro power.
Onsite Generated Electricity (PV solar)	361	0	0	None.	Not required reporting under Scope 2 guidance; therefore the values are not included in the totals.
<b>Market-Based Totals:</b>	34,440		<b>19,111</b>		

#### Business Travel - Only DCA Employees

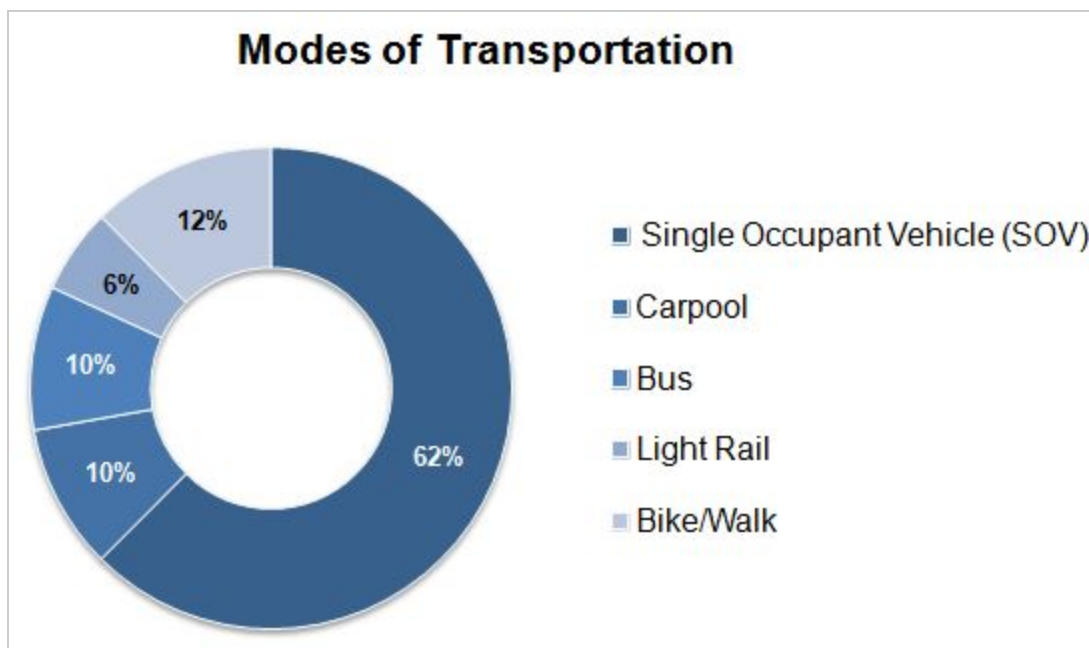
The data is for DCA employees only. It was provided by the travel management company (Azumano Travel) that books all DCA employee air travel. It is very reliable because the mileage is provided from the airlines for each trip. There was only one trip made by bus in FY14. There was no business travel by train in FY14. The data also includes miles driven by employees for business purposes in their personal vehicles. This data is obtained from central payroll from data collected to reimburse employees for costs associated with using their personal vehicles for work-related purposes.

#### Solid Waste - All County

The data is provided in pounds by the garbage hauler vendors. It was converted to short tons using the standard conversion rate. All solid waste collected from County buildings is converted into electricity from methane capture.

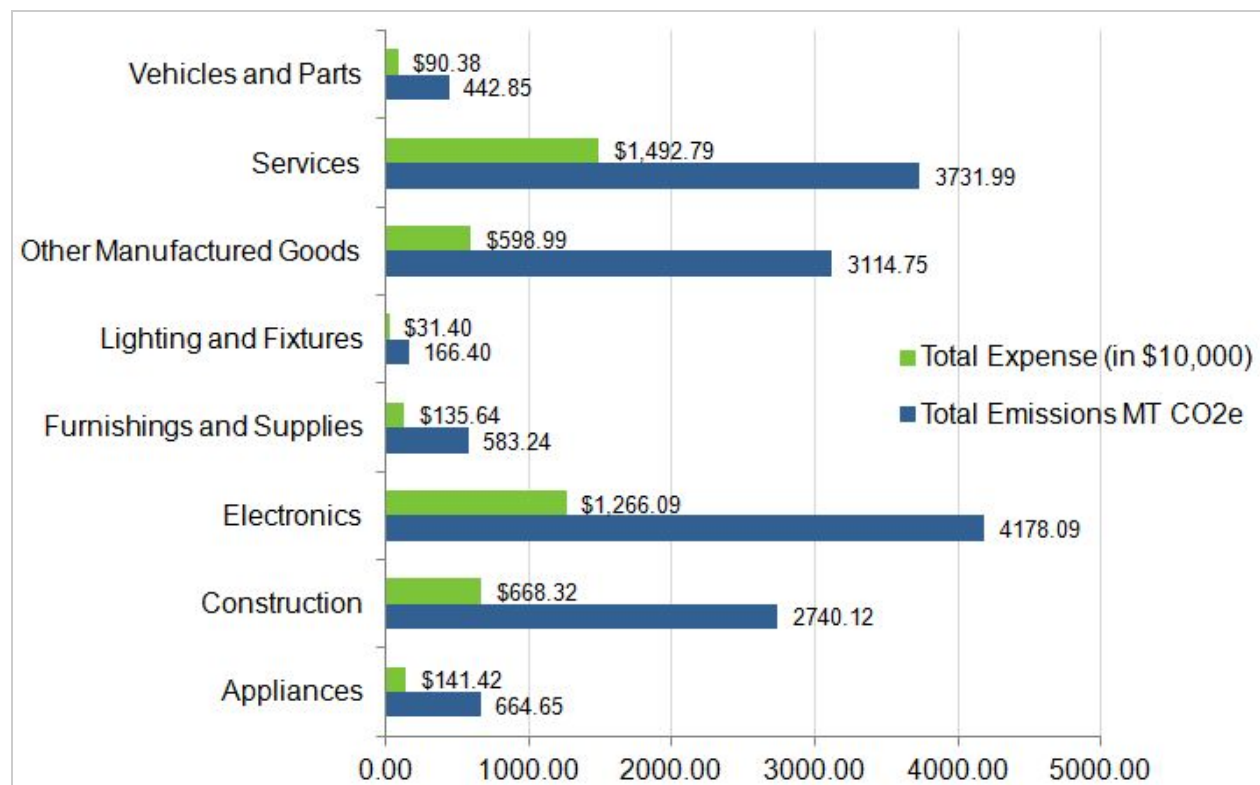
**Figure 9: Top 10 Buildings - Solid Waste Quantities (FY2014)****Commute - All County**

Two hundred seven of 336 DCA employees completed a commute survey. This is a 62 percent response rate. Because the response rate was so high we applied the results to the entire County. The survey collected the number of trips each employee made in a week, by mode, and then calculated the percentage of total trips made by mode. Respondent errors were adjusted following assumptions such as: employees do not work seven days per week. The survey data was also used to calculate average one-way distance, and average fuel efficiency (miles per gallon). The number of days worked in FY14 by DCA employees was calculated by running an SAP ad hoc query of the total number of DCA employees who worked and were paid in FY14. It excluded employees who tele-worked. We also used an SAP report of attendance/absence.

**Figure 10: County Employee Commute Detail FY2014**

#### Embodied Emissions in Purchased Goods and Services - Only DCA

For estimating the emissions associated with producing the goods and services purchased by Department of County Assets, this analysis relied on DCA spend data and a model and data specific to Oregon provided by the Oregon DEQ. We chose to use this instead of the EIO-LCA because that model uses 2002 dollar values and uses national US averages for production processes. We felt that we should take advantage of the new Oregon DEQ model for greater accuracy. Figure 5 shows embodied emissions and spend in each of eight economic categories. The results should be considered a good but not highly precise estimate. Given the quality of the data extracted from the ERP system of record, it was not always possible to identify with precision what was purchased and to which economic sectors (and category) it belonged. For example, sometimes we only had a vendor name but no information on which of many possible goods and services were purchased from that vendor. Sometimes we knew the overall vendor's business sector but not what was actually purchased in that particular transaction. This results in some generalizations that are close but not exact. In the next three to five years, there will be a new or upgraded ERP system to replace the current one which will soon reach the end of its useful life. A new ERP system has the potential to offer more precise reporting by commodity codes to facilitate analysis.

**Figure 11: Embodied Emissions in Purchased Goods and Services for Entity (FY2014)**

## 7. COST OF CARBON: QUANTIFICATION AND RISK

Assembling a GHG inventory is an opportunity to analyze a particular kind of financial risk, i.e., the implications of a “cost of carbon” – a direct or indirect cost associated with GHG emissions, as a result of policy. Many analyses of proposed legislation have indicated a likely range of this cost. Examples are available in countries that have already capped CO<sub>2</sub> emissions.

Recent EPA analysis<sup>4</sup> of proposed climate policy suggests that, within a few years of implementing a cap-and-trade system, the cost of carbon could be around \$15 per MT CO<sub>2</sub>e. One proposed “reserve price” (or price floor) is \$10, while short-term “escape hatch” prices (or price ceilings) have been around \$30. California Cap-and-Trade program auctions provide a useful example of current carbon prices. The August 2015 auction average price per metric ton was \$13.73.<sup>5</sup>

<sup>4</sup> [http://www.epa.gov/climatechange/economics/pdfs/HR2454\\_Analysis.pdf](http://www.epa.gov/climatechange/economics/pdfs/HR2454_Analysis.pdf)

<sup>5</sup> [http://www.arb.ca.gov/cc/capandtrade/auction/aug-2015/summary\\_results\\_report.pdf](http://www.arb.ca.gov/cc/capandtrade/auction/aug-2015/summary_results_report.pdf)

In 2013 the Oregon Legislature directed Portland State University to complete a study of a implementing a statewide carbon tax, including its impact on the state economy. The study looked at a carbon tax in the range of \$10 to \$150 per MT CO<sub>2</sub>e. The study concluded that a tax of \$60 per MT CO<sub>2</sub>e would be sufficient to support Oregon meeting its 2020 goal of reducing GHG emissions 10 percent below 1990 levels. The study determined that at that level, the tax would not have a significant impact on the state's economy. This study will serve as the basis for future discussion in the Oregon Legislature about how to meet the state's climate goals.

These ranges provide a sense of the Multnomah County Department of County Assets total direct and indirect financial exposure related to a cost of carbon.

The actual value to society of reducing carbon emissions is much higher. In 2012 Multnomah County commissioned a feasibility study of a financing tool that would support energy retrofits on commercial building. That study, completed by ECONorthwest, estimated that there is a \$454 per MT CO<sub>2</sub>e benefit to society for GHG emissions reduced on an ongoing basis.

If the California Cap-and-Trade auction price of \$13.73 is applied to DCA's 2014 emissions it provides a sense of scale for *potential* costs, by Scope category:

- Scope 1 (9,400 MT CO<sub>2</sub>e): \$130,000
- Scope 2 (12,664 MT CO<sub>2</sub>e): \$170,000
- Scope 3 (25,158 MT CO<sub>2</sub>e): \$350,000

This total financial risk is unlikely to be borne entirely by DCA. Indeed, just as part of the carbon footprint is shared with others – from employees who commute to vendors that supply the organization with goods and services – the cost-of-carbon risk will likely be shared. This rough calculation is an approximation of the financial risk that could emerge under possible climate policy scenarios.

## 8. REGULATORY REQUIREMENTS

### Mandatory Reporting in Oregon

Oregon Department of Environmental Quality (DEQ) requires GHG reporting for a wide range of entities. The reporting threshold is 2,500 MT CO<sub>2</sub>e annually.

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. For more information on Oregon's rules, visit [DEQ's GHG reporting](#).

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 and other facilities organizations 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 will exceed 2,500 MT CO<sub>2</sub>e annually.

#### Mandatory Reporting at the Federal Level

US Environmental Protection Agency (EPA) has issued [mandatory reporting guidelines](#), finalized in September 2009. The reporting threshold is 25,000 MT CO<sub>2</sub>e annually.

Federal climate legislation might 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 government agencies, will have such responsibilities.

#### EPA 111-D Rulemaking - Clean Power Plan

The EPA is expected to publish the final rules for the Clean Power Plan in August of 2015.

The Oregon Department of Environmental Quality will have one year to develop a compliance plan for the State of Oregon. The plan must show a path to reaching the EPA assigned carbon reduction goal through strategies that can include any combination of: reducing the carbon amount of fossil fuel generated in the state; reducing the carbon intensity of the State's electricity load; generating additional energy from renewable sources; or reducing overall energy use in the state via energy efficiency. Oregon's compliance plan can include just the state as a single entity, or the state in a compliance partnership with multiple states in the region.

It is unlikely that the Oregon compliance plan will place additional requirements on Multnomah County operations directly, but the County may experience an impact depending on how the plan is developed and implemented.

## **9. BACKGROUND ON CLIMATE ACTION AT MULTNOMAH COUNTY**

Multnomah County has worked over the last decade and a half towards addressing sustainability concerns, building from the traditional "recycling and responsible resource consumption" framework towards a holistic, triple bottom line approach that integrates economic realities and the essential inclusion of a social justice framework.

If environmental degradation and resource exploitation disproportionately affect the most vulnerable populations, and one of our primary mission is to serve and support the most vulnerable populations in Multnomah County, then the logic follows that it is ultimately one of

our greatest responsibilities to build resiliency into those communities, and to do nothing that adversely harms them. Our long term planning must meet the needs of the populations we serve today without impeding our ability to continue to serve Multnomah County residents in the future.

The Sustainable Jails program, launched in 2012, has received national recognition through National Association of Counties Achievement Award, and the new East County Courthouse, completed in the same year, has received the LEED Gold certification.

The county has received over \$1 Million dollars in Energy Trust of Oregon incentives for various projects that have help lead an overall reduction of 12% carbon emissions since 2007 (Climate Action Plan). The East County Courthouse (2012) and the Hillsdale library (2004) both achieved LEED Gold certification for new construction. Where it is practical, we install green roofs to help reduce the Urban Heat Island Effect. Three exist today: Central Library, Mead Building, and East County Courts. The county incorporates solar power into its facilities at three sites that can generate over 500,000 kilowatt hours per year: Juvenile Justice Complex, Yeon Complex, and East County Court. At the Inverness Jail laundry facility, the recently installed (2012) water recycling system saves 60% of the water needed for laundry operations.

Strategic Energy Management is a priority. Forty of the largest buildings are equipped with an integrated Building Automation System that allows engineers to program building equipment to operate only when it is needed for employees and clients.

Perhaps the most relevant milestone is the county's adoption of Portland's Climate Action Plan (CAP) in 2009, and the renewed commitment to the 2015 revision. The efforts outlined in this report document a new milestone for the county, as DCA will be the first county department to commit to quantifiable, department-specific carbon reduction goals as outlined in the CAP. The DCA staff contributed thirteen specific goals to be met by 2030.

Completed and current IT Projects and activities that support carbon emissions reduction:

	<b>Project</b>	<b>Activity and Outcome</b>
1	Recycling of older IT systems (ongoing)	Firewall system replacement. VPN system replacement. Annual PC replacement of approximately 1,660. systems being reused or broken down and recycled. Recycling of used cell phones and mobile devices.

2	Google Hangouts (2014)	Provided online conference rooms as an option and reducing need to drive to attend meetings.
3	Server Virtualization for Data Center Migration (2012)	Reduce the physical server device needs causing a decrease in power consumption annually by 46.47 KWh.
4	East County Court Building and DataCenter Facilities systems (2012)	Groundwater based cooling, variable speed fan systems, hot air containment, heat from the Data Center reclaimed and used in the building, and a photovoltaic roof. LEED Gold certified building.
5	Disks to disk backup (2012)	Reduction of backup tapes (durable goods). Less use of Iron Mountain service (delivery/pickup daily of tapes) from 7 days a week to 1 day a week.
6	Reduction of printed materials (2011)	Operations nightly batch printing (approx 360,000 sheets of paper per year). Online employee enrollment in the Benefits Program enrollment instead thousands of printed and mailed packets.

Efforts in the 1980s include incorporating a “green” focus in the construction of the Yeon Building in East County in the early 1980s, utilizing solar power and passive cooling, reliant on a partially subterranean construction, and the establishment of a county-wide recycling program. In 2001, a concerned group of employees established the Green Team, leading ultimately to the formal establishment of the Office of Sustainability in 2011.

## 10. POTENTIAL GHG EMISSIONS REDUCTION OPPORTUNITIES

Take actions that: 1) reduce consumption of goods, services and energy, and 2) purchase goods and services and energy that are less carbon-intensive. Evaluate goods and services in all three phases of their life-cycle: production, use, and disposal. Take actions that address the phase that is most carbon intense.

Areas of greatest opportunity:

1. Energy Efficiency

2. Renewable Energy
3. Purchasing Policy
4. Space Utilization

Category	Examples of Opportunities
Transportation	Fuel-efficient vehicles Low-carbon fuels for fleets Expand commute walk / bike / transit Route optimization software
Buildings and Energy	Build net-zero buildings. Digitize energy efficiency such as light on/off sensors. Purchase renewable power (and their certificates). Expand building systems efficiency Develop on-site renewable power generation Establish space utilization policies that reduce square footage per person Establish heating a cooling policies with higher and lower allowable indoor temperatures. Stormwater management at buildings. Install eco roofs on all new buildings. Recycle water. Use passive solar systems. Sequester carbon through green infrastructure. Increase the number of acres with urban canopy. Use cold water for laundry in jails. Expand use of video conferencing.
Purchasing and Procurement	Purchase products and services that are less carbon intensive. Consume less. Establish sustainable purchasing policies. Identify vendor specifications. Establish building materials standards. Consolidate purchases to reduce number and frequency of deliveries. Assess environmental product disclosures for all purchases. Reduce the types of pens available and where feasible purchase those that can be re-filled. Reduce the types of office supplies available.

Infrastructure construction and development	Identify materials with lower carbon intensity Partner with vendor to meet our requirement Establish requirements for materials reuse and recycling
Business travel	Develop alternative fuels program Monitor metrics for vehicle use Expand video conferencing Purchase carbon offsets

These guiding principles for how to implement the complex work of reducing carbon emissions are inspired by the City of Gresham.

1. Shift the focus from consumption to encompass the whole system: from resource extraction and manufacturing of goods through distribution, use, and disposal. Sustainable purchasing upstream, and repurposing, recycling and reusing downstream. This approach addresses all sources of emissions: those we create directly by our actions and those we contribute to indirectly.
2. Examine our work from systems perspective, defining mutually supportive economic, equitable, social, and environmental goals and objectives.
3. Incorporate a long term and global perspective of the impact of human activities and environmental conditions when making decisions and establishing policies.
4. Account for the social and environmental costs and benefits, as well as making explicit the inherent value of the natural environment.
5. Align policies, rules, processes, and procedure to encourage the widespread adoption of best practices.
6. Inspire other County departments to help DCA achieve this vision and sustainability goals.

## 11. CONTACT INFORMATION AND ADDITIONAL RESOURCES

For information about how the DCA is reducing emissions and mitigating the impacts of climate change, please contact Tracey Massey and Patrick Williams in the Department of County Assets.

In 2013, a team of DCA staff nicknamed the Think Tank began meeting to figure out how to put into action their department's value of sustainability. They were tasked by the department director to consider what they had learned in a series of workshops led by Darcy Winslow entitled "Leadership for a Sustainable Future". They wanted to address all three goals of a triple bottom line. They were committed to ensuring that equity was a central feature of whatever they came up with. Once they understood the disproportionate impact of climate change on



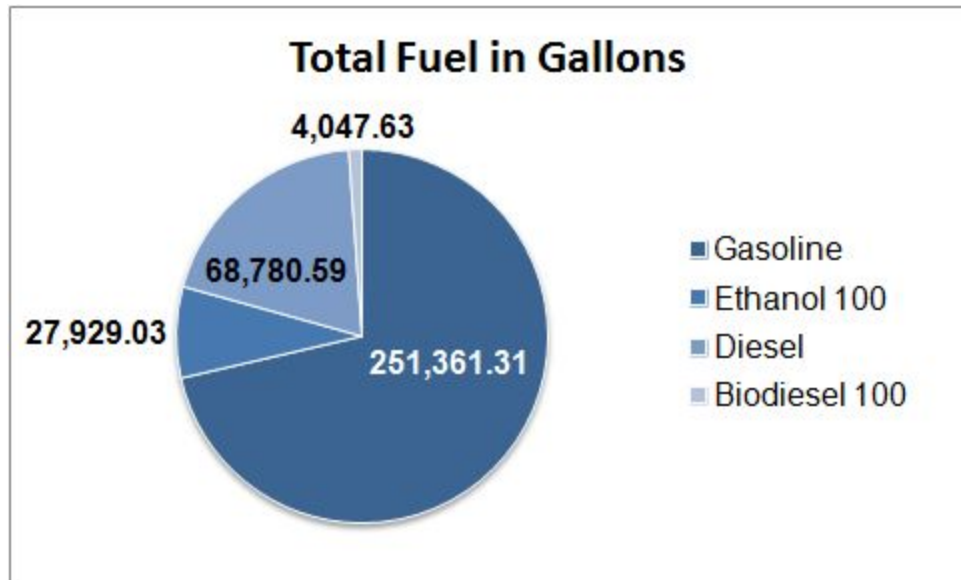
vulnerable people, they quickly settled on reducing carbon emissions as a way to advance social justice.

Thank you to all the team members: Jacob Farkas, Eric Winn, Kaleb Smith, Madeleine Mader, Tracey Massey, Jenny Mundy, Patsy Moushey, and Patrick Williams from the Department of County Assets. In addition, numerous staff contributed data and analysis to the GHG inventory, including Garret Vanderzanden, Maureen Noblitt, Chris Brower, and Tim Lynch.

This GHG inventory was completed as a part of the Department of County Assets' participation in BASEline, a multi-jurisdictional process led by Good Company ([www.goodcompany.com](http://www.goodcompany.com)). Good Company facilitated the use of its proprietary calculation tool (Good Company's Carbon Calculator, or G3C), 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 the template for this document. Staff of the Department of County Assets' prepared this report. For more information about BASEline, visit <http://www.goodcompany.com/baseline> or contact Aaron Toneys ([aaron.toneys@goodcompany.com](mailto:aaron.toneys@goodcompany.com), 541-341-4663, ext. 218).

## APPENDIX A

Figure 12: Fuel Consumption in Gallons FY2014



## APPENDIX B: Timeline of Sustainability Actions [OFFICE OF SUSTAINABILITY](#)

**APPENDIX C: Photo of the volume of one metric tonne of CO<sub>2</sub>**

