City of Gresham
Greenhouse Gas Emissions Inventory
FY 2017-18

For City's Internal Operations

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EXECUTIVE SUMMARY

This report is an update to the original 2008 and 2012 Greenhouse Gas Inventories. Its purpose is to:

1. Present the latest data for FY 2017-18
2. Compare data across the 3 years, and
3. Present priority areas for greenhouse gas reduction based on the data.

Henceforth in this report, the term "greenhouse gas" will be referred to throughout as GHG.

The City's goal, as stated in its **Internal Operations and Facilities Sustainability Plan,** is 80% GHG reduction by 2050, from 2008 levels. Results from the FY 2017-18 GHG inventory show that the City's actual emission reductions are ahead of the 2020 target. This accelerated progress was primarily due to the City's LED streetlight replacement project and significant reduction in the carbon intensity of grid-supplied electricity.

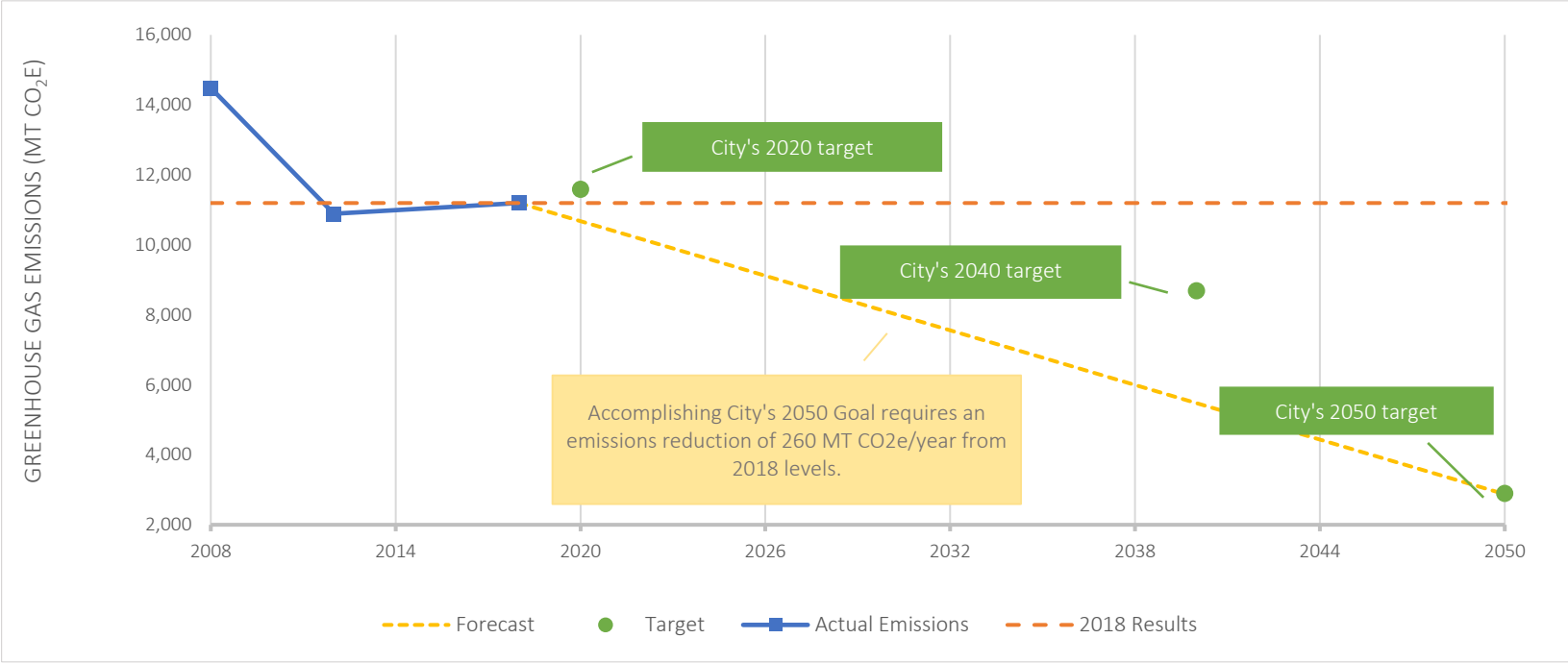


Figure I: City's progress toward climate goal (excluding supply chain emissions)

The largest source of GHG emissions was the energy use in buildings for lighting, heating and air conditioning. Fuel used for the City's fleet vehicles was another significant source of emissions. Significant emission reductions have been achieved for natural gas, electricity and business travel despite community and organizational growth.

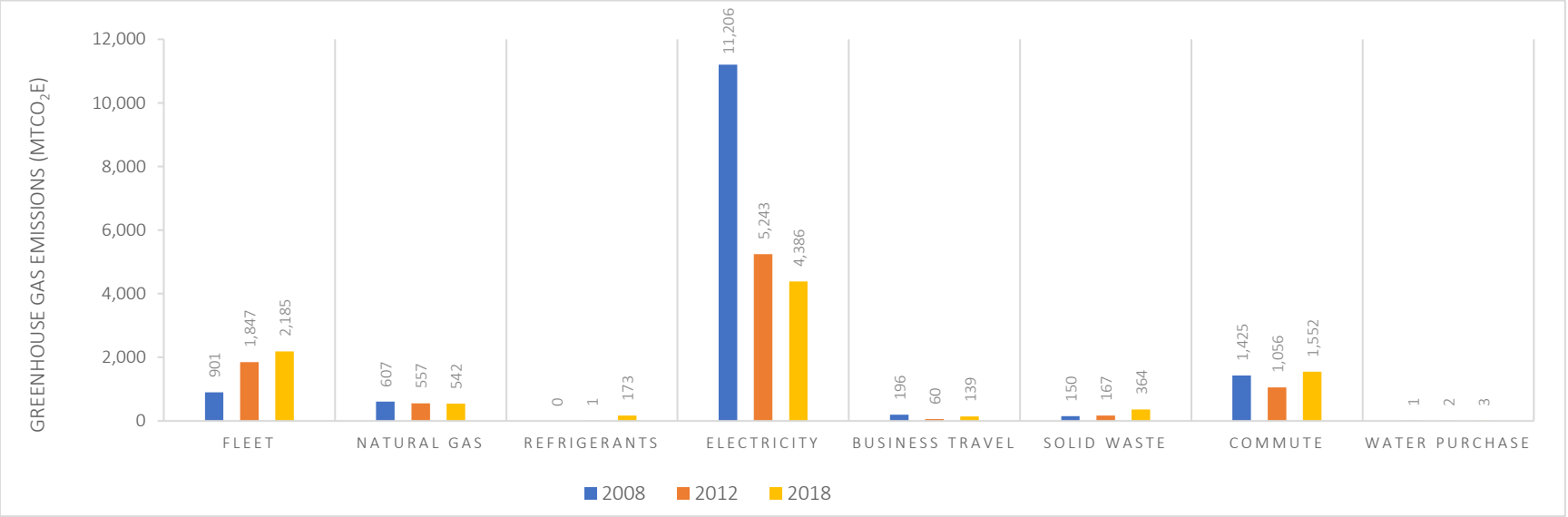


Figure II: City-wide emissions by source.

INTRODUCTION

Starting in 2008, the City began to track GHG emissions resulting from its internal operations. This report presents data and emissions for 2018 (fiscal year 2017-18) and follows on the City's 2008 (baseline) and 2012 GHG inventories. GHG emissions are reported in metric tons of carbon dioxide equivalent (MT CO_2e). Based on the results of the baseline greenhouse gas (GHG) inventory conducted for 2008 emissions, the City adopted a sustainability goal to reduce direct and indirect GHG emissions from internal operations to 80% below 2008 levels by 2050.

Policy Context

In 2007, Mayor Shane T. Bemis signed the US Mayor's Climate Protection Agreement, aligning Gresham with more than 1,000 cities across the nation that recognize the need to confront environmental concerns. The agreement urges local governments to enact measures to reduce GHG emission levels by 7% below 1990 levels by 2012. The City has already achieved this goal. Since then, the focus has been on the targets set by the Internal Sustainable Operations Plans.

In 2011, the City created its first-ever Sustainable Gresham Initiative as a call to community members, businesses, organizations and local government to join in a multi-phased strategy to pave the way towards a more resilient city. In order to do so, the City needed to better understand its own contribution of GHGs that result from ongoing City operations and facilities.

SCOPES 1 AND 2 EMISSIONS	
Year	Reduction Target
2020	20% reduction
2030	40% reduction
2040	60% reduction
2050	80% reduction

Table 1: Interim targets for tracking progress toward City's Climate Goals

The first phase of the Sustainable Gresham Initiative addresses the City's internal operations and facilities, with specific GHG reduction targets to be met while enhancing City operations and practices. This effort, coupled with periodic GHG assessment for City operations and facilities, enables City staff to track progress over time towards our climate goals.

Goal 1

80% GHG Reduction by 2050

Goal 2

100% Renewable Energy by 2030

OPERATIONAL EMISSION BOUNDARIES

The City of Gresham sought to include the widest possible boundaries (emission sources and facilities) while following the standard GHG inventory protocols and being consistent with the baseline inventory. Emissions sources and activities are classified as either producing direct or indirect GHG emissions. Direct emissions are those that stem from sources owned or controlled by an organization. Indirect emissions occur because of the organization's actions, while the direct source of emissions is controlled by a separate entity.

To distinguish direct from indirect emissions sources, three "scopes" are defined for traditional GHG accounting and reporting. Figure 1 (below) illustrates the three emission scopes.

- Scope 1 – All direct GHG emissions that originate from equipment and facilities owned or operated by the City of Gresham.
- Scope 2 – Indirect GHG emissions from purchased electricity, heat or steam.
- Scope 3 – All other indirect GHG emissions that may result from City activities 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 institution, emissions from land-filled solid waste, and the commuting habits of institution employees.

Scope 1 and 2 are mandatory categories for most protocols and registries, while Scope 3 is an optional reporting category that serves to clarify an organization's entire carbon footprint and illuminate the potential regulatory and financial risks an institution may face due to its carbon footprint.

Embodied emissions in purchased goods and services (referred to as Supply Chain) are a significant share of the City's greenhouse gas emissions, which are in turn dictated by the types and quality of services provided, infrastructure owned, and number of citizens served. As the city has grown in population, additional infrastructure has been constructed to serve these citizens, including new streets, streetlights, water/wastewater/ stormwater pipes, fire stations and parks.

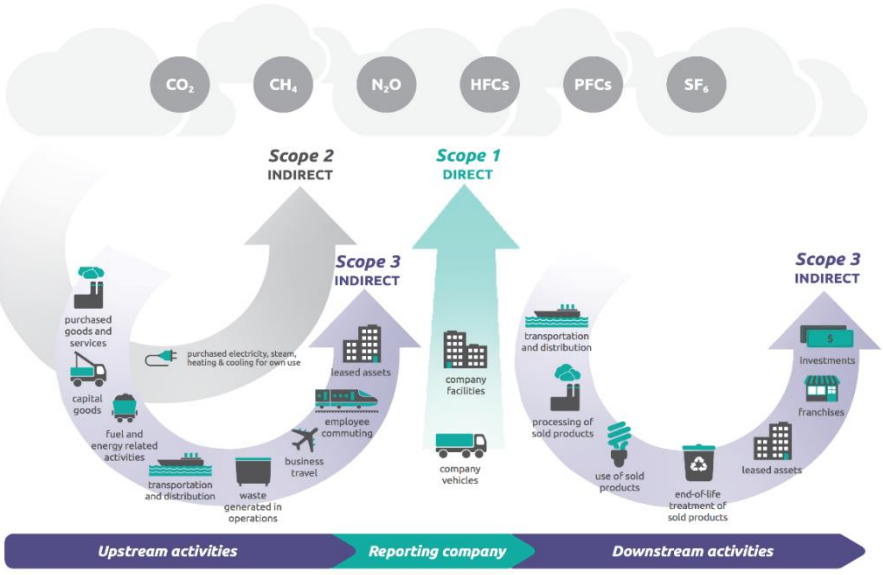


Figure 1: Greenhouse gases and accounting and reporting scopes.[1]

Scope 3 emissions are the most difficult to track but are large in scale and serve mission-critical activities. However, quantifying Supply Chain emissions is currently a very data- and resource-intensive process.

Although there are significant challenges in quantifying and tracking Supply Chain emissions, the City identifies the need to develop process targets for these emissions. In the meantime, the City continues to quantify its non-Supply Chain emissions – solid waste, water purchases, employees' commute, and business travel.

Table 2: Description of City of Gresham's operational GHG emission sources

	EMISSIONS SOURCE	EMISSIONS SOURCE DESCRIPTION
Scope 1 (Direct Emissions)	Fleet	This includes all owned vehicles and mobile equipment that consume gasoline and diesel fuels. The City currently owns 369 fleet vehicles including: ▪ 6 hybrid vehicles ▪ 1 electric vehicle ▪ 54 diesel vehicles, all powered by B5 (biodiesel)
	Stationary Fuels	The City consumes natural gas for space and water heating in 11 buildings, including fire stations as well as the Wastewater Treatment Plant.
	Refrigerants	Refrigerants are used in heating, ventilation, and air conditioning systems at the City's facilities, as well as in fleet maintenance systems. Emissions occur as a result of leakage over the operational life of equipment.
Scope 2 (Indirect Emissions)	Electricity	Emissions from electricity consumption were calculated from all the facilities included in the inventory boundary. The emissions shown here were calculated using the emissions factor for PGE (owner-based), as reported to the EPA's Emissions & Generation Resource Integrated Database (eGRID).
Scope 3 (Indirect Emissions)	Business Travel	Business travel encompasses employees' use of airlines, rental cars, and personal vehicles for travel associated with training or meetings.
	Solid Waste	This category includes waste generated from multiple City facilities and parks (end user waste). All waste is transferred to Columbia Ridge landfill in Arlington, Oregon, operated by Waste Management, Inc. (a methane capture facility with renewable energy generation onsite). CIP project-related waste is not included in this category, only direct waste from City operations. CIP-related waste is captured in the purchasing category not covered in the scope of this inventory.
	Water Purchase	The City purchases potable water from Portland and Rockwood and supplements these primary sources with wells. This category includes emissions associated with Gresham's water purchase only. Power to distribute water within Gresham is accounted for in Scope 2 above.
	Employee Commute	There are approximately 649 City employees including full-time, part-time and temporary staff in FY 2017-18. Commute survey information provided data on the percentage of trips by mode and average one-way trip mileage.

INVENTORY RESULTS

This report is an update to the original 2008 and 2012 GHG Inventories. Full details on methodology and results specific to 2008 and 2012 can be found in the original reports.

Total GHG (including Scope 3 non-supply) emissions in FY 2018 resulting from internal operations was 11,196 metric tons of CO_2e (MT CO_2e). By calculating non-Supply Chain Scope 3 emissions, the City is able to explore these areas for emissions reduction opportunities. The largest source was the energy use in buildings for lighting, heating and air conditioning. Fuel used for the City's fleet vehicles was another significant source of emissions.

This represents a 23% decrease from FY 2008.

FY 2018 emissions are broken down as follows:

- Scope 1 emissions: 2,900 MT CO_2e
- Scope 2 emissions: 4,386 MT CO_2e
- Scope 3 emissions (non-Supply Chain): 3,910 MT CO_2e

2018 emissions from internal operations are equivalent to
- Annual energy use from 1,341 homes, or
- Driving 2,377 cars for one year

Calculated using EPA's Greenhouse Gas Equivalencies Calculator.

COMPARISON OF INVENTORY RESULTS – 2008, 2012, 2018

SCOPE 1

Fleet: This category includes emissions from public works, police, fire and general City fleet vehicles. In 2018, fleet emissions accounted for 2,185 MT CO_2e. The majority (96%) of the City fleet's GHG emissions originated from conventional fuels (gasoline and diesel). Alternative fuels (ethanol and biodiesel) produced the remaining (4%) of emissions.

Total gallons of fuel purchased for fleet vehicles has increased over the years, resulting in an increase in emission sources from fossil fuels.

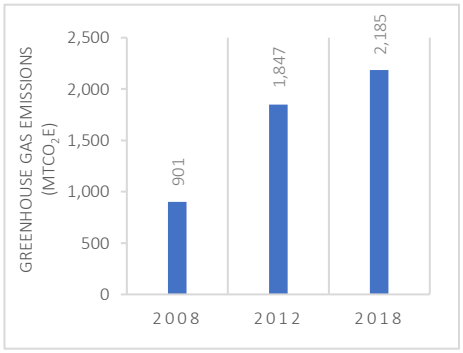


Figure 1: Historic comparison of fleet emissions.

Stationary Fuels: The City uses natural gas in 11 City facilities for space and water heating. Due to continued efforts in energy efficiency by the City's Facilities department, natural gas emissions have reduced by 11% despite an increase in the number of employees at the City.

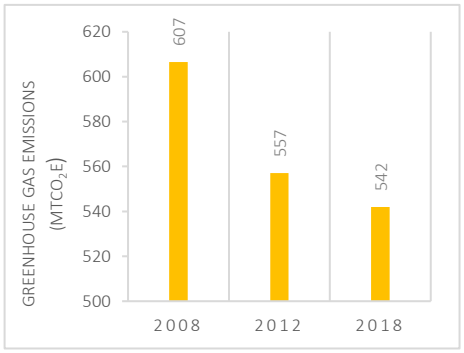


Figure 2: Historic comparison of natural gas emissions.

Refrigerants: Hydrofluorocarbon refrigerants (HFCs) are greenhouse gases used by facilities and fleet for air-conditioning. Emissions occur as a result of leakage over the operational life of equipment. HFCs like R-22, R-12 and R-11 are being phased out as part of the Montreal Protocol, given it has a high global warming potential.

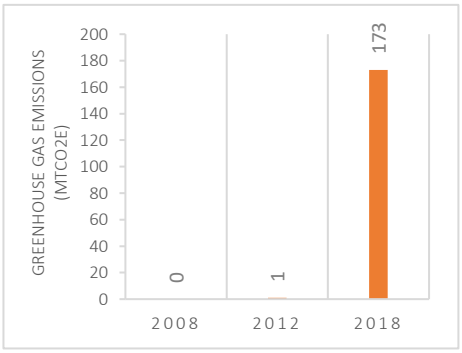


Figure 3: Historic comparison of fugitive emissions.

Our current HFCs will eventually be replaced with a refrigerant that is a more sustainable alternative. By including R-22 in the inventory, it signals a change in operations to replace the refrigerant with a lower global warming potential in line with the phase out timeline.

Refrigerants are currently 2% of total non-Supply Chain GHG emissions.

SCOPE 2

Electricity:

The major driver in the decrease of emissions is the fact that the electricity supply is becoming cleaner due to lower carbon intensity. The emissions factor for electricity dropped from 1,617 lbs. of CO_2 per MWh in 2009 to 816 lbs. of CO_2 per MWh in 2016. This decline in emission factors is the result of state policies, like Oregon's renewable portfolio standard, which have reduced the carbon intensity of PGE's electricity grid. While the electricity usage decreased 13% in 2018, GHG emissions associated with electricity decreased by 61% compared to baseline emissions. This trend illustrates the fact that emissions from electricity can decrease as a function of electricity emissions factors, use reduction, or both. This means there is potential for electricity produced from an increasing proportion of renewable sources to drastically reduce GHG emissions, despite increased demand for electricity.

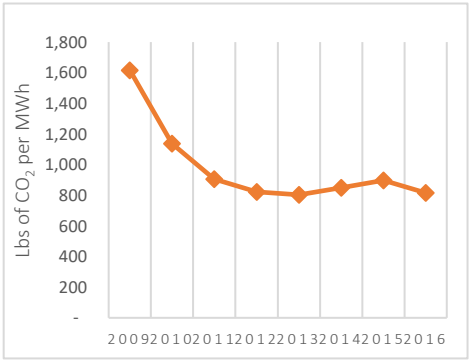


Figure 4: Historic PGE emission factors

Unlike emissions factors for electricity, emissions factors for fossil fuels remain relatively constant. This means that while emissions from electricity can decrease even as use increases, emissions from any given fossil fuel can only decrease as a result of a decrease in use.

On-site solar at City Hall was installed in 2012. This resulted in a reduction from what the total building GHG emissions from energy use would have been had that electricity been supplied by the grid.

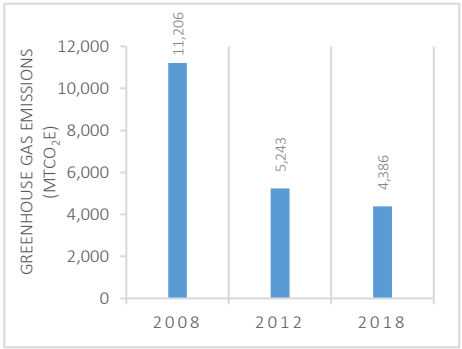


Figure 5: Historic comparison of electricity emissions.

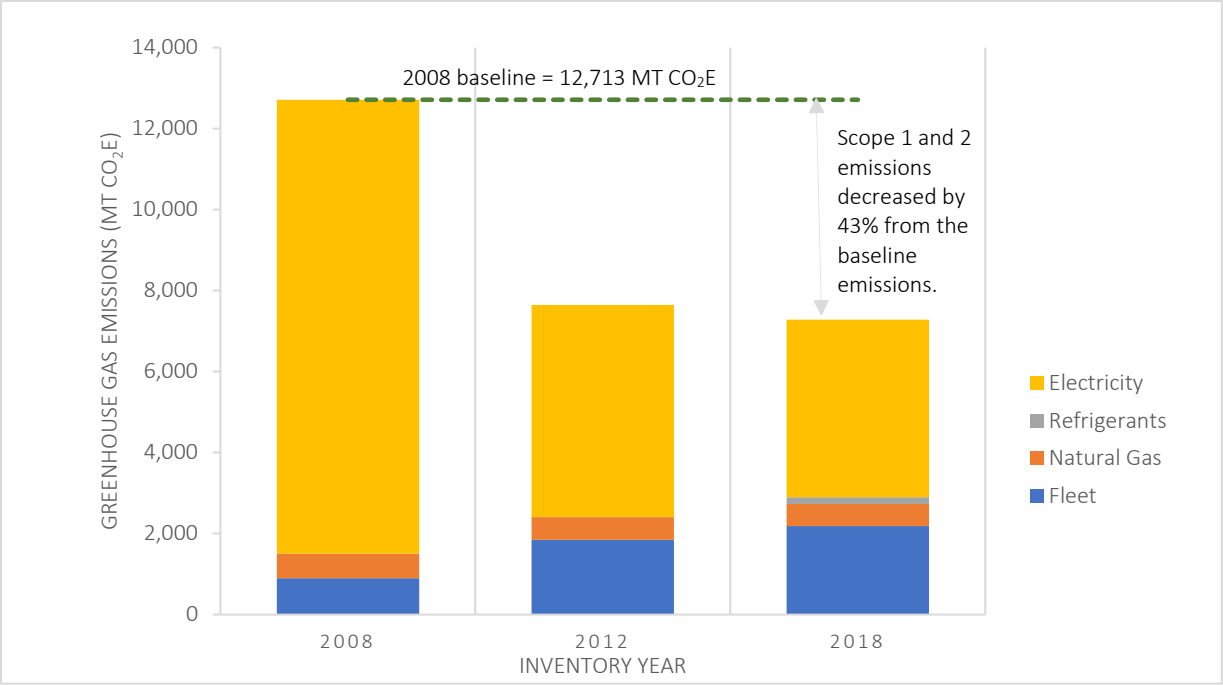


Figure 6: Comparison of Scope 1 and 2 emissions, by source, over time.

SCOPE 3 (NON-SUPPLY)

Business Travel: Business travel has reduced 29% from 2008 to 2018. The vast majority of business travel emissions originate from air travel. In 2012, there was a 69% decline in emissions from business travel due to the City's substantial efforts to limit out-of-state travel to educational conferences. However, due to increased engagement in training activities, air travel emissions have grown again.

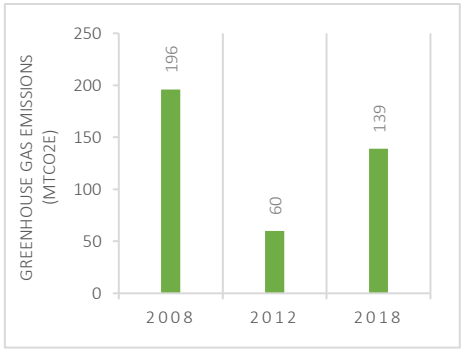


Figure 7: Historic comparison of business travel emissions.

Solid Waste: Emissions from solid waste have increased 2.5 times as compared to 2008. This increase can be largely attributed to additional waste transferred from the Main City Park and prevalent cases of illegal camping at the Gradin Sports Park. It should also be noted that employee count has increased 25% since 2012.

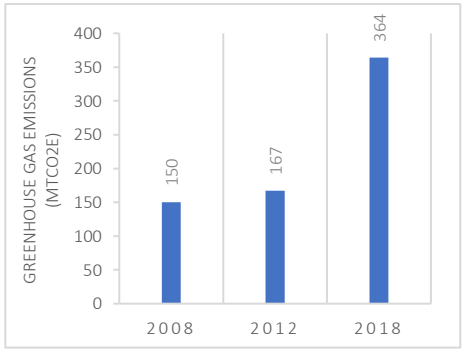


Figure 82: Historic comparison of solid waste generation.

Employee Commutes: Emissions associated with employee commutes have increased 9% as a result of increase in City staff members. However, based on responses from the employee survey, the percentage of staff commuting to work in a single occupancy vehicle decreased from 86% in 2008 to 82% in 2018. At the same time, commuting by light rail increased from 5% in 2008 to 8% in 2018.

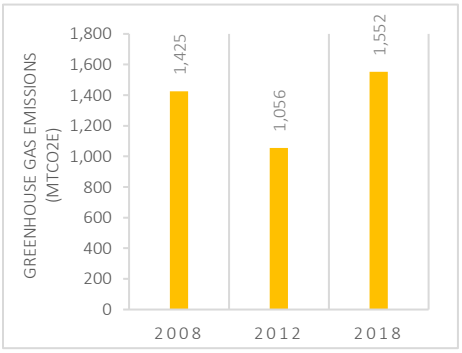


Figure 10: Historic comparison of employee commute emissions.

Water Purchases: The City purchases the great majority of its water from the Portland Water Bureau (PWB), and purchased a small amount of water from Rockwood Water People's Utility District, the City of Troutdale and Pleasant Home Water District. This category accounts for Gresham's purchase of water. Emissions associated with the electricity used to distribute water within Gresham are accounted for in the Scope 2 electricity category.

Overall, the emissions from water purchased has increased three times the baseline emissions due to an increased water consumption at City facilities.

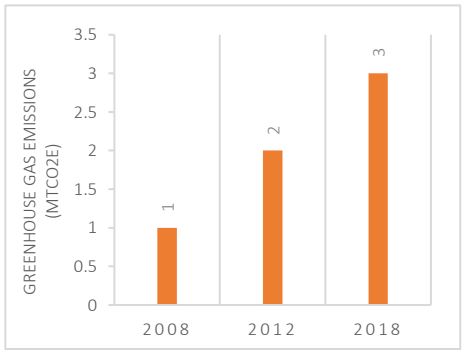


Figure 11: Historic comparison of water purchase emissions.

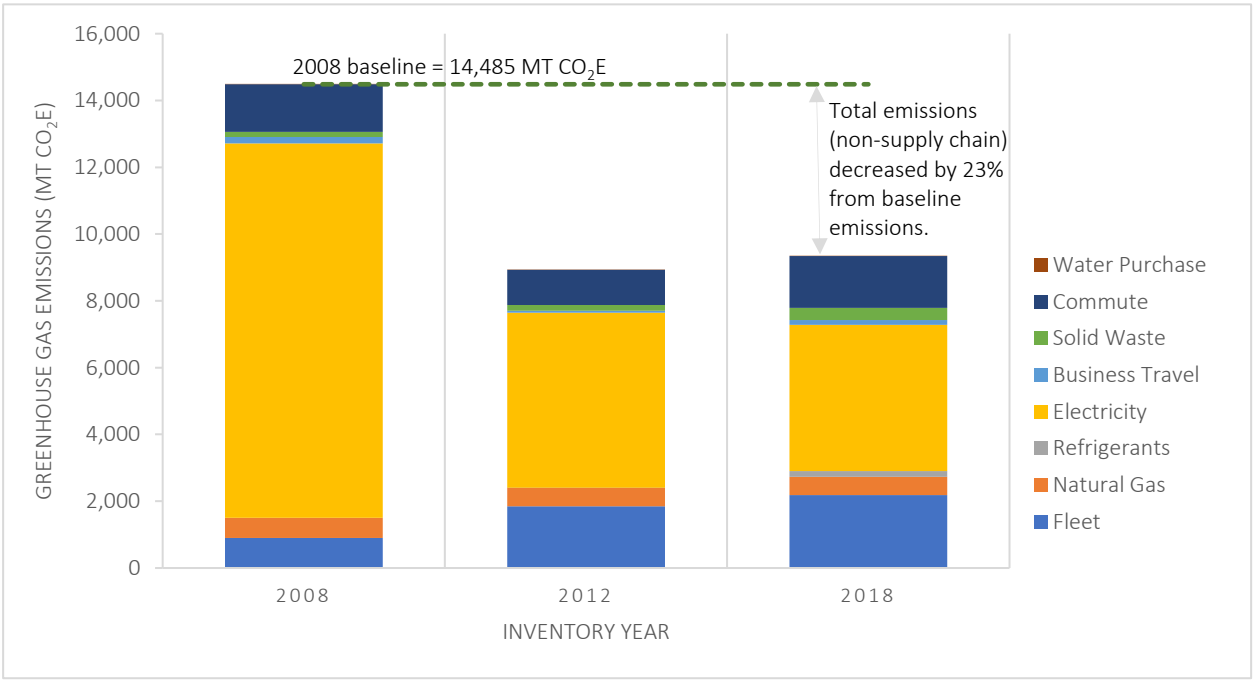


Figure 12: Comparison of total emissions (non-supply chain), by source, over time.

PROGRESS TOWARDS CITY'S CLIMATE GOALS

1. Goal 1: 80% Reduction by 2050

The carbon reduction goal adopted in the Internal Operations and Facilities Sustainability Plan is 80% reduction of GHG emissions by 2050 from the 2008 baseline of 14,485 $MTCO_2e$.

2018 non-supply chain GHG emissions, at 11,196 $MTCO_2e$, in comparison to 2008 non-supply chain GHG emissions at 14,485 $MTCO_2e$, is a decrease of 3289 $MTCO_2e$ or 23%. Fig. 16 shows that the City's FY 2017-18 non-supply emissions reductions have achieved the 2020 target and are on-track for the 2030 target (i.e. 40% GHG reduction from baseline emissions). To reach the 2050 goal requires emission reductions at an estimated 260 $MTCO_2e$/year from 2018 levels.

The City has already achieved the climate goals under the US Mayor's Climate Protection Agreement.

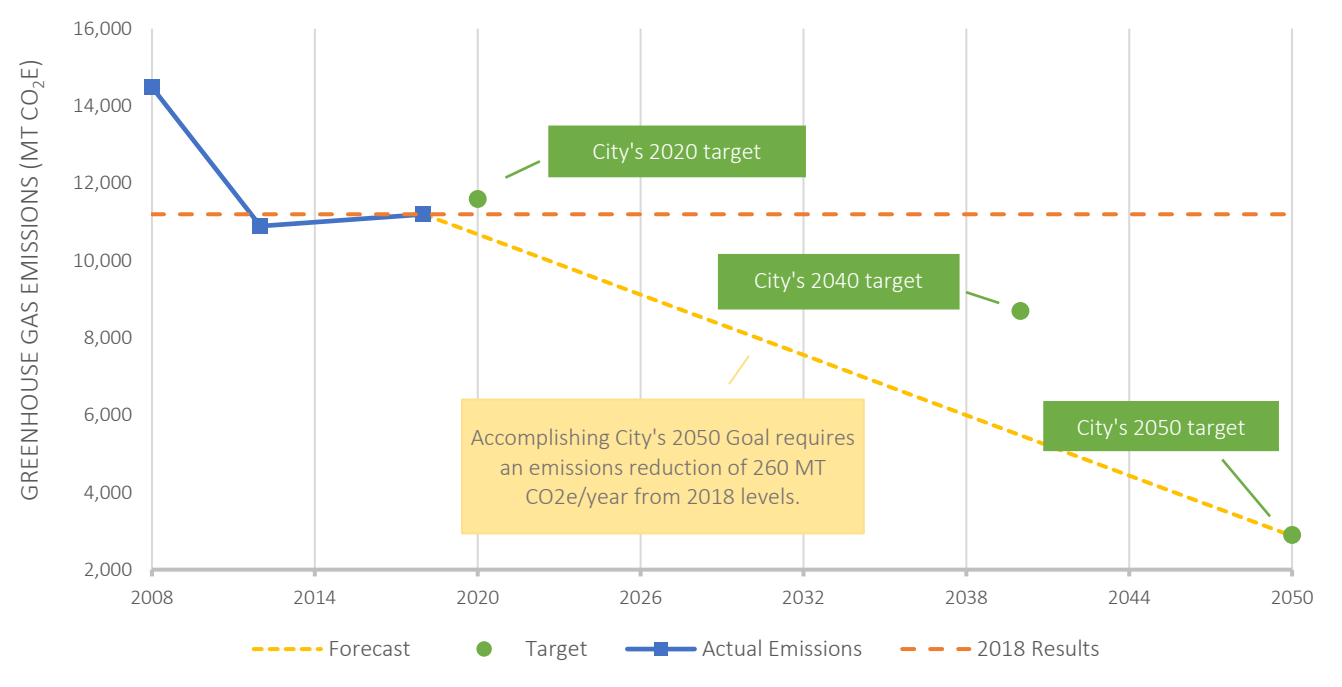


Figure 13: City's progress toward climate goal (excluding supply chain emissions).

This accelerated progress was primarily due to the City's LED streetlight replacement project and significant reduction in the carbon intensity of grid supplied electricity. The additional reductions necessary for the City to reach its goal will require strategic efforts across all sources of GHG emissions.

2. Goal 2: 100% Renewable Energy by 2030

In FY 2017-18, 57 percent of the City's energy needs were supplied by renewable resources, up from 31 percent in 2012. Forty-seven percent of the electricity use is generated by renewable energy systems installed on City facilities. The largest onsite renewable energy system (42%) in City operations are the two "co-generation" energy systems at the Wastewater Treatment Plant.

The City purchases Renewable Energy Certificates (RECs) to account for some of the electricity usage from the utility companies. RECs offset the City's use of fossil fuel-based power. In FY 2017-18, the City purchased 110,923 kWh of RECs, which represents 22 percent of the City's overall usage.

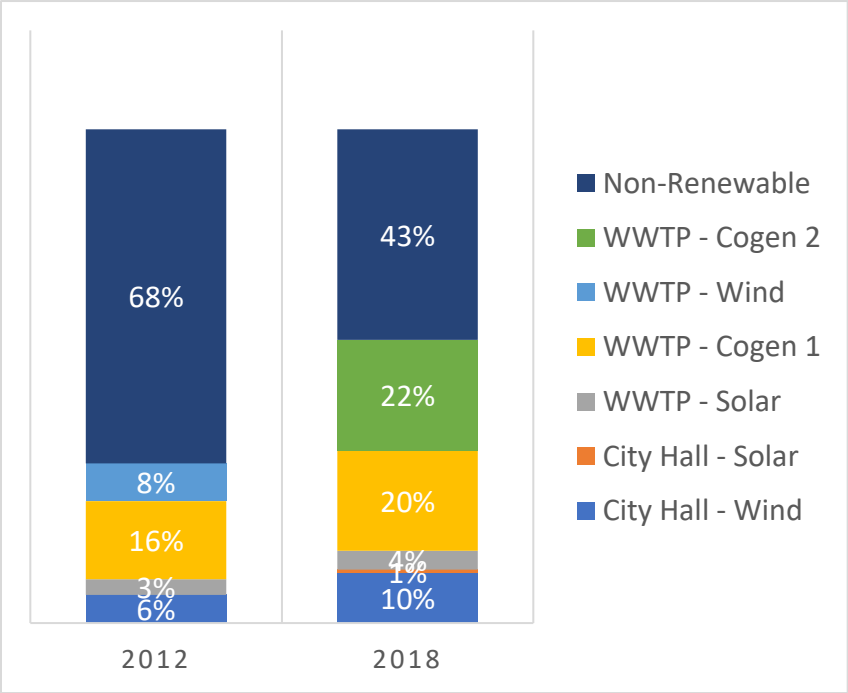


Figure 15: City's progress toward renewable energy goal.

Table 3: Progress Tracker

Metric	Baseline	Goal	2018 Status
80% GHG Reduction by 2050	14,485 MT CO_2e	2,897 MT CO_2e	On-Track
Interim: 20% Reduction by 2020	14,485 MT CO_2e	11,588 MT CO_2e	Achieved
Interim: 40% Reduction by 2030	14,485 MT CO_2e	8,691 MT CO_2e	On-Track
Interim: 60% Reduction by 2040	14,485 MT CO_2e	5,794 MT CO_2e	On-Track
100% Renewable by 2030	100%	57%	On-Track

GHG EMISSIONS ACCOUNTING VS. RENEWABLE ENERGY PRODUCTION

The Wastewater Treatment Plant (WWTP) currently generates 100% of its power onsite from biogas-to-cogeneration and solar. In fact, most of the time, the WWTP generates more power than it needs and exports the surplus to the grid. On average, the WWTP generates 10% more power than it needs. The electricity is produced with renewable biogas and hence it has environmental attributes that can be used to lower the carbon footprint of the City. However, the City transferred the associated Renewable Energy Credits (RECs) to the Energy Trust of Oregon in exchange for additional financial incentives for these two projects. So, while the City is purchasing no conventional electricity, the associated GHG emissions for these kilowatt hours cannot be deducted from total GHG emissions accounted for in the report. The combined RECs for the 2 cogeneration projects and the solar project equate to 2,215MT CO2e/year. If the City had retained the RECs from the WWTP, it would have already achieved its interim 60% GHG Reduction Goal and would be on its way to achieving 80% GHG reduction well ahead of 2050.

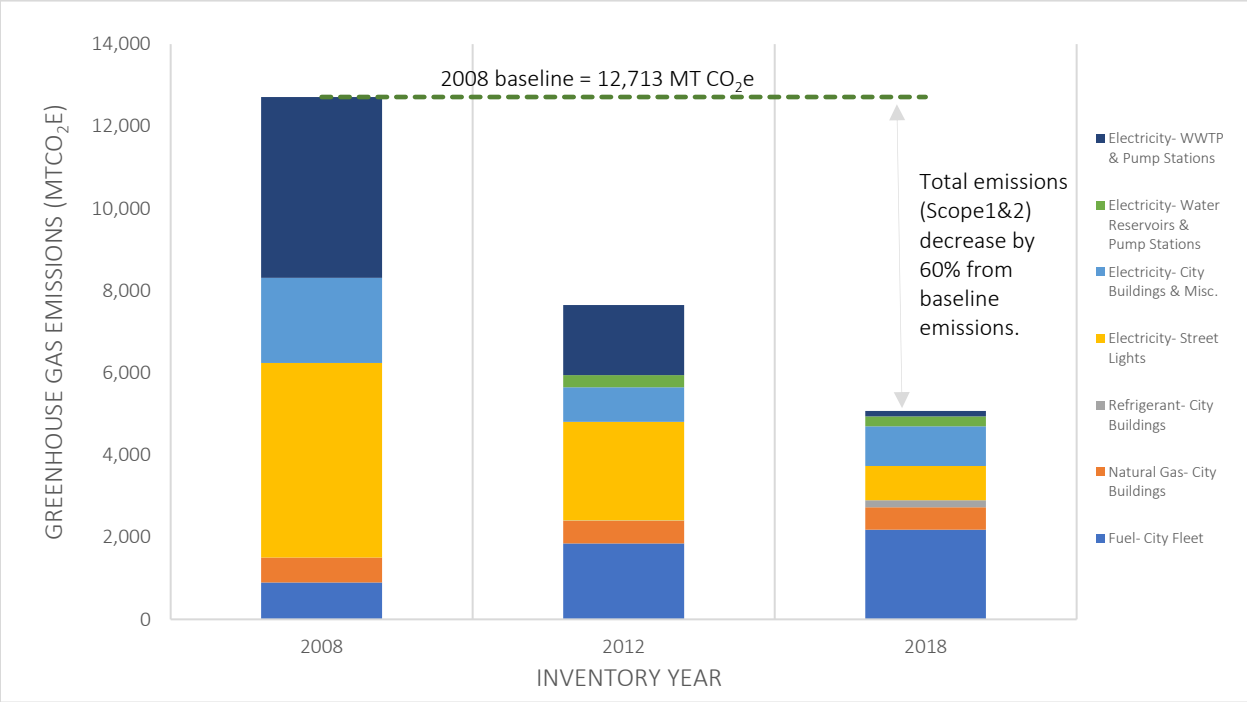


Figure 16: Comparison of GHG emissions with the RECs generated from City's Wastewater Treatment Plant.

SUSTAINABILITY EFFORTS AND CLIMATE ACTION EFFORTS AT THE CITY

The City of Gresham is strongly committed to reducing its carbon footprint associated with City operations as portrayed by the achievement of reaching the US Conference of Mayors Climate Protection Agreement goals. Inventories from past years have allowed tangible strategies to be developed to realize this goal.

Gresham has been recognized as a Green Power Community (GPC) by the EPA since 2008 for its purchase of renewable energy. GPCs are towns, villages, cities, counties, or tribal governments in which the local government, businesses, and residents collectively use green power in amounts that meet or exceed the EPA's Green Power Community usage requirements. As a community, Gresham uses 48 million kWh of renewable power over a year.[1]

The City's Facilities Maintenance Division continues to seek and implement efficiency measures across the City's building portfolio, which provides a powerful example of how energy efficiency measures can benefit institutional commercial and industrial facilities. Some of these projects include energy retrofit/upgrades, such as LED lighting in all conference rooms and City Hall floors, energy efficient boilers, etc.

Inventory Highlight 1: Net Zero Wastewater Treatment Plant

The City's Wastewater Treatment Plant (WWTP) used to be the second largest purchaser of energy for City operations. But starting in 2005, the WWTP initiated a strategic diversified approach to becoming energy independent. The first step was the installation of a 400kW cogenerator to transform the onsite digesters' methane gas into electricity, saving $260,000 a year in avoided electricity costs and providing 54% of the plants' energy needs. In 2009, the Pacific Northwest's largest ground mount solar array was installed at the WWTP, providing 7% of the plants' energy needs. Energy efficiency measures were also implemented, further reducing the overall energy demand of the plant by 6% since 2005. 2012 marked the installation of a 10,000-gallon FOG (fats, oils and grease) receiving station and a 400kW cogeneration system was installed in 2015, allowing the WWTP to be fully energy net zero. The WWTP has been net zero for 4 years now, saving $4.9 million and avoiding $2.1 million in utility costs since 2006. Since 2005, on-site renewable production at the WWTP amounts to 48,485,246 kWh, which is equal to 36,084 MT CO_2e of greenhouse gas emissions. A net zero energy WWTP equates to keeping 7,727 cars off the road for one year or powering 3,896 homes' energy use for one year.[2]

[1] *Source: EPA Green Power Community*
[2] *Source: Greenhouse Gases Equivalencies Calculator*

LEED Certified Treatment Tank

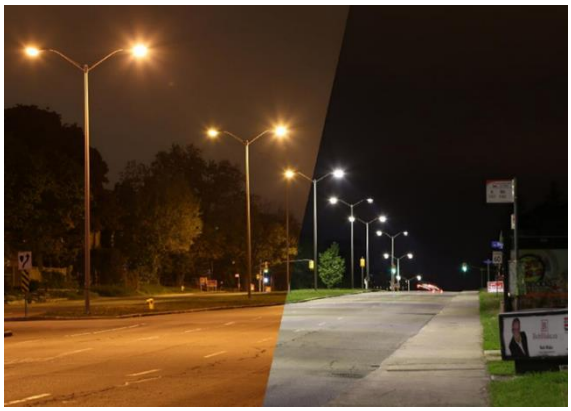
The WWTP's thickener building housed the sludge thickening process utilized by the original WWTP constructed in 1954. The building was mothballed in 1987 after construction of two anaerobic digesters. In 2012, the building was remodeled, and the sludge thickener tankage was converted to office space and a training room. The old concrete walls were scrubbed and sealed, and large windows above bring daylight into the space.

A projector hangs from beautiful stained beams and a whiteboard has been pressed into a side of the cylindrical wall. The repurposed thickener tank, which has become the central meeting space for the Gresham WWTP, is the City's first, and only, LEED certified building. It won the 2013 American Society of Engineering Companies (ASEC) engineering excellence honor award for building reuse.

Figure 17: Gresham WWTP's LEED certified meeting space is a repurposed thickener tank.

Inventory Highlight 2: LED Streetlight Replacement Project

There are about 7,500 streetlights across Gresham which are the number one source of energy for City operations. In its efforts to reduce energy demands in 2009, the City initiated a pilot project with PGE, installing 26 LED (light-emitting diode) streetlights. The City's investment in street lighting has contributed to a 70 percent reduction in energy use and 85 percent reduction in GHG emissions associated with electricity consumption since 2009. For a sense of scale, this is equivalent to 787 cars taken off the road, or 550 homes' electricity use for one year. Moreover, it has resulted in a $700,000 electricity cost savings per year.



NEXT STEPS/RECOMMENDATIONS

1. On-Site Solar Generation

The City is actively considering including on-site renewable energy generation to reduce its GHG emissions and to ultimately achieve net-zero energy over time. Rooftop solar at City Hall will reduce the energy needs fulfilled through traditional energy sources such as coal and natural gas. This project is also eligible for funding under PGE's Renewable Development Fund. If awarded the grant money, the City will only be responsible for 15% of the total costs. Details about its capacity and estimated percentage of addition to City's renewable energy portfolio is available in a feasibility study report prepared by EC Company.

2. Conduit Hydropower

Conduit hydropower is a method of using the mechanical energy of water as part of the water delivery system through man-made conduits to generate electricity. A conduit can be defined as any tunnel, canal, pipeline, aqueduct, ditch or similar conveyance that is operated for the distribution of water for agricultural, municipal, or industrial consumption. When these conduits in water transmission and distribution systems are fitted with turbines, a new, efficient, innovative power source is born out of generation that's otherwise uncaptured and wasted.

The City conducted a feasibility study to explore the potential of this project through a California-based company called Nline Energy. The study included two sites: The WWTP Sewer Main Site and a future PRV On Semiconductor Processing Plant. The WWTP Sewer Main Site has an estimated annual generation of 310,000 kWh, while the latter has an estimated annual generation of 520,000 kWh. This additional supply of renewable energy production can also be a source of annual revenue by selling excess energy to PGE.

This is an innovative technology that can help offset the City's carbon footprint while increasing revenue and decreasing operational costs.

3. Green Fleet

Electric and Natural Gas vehicles provide a key opportunity to reduce the lifestyle carbon emissions of transportation fuels. The City is in the process of acquiring two Battery Electric Vehicles (100% electric) Nissan Leafs in its Fleet. The City has also installed electric-vehicle charging infrastructure at City Hall for electric fleet expansion. Fleet electrification paired with City EV charging infrastructure expansion will make operating EVs easier for both the municipality and its residents.

4. Expanding the Liquid Organic Digestion Capacity at the Wastewater Treatment Plant

The WWTP is currently in the process of funding a feasibility study to expand their Liquid Organic Digestion Capacity and calculate an estimated gas production quantity, including Renewable Natural Gas (RNG). RNG is essentially biogas (the gaseous product of the decomposition of organic matter) that has been processed to purity standards. The study, beginning July 1, is pending the receipt of an Energy Trust of Oregon grant with a budget of $200,000.

RNG, or biomethane, is a pipeline-quality gas that is fully interchangeable with conventional natural gas and thus can be used in natural gas vehicles. It is theoretically possible to retrofit City Fleet to run on RNG, produced at the WWTP, to reduce the GHG emissions resulting from the use of gasoline or diesel as fuel.

5. Demand Response Program

During hot summer and cold winter days, more electricity is used, putting pressure on the grid, energy prices and the environment. Approximately 71% of City Hall's monthly electricity consumption is during peak usage, which accounts to 44% of the monthly bill. Demand Response is the solution to help keep the power reliable, affordable and sustainable.

The Energy Partner program is a commercial Demand Response program offered through Portland General Electric (PGE) in which their business customers are paid a monthly incentive to temporarily curtail "non-critical" load when notified in advance. When executed correctly, the event runs in the background without impacting operations or affecting tenants, and every property has some method to curtail some amount of demand for a short period of time.

Demand Response Program: Portland Fire Station Case Study

- Smart thermostats at 30 fire stations, under Schedule 25
- Free thermostats and installation
- Up to $15,000 in annual incentives
- Remote access and control to all thermostats
- Ancillary efficiency benefits

Schedule 25 or Non-Residential Direct Load Control Pilot offers incentives to allow PGE to control thermostats during Direct Load Control events. PGE does provide advance notice to participating customers for these events. For City Hall, signing up for the program has the potential of monthly incentive payments of between $2-$10+ per kW in addition to programmable thermostats and free energy monitoring.

With energy prices continually rising, Demand Response offers a means for generating payments that offset electricity costs, and financial incentives to help reduce overall operational costs. In addition to energy efficiency measures and on-site renewable generation, Demand Response serves as a critical alternative energy strategy for reducing power consumption from the grid.

6. City's Supply Chain Goals

By including all Scope 1, 2 and 3 emission sources in developing the City's baseline, the City integrated a holistic and more accurate approach to accounting for the total emissions associated with the City's mission-critical business activities. The decision to include Scope 3 emissions reflects the City's commitment and leadership to fully understanding the City's contribution to climate change as well as the ongoing efforts to reduce emissions. The tool used to quantify Scope 3 emissions, particularly embodied emissions in purchased goods and services (referred to as Supply Chain) is called Economic Input-Output Life Cycle Assessment (EIO-LCA). Currently, there are limitations associated with the tool and datasets. Moreover, Supply Chain emissions are subject to increase based on growing public sector operations required for the City to provide optimal service to its citizens. In light of the limitations, the City should develop interim goals that address "sub-goals" separately. There can be two separate goals; a quantitative reduction goal for Scopes 1 and 2 and a second qualitative reduction goal for Scope 3.

7. Climate Action Plan

Future phases of the Sustainable Gresham Initiative intend to address opportunities to increase alignment of Capital Improvement Projects with the City's Sustainability goals, embed sustainability within the Community Development Plan, and develop, in collaboration with residents, a community-wide Sustainability Plan to advance sustainability and build resiliency across the community. A natural step in this direction would be to join the Multnomah County's Climate Action Plan (CAP) which emphasizes resiliency. Multnomah County's CAP identifies twenty 2030 objectives and more than 100 actions that should be completed or significantly underway in the next five years.

APPENDIX A: METHODS – DATA, PROTOCOLS, AND SENSITIVITY ANALYSIS

a. Protocols and Tools

City of Gresham's Municipal GHG emissions were inventoried using The Climate Registry's Local Government Operations Protocol v1.1 (LGOP)[3] for Scope 1 and Scope 2 emission sources. This includes emissions from stationary combustion, emissions from mobile combustion, fugitive emissions, and emissions from purchased electricity.

Good Company's Carbon Calculator v4.0 (G3C) was used to calculate all GHG emissions for the City's operations. G3C follows the standards set by the LGO Protocol in its methodology and calculation of emissions. Calculations in G3C are fully transparent and include an audit trail that includes all data and resources used in the inventory.

Emissions of all six Kyoto Protocol gases are included: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFCs), nitrogen fluoride (NF_3) and hydrofluorocarbons (HFCs). The City does not use any PFC, SF_6 or NF_3 and hence these gases are excluded from the inventory.

b. Methods

The methods used in this inventory follow previously-stated GHG inventory protocol and guidance that was documented in the City's 2012 GHG Inventory Report, with the exception of the items described below.

General Information

- For the 2018 report, Scope 3 Supply Chain emissions are not included. Scope 3 emissions are produced from goods and services purchased by the City. Currently, the data sources to estimate emissions from these sources are insufficient. The inventory will be updated to include these emissions as accurate and reliable data for those sources becomes available.
- Several new facilities have been added to the portfolio:
  1. Rockwood Public Safety Building
  2. Cedarville Pump Station – Water Reservoir & Pump Station
  3. Linnemann Station – Water Purchased
- Oregon Department of Environmental Quality has begun providing the utility-specific emission factors for Portland General Electric since the 2012 inventory. These factors were used in market-based electricity accounting.
- Purchase of RECs from PGE's Clean Wind program increased after 2012. These purchases were accounted for in market-based electricity accounting. Clean Wind RECs at the WWTP are discontinued after 2012.
- Cogeneration Plant 2 was installed at the Wastewater Treatment Plant after the 2012 inventory.

[3] The Climate Registry - Local Government Operations Protocol

- Facilities excluded from Inventory the Yeon Fleet Maintenance Shop and Station 31. These buildings are operated under an IGA with Multnomah County and City of Portland and are excluded from this inventory to avoid double accounting.

Stationary Fuels

Historically, in calculation of fleet emissions, emissions from fire vehicles were not included due to lack of data availability. However, for 2018 fleet emissions, fire vehicles have also been included.

Electricity

The results discussed for electricity emissions refer to the market-based accounting method outlined in GHG Protocol Scope 2[4] guidance.

The emission factors used for PGE's electricity in 2012 were based on data from 2005. Since then, new emission factor data has been available for 2012 and hence the emissions from electricity have been revised to reflect this change. The revised Scope 2 emissions also account for the market-based emissions.

Moreover, Oregon DEQ modified methods for calculating emission factor. According to an email by Elizabeth Elbel (ODEQ), "In the past, DEQ was utilizing a default emission factor of .499 MTCO2e/MWh for electricity supplied to Oregon from unknown sources. We have modified this approach to utilize the Northwest Powerpool net system mix value." DEQ believes this is an accurate characterization of calculating emissions from unknown power sources.

Business Travel

During the previous inventories, business travel data has only included air travel for training and conference purposes. For the 2018 inventory, expenses for UBER/LYFT and parking are also included. Financial data is multiplied by a conversion factor (passenger miles/ $) to estimate passenger miles.

Solid Waste

Methodology for this emissions source was the same as in the 2012 report.

Commute

Historically, the data for employee commutes, specifically mileage and average employee daily commute distance, has stemmed from employee surveys. Since the survey has not been done in a few years and hence outdated, the methodology has been different this year. Mileage data was provided by Bureau of Transportation Statistics (BTS)[5] and employee daily commute distance was provided by Oregon of Transportation (ODOT)[6].

[4] GHG Protocol Scope 2 Guidance
[5] Average Fuel Efficiency of U.S. Light Duty Vehicles
[6] Daily Travel in Oregon: A snapshot of Daily Household Travel Patterns

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Additionally, the author referred to the Metro document Greenhouse Gas Emissions Inventory for FY2016-17 for formatting and other guidance.

Consulting Team:

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