



**City of Winston Salem**

**2018**

**Sustainability Summary Report**

**City of Winston-Salem Office of Sustainability**

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### City-Wide Highlights

- Reorganized Office of Sustainability
- Reporting and Disclosure
- Social Media Efforts
- Community Sustainability Advisory Committee

## Executive Summary

In the recent fiscal year, the City of Winston-Salem has continued its efforts towards becoming a more sustainable community. A significant change came from the restructuring of the Office of Sustainability. The office was formerly a division of Property and Facilities Management to becoming a new department that included the Recycle Today and Keep Winston-Salem Beautiful divisions.

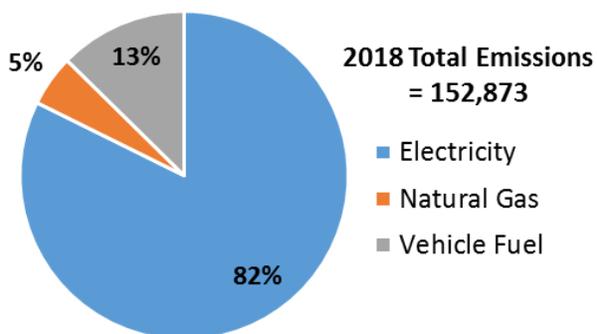
The office reported to the CDP, formerly the Carbon Disclosure Project, for the third year straight and became members of the LEED for Cities and Communities program platform. These reporting tools help us measure our environmental impact in the community on an annual basis.

The Office of Sustainability regularly posts to Twitter and Facebook to increase awareness and to educate the public on sustainability topics and issues. We have seen a popular response to these posts from the public.

City Council passed a resolution to re-establish the Community Sustainability Program Committee in an advisory capacity. In the spring of 2019, the committee will officially convene.

Additionally, the Office of Sustainability has continued to track municipal greenhouse gas emissions on an annual basis. This inventory, as in previous years, was conducted with the Local Government Operations Protocol using the baseline year of 2008. Emissions are calculated for the following sources:

- Electricity (kWh) used by select facilities of municipal government operations,
- Fuel (gallons) used by city-owned or leased vehicles,
- Natural gas (therms) used by select facilities of municipal government operations, and
- Carbon Dioxide per square foot (CO<sub>2</sub>/ft<sup>2</sup>) in municipal facilities



In the most recent year, total emissions from local government operations were 152,873 tons of CO<sub>2</sub>. Emissions are up 7.32% from 2017 emissions, and down 1.08% from the 2008 baseline. Once again, electricity use by municipal operations was the principal contributor to emissions, making up 82% of emissions as seen in Figure 1.

**Figure 1:** 2018 CO<sub>2</sub> emissions from local government operations (tons)

## Reorganization of the Office of Sustainability

The Office of Sustainability went through significant changes in 2018. The division, originally part of the Property & Facilities Management department, restructured to be a standalone department within the city’s organization in the fall of 2018. Recycle Today and Keep Winston-Salem Beautiful were both moved to the new department as well to create the Office of Sustainability. Recycle Today was previously under the Sanitation Department and Keep Winston-Salem Beautiful was another division of Property & Facilities Management as the Office of Sustainability had been.

### Keep Winston-Salem Beautiful

Keep Winston-Salem Beautiful division is in charge of organizing and running many programs annually that involve litter prevention and community beautification. Below in Table 4 is a summary of the participation of each of these events and programs.

**Table 4:** KWSB programs

Event/Program	Attendance	Details
<b>Great American Cleanup</b>	746	9,710 lbs of litter collected
<b>Big Sweep</b>	2367	19,125 lbs of litter collected
<b>Community Roots Day</b>	350	300 trees planted in 2 miles
<b>Flower Bulbs</b>	50	4,000 bulbs provided and planted
<b>Flower Bed</b>	100	20,000 plants/shrubs/flower/bulbs planted in 37 beds
<b>Clean and Green</b>	34 schools	21,575 lbs of litter collected, 191 trees planted, 6,240 plants/shrubs/flowers/bulbs planted
<b>Adopt-A-Street</b>	59 groups	5,000 lbs of litter collected in 50 miles of roadway
<b>Adopt-A-Stream</b>	13 groups	1,000 lbs of litter collected in 10 miles of streams
<b>Adopt-A-Park</b>	28 groups	4,000 lbs of litter collected in 200 acres
<b>Miscellaneous cleanups</b>	250	5,000 lbs of litter collected

Keep Winston-Salem Beautiful decided to update online capabilities by making the clean-up reports accessible on the respective adoption webpages. The division hopes that this will increase responsiveness from groups participating in cleanups throughout the year.

### Recycling

The Recycle Today program is the division of the City of Winston Salem responsible for recycling services. Recycle Today is in the sixth year of single stream recycling after switching from dual stream in 2012. For collection services, the city contracts with waste management. Table 5 shows the totals for recycle collections in the 2018 calendar year by commodity.

Month	Tons Collected
January	1303
February	1056
March	1162
April	1182
May	1285
June	1276
July	1184

August	1311
September	1118
October	1228
November	1287
December	1193
<b>Total</b>	<b>14585</b>

**Table 5:** Recycling tons collected 2018

The total tons of recycling collected in 2018 has shown a slight increase from the 2017 calendar year.

The Recycle Today program is also responsible for educating the public on recycling practices for the City of Winston-Salem through educational material and presentations to community groups.

## Reporting and Disclosure Tools

The Office of Sustainability is consistently utilizing online reporting tools to track progress in certain sustainability-related areas. We recently gained access to the LEED for Cities and Communities platform from the US Green Building Council (USGBC) and will be utilizing this platform in the future. We have continued to report to the CDP, formerly the Carbon Disclosure Project, since 2015.

### LEED FOR CITIES AND COMMUNITIES

In 2018, the STAR Communities program that we had been utilizing since 2016 was absorbed by the USGBC and incorporated into their LEED for Cities and Communities framework. This program is still in its pilot stage but will be official later in 2019. Compared to the STAR Communities framework, the LEED for Cities platform is more general and allows more flexibility in measuring our own data. The LEED for Cities framework consists of five categories with 14 specific metrics, as seen in the table below.

**Table 1:** LEED for Cities Framework

CATEGORY	METRIC	UNIT
<b>Energy</b>	Greenhouse Gas Emissions (CO2 equivalent)	Tons/Year/Person
<b>Water</b>	Domestic Water Consumption	Amount/Year/Person
<b>Waste</b>	Municipal Solid Waste Generated	Amount/Year/Person
	Municipal Solid Waste Diverted from Landfill	% of Total Amount Collected
<b>Transportation</b>	Distance Traveled in Individual Vehicles Daily	Distance Per Day
<b>Human Experience</b>		
Education	Population with (at least) a High School Degree	% of Population 25 Years and Over
	Population with (at least) a Bachelor's Degree	% of Population 25 Years and Over
Equitability	Median Gross Rent as % of Household Income	% Number between Zero and One

	Gini Coefficient (income concentration index)	
Prosperity	Median Household Income Unemployment Rate	US Dollars per Year % of Population 16 Years and Over
Health and Safety	Median Air Quality Index (AQI) Air Quality Days Unhealthy for Sensitive Groups Violent Crime	Number between Zero and 500 Number of days between 0 and 365 Per Capita per Year

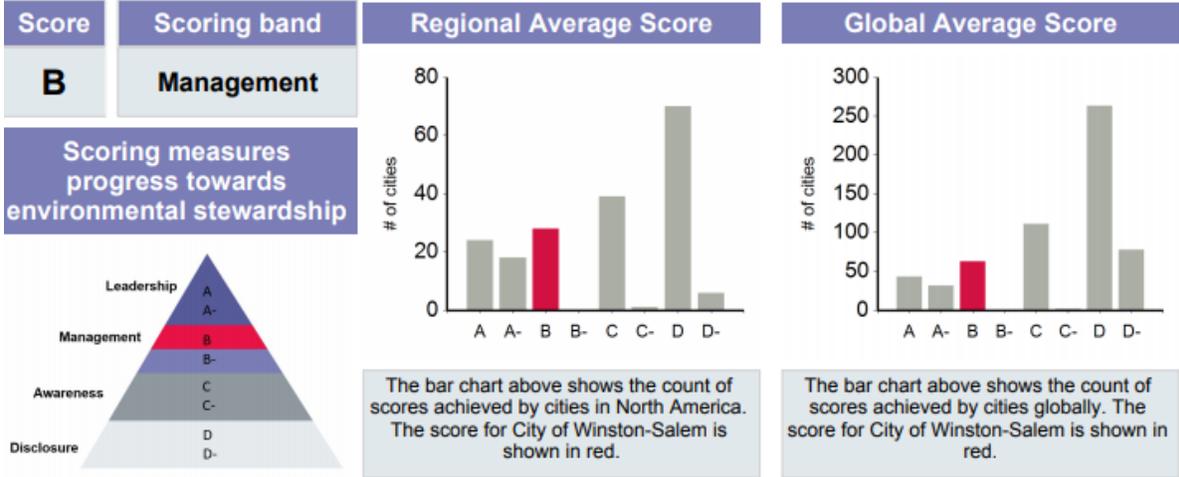
Similar to STAR Communities, each category is worth a certain number of points that equal 90 points, with a base score of up to 10 points making the final score out of 100. The base points are available as either the submission of various plans that our city has created or through the measuring of additional data points; data points that are chosen from an extensive list or come from city management recommendation.

The certification levels possible for us to achieve are consistent with the general LEED rating system used for buildings. Those certification levels are as follows:

- 40-49 is Certified
- 50-59 is Silver
- 60-79 is Gold
- 80-100 is Platinum

**CDP REPORTING**

The Office of Sustainability has been reporting greenhouse gas and climate adaptation and mitigation efforts to CDP since 2015, with our data becoming public in 2016. This reporting system is a global disclosure system that enables companies, cities, states, and regions to measure and manage their environmental impacts. Almost 500 cities worldwide participate in this disclosure system, 186 of them being from North America as of 2018. Our recent reporting earned us a score of B on a scale ranging from D- to A. This score puts us in the ‘Management’ band. Image 1 shows a graphic representation of our score.



**Image 1:** CDP score and description

## Social Media Efforts

The Office of Sustainability has begun using social media to boost awareness of sustainability among citizens. Awareness of sustainability was low in the community as well as the efforts of the Office of Sustainability. The Office of Sustainability began using the city's Twitter and Facebook accounts to spread awareness and demonstrate that the City of Winston-Salem supports sustainability efforts. Through Twitter, the Office created the hashtag **#sustainableWSNC** to identify the tweets that specifically address the topic.

Below is a short list of some of the more popular topics:

- Environmental impacts of real versus artificial Christmas Trees with an article from the New York Times: <https://t.co/898IGfAr8G>
- Encouraging the public to sign up for one of Keep Winston-Salem Beautiful's adoption programs: Adopt-A-Park, Adopt-A-Street, or Adopt-A-Stream.
- Earth Day Fair 2018, as seen in Image 2 below
- Visit the Holiday Handcrafted Showcase at the Fairgrounds Farmer's Market



 **Earth Day Network**   
@EarthDayNetwork

Follow

Replying to @CityofWS

Thanks for spreading the word about **#EarthDay2018** - a **#sustainableWSNC** will help us with our global campaign to **#EndPlasticPollution!**

3:12 PM - 19 Apr 2018

**Image 2:** Earth Day Fair 2018 tweet demonstrating the use of the Twitter hashtag **#sustainableWSNC** and a reply also

## Community Sustainability Program Committee

In September 2018, City Council recommended the Office of Sustainability re-establish the Community Sustainability Program Committee to advise on the development and implementation of sustainability goals in the city. This committee previously functioned from 2008 until 2013. City Council passed the resolution unanimously. Applications opened in October of 2018 and members are still being appointed to this committee. The first official meeting will be in spring 2019. The committee's goals are:

- Advise on current priorities set forth by the Office of Sustainability
- Generate a work plan for future goals of the Office of Sustainability
- Become familiar with municipal greenhouse gas emission levels
- Produce an annual report
- Advise ways to increase the city's LEED for Cities and Communities
- Oversight of BEE CITY USA activities and initiatives

## Municipal Greenhouse Gas Emissions

### TOTAL CO<sub>2</sub> EMISSIONS

**Table 2:** Total CO<sub>2</sub> emissions from internal operations in tons

	<b>Electricity</b>	<b>Natural Gas</b>	<b>Vehicle Fuel</b>	<b>Total</b>
<b>2008</b>	131,897	3,625	19,015	<b>154,537</b>
<b>2009</b>	126,850	8,050	18,294	<b>153,194</b>
<b>2010</b>	122,560	7,300	20,532	<b>150,392</b>
<b>2011</b>	121,291	6,800	20,507	<b>148,598</b>
<b>2012</b>	122,000	6,980	20,853	<b>149,833</b>
<b>2013*</b>	114,786	6,065	19,075	<b>139,926</b>
<b>2014</b>	116,032	6,113	19,409	<b>141,554</b>
<b>2015</b>	118,902	5,500	19,010	<b>143,412</b>
<b>2016</b>	118,727	6,033	19,717	<b>144,477</b>
<b>2017</b>	114,911	6,690	19,800	<b>141,401</b>
<b>2018</b>	125,832	7,721	19,320	<b>152,873</b>

Since 2008, total GHG emissions reduction for municipal operations equals 1.08%

\*2013 is the year the LJV Coliseum was sold to Wake Forest University. After the sale, the City of Winston-Salem was no longer responsible for the emissions of the coliseum, accounting for a portion of this significant decrease in emissions.

Total greenhouse gas (GHG) emissions were 152,873 tons of carbon dioxide in 2018 --- an almost 11,500-ton increase compared to 2017. As you see from Table 1, the approximate 9.5% increase in electricity use and the 15% increase in natural gas consumption were the primary contributors to the total GHG increase.

In 2019, we expect to see a decrease in total GHG emissions because of the continued reductions associated with LED lighting retrofits, improved HVAC controls, reduced heating degree days in January & February and the reduced gasoline usage associated with the propane-fueled vehicles. However, it is important to remember that as the city adds new facilities, GHG emissions will also increase.

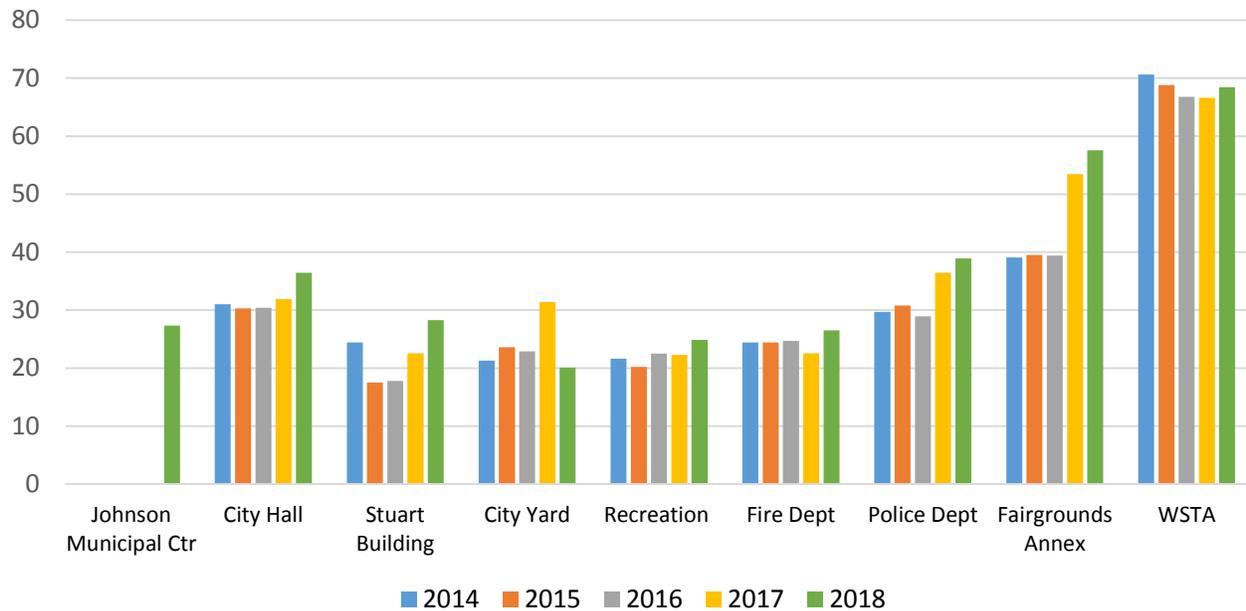
To maintain consistency with previous reports, calculations assume 2.1 pounds of CO<sub>2</sub> emitted for each kWh consumed. The original 2008 GHG report used this multiplier under the assumption that additional coal was burned to produce each additional kWh (per ICLEI recommendations). Duke Energy’s published multiplier in 2005 was 1.29 lbs/kWh, and it dropped to 0.96 lbs/kWh in 2017 as Duke Energy’s generation replaced coal with natural gas. The utility’s energy generation in 2017 was 35% coal, 35% nuclear, 29% natural gas & 1% hydro/solar generation. Duke Energy expects the multiplier in 2030 to be reduced to 0.71 lbs/kWh as natural gas continues to replace coal-fired generation. Utilizing their current multiplier would decrease total GHG emissions over 80,000 tons. When comparing Winston-Salem’s data to another city’s data, then the same multipliers must be used by all cities.

#### CO<sub>2</sub> PER SQUARE FOOT

Analyzing our city operations, City/County Utilities and WSDOT cause over 80% of GHG emissions. Contributing factors include water/pumping, street lighting, and traffic signals, where there is no relationship to square footage. Entertainment areas such as the annex and fairgrounds are dominated by electric energy that is not utilized within buildings. The total CO<sub>2</sub> per square foot can be broken down among several department categories with specific buildings that are summarized in Table 3 below. The average CO<sub>2</sub> per square foot for the city’s buildings is approximately 33 lbs/square foot. Figure 2 shows how each facility’s CO<sub>2</sub> per square foot has changed over five years. Note that the Joycelyn V. Johnson Municipal Services Center only has one year’s worth of data because it was not a city-owned facility prior to 2018.

**Table 3:** Pounds of CO<sub>2</sub> per square foot in city buildings in 2018

	<b>Electricity (kWh)</b>	<b>Natural Gas (Therms)</b>	<b>Annual CO<sub>2</sub> Emissions (Tons)</b>	<b>Square Footage</b>	<b>Pounds of CO<sub>2</sub> per SF</b>
<b>City Hall</b>	1,090,357	24,350	1,296	71,125	36.4
<b>Stuart Building</b>	2,049,464	0	2,152	152,315	28.3
<b>Johnson Municipal Ctr</b>	819,493	8,879	916	67,000	27.3
<b>City Yard</b>	1,358,845	23,175	1,570	156,350	20.1
<b>Recreation</b>	2,299,301	66,167	2,825	227,362	24.8
<b>Fire Department</b>	1,269,959	37,987	1,569	118,343	26.5
<b>Police Department</b>	4,526,179	69,273	5,182	266,363	38.9
<b>Fairgrounds Annex</b>	2,687,757	50,204	3,133	108,847	57.6
<b>W-S Transit Authority</b>	1,229,493	39,916	1,538	44,970	68.4
<b>TOTAL</b>	17,330,848	319,951	20,181	1,212,675	33.3



**Figure 2:** Pounds of CO<sub>2</sub>/sq ft in city facilities.

## Electric Energy Use

The city consumed a total of 10.4 million more kilowatt-hours (kWh) in 2018 than in 2017, a 9.5% increase. The greatest increase in electricity use came from City/County Utilities, specifically from wastewater treatment operations and the expansion project at the Muddy Creek plant, which alone totaled over 5 million kWh. The Elledge Wastewater Treatment Plant used over 1.6 million kWh, and over 1.5 million kWh total came from the water treatment facilities. A note about the Muddy Creek Wastewater Treatment Plant: this project includes a six million kWh/year CHP generator that will provide a GHG emissions credit of 6,000 tons/year to offset future GHG increases caused by the Muddy Creek facility expansion which will consume increased electric and natural gas energy.

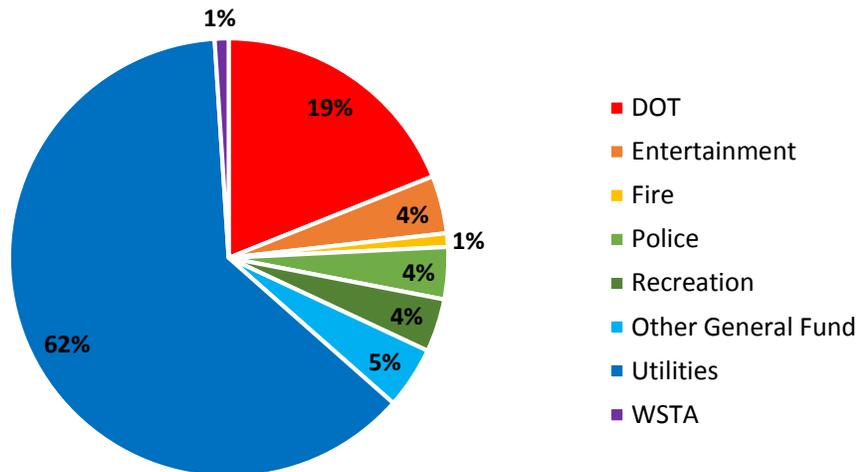
The entertainment facilities electricity use experienced an increase due to the professional hockey league use of the Annex facility. The use alone accounted for 500,000 kWh. There were also increases of 150,000 kWh and 50,000 kWh at the fairgrounds/campgrounds and Bowman Gray Stadium and Field House, respectively.

Electric use increased at the city's police and fire facilities by 7% each, while recreation experienced a 15% increase. The 286,000 kWh increase in police facilities is principally due to the expansion of the Beaty facility; however, there was electric energy reduction in the Public Safety Center facility. The fire department's 80,000 kWh increase was due to the re-opening of two stations which closed during 2017 for renovations. Recreation's almost 964,000 kWh increase can be accounted for by new and expanded facilities to include: Winston Lake Aquatics Center, Salem Lake Marina, Long Creek, Quarry Park, Jamison Park, and Bowen Park.

General government facilities also increase by 15% in electric energy use, with much of this increase coming from the Bryce A. Stuart building, in part from the lack of accessibility for staff to the upgraded

energy management system. Electric vehicle charging stations also experienced a surge in use which added 4,000 kWh to the overall increase in this category.

Electricity usage was reduced in the transportation department and from Winston-Salem Transit Authority (WSTA) due to LED and street light upgrades. Combined, the reduction is almost 450,000 kWh.



**Figure 3:** Electricity use summary for 2018 by department

## Natural Gas Use

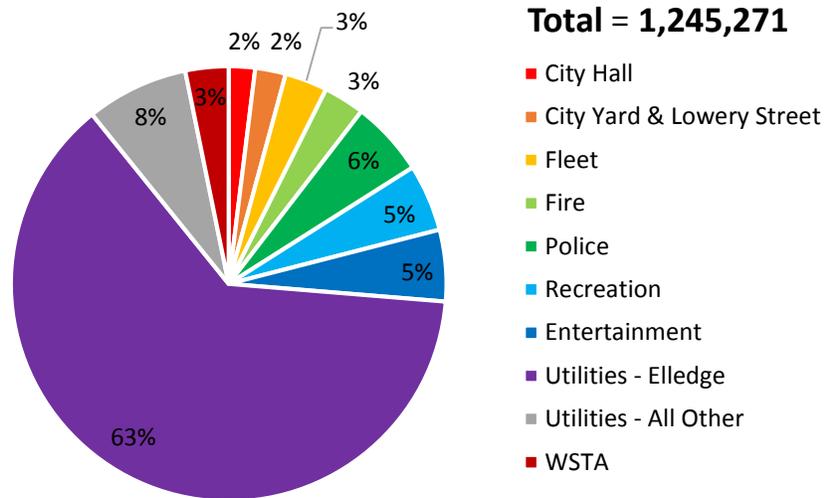
Natural Gas consumption was 15% greater in 2018 compared to 2017. City/County Utilities accounts for over 46,000 therms (thm) of usage due to the bio-solids dryer located at the Elledge Wastewater Treatment Plant. Most departments increased usage, except for those facilities categorized under Entertainment, which saw a 2000 therm decrease.

Police experienced a 30% increase in natural gas as a result of the Beaty expansion and the new District offices, plus additional heating requirements at the Public Safety Center. Fire experienced a 50% rise in natural gas use, but half of the increase was associated with Stations 7, 8 & 9 re-opening after being closed for much of 2017. Over 1,000 thm of natural gas were consumed at the Station 3 Annex (old rescue squad) which the city now owns. The remainder of the increase was spread among the other 16 fire stations.

Recreation used 38% more natural gas than 2017 likely caused by the higher heating degree days. The most significant increases were in the large facilities including MLK Jr., Miller Park & Hanes Hosiery Recreation Centers plus an additional 2,400 thm needed by the Recreation Warehouse. The Jamison Park maintenance facility required an additional 1,100 thm.

WSTA experienced a 28% increase at their maintenance facility & transportation center. One possible explanation is due to the colder weather combined with the higher temperature now maintained in the transportation center's waiting area.

General government facilities experienced an increase of 14,000 thm, including an 8,300 thm increase in City Hall. There are various reasons for this increase including the requirement to run the primary HVAC unit during the night and weekend hours (which requires added heating).



**Figure 4:** Natural gas use summary in 2018 by department in therms

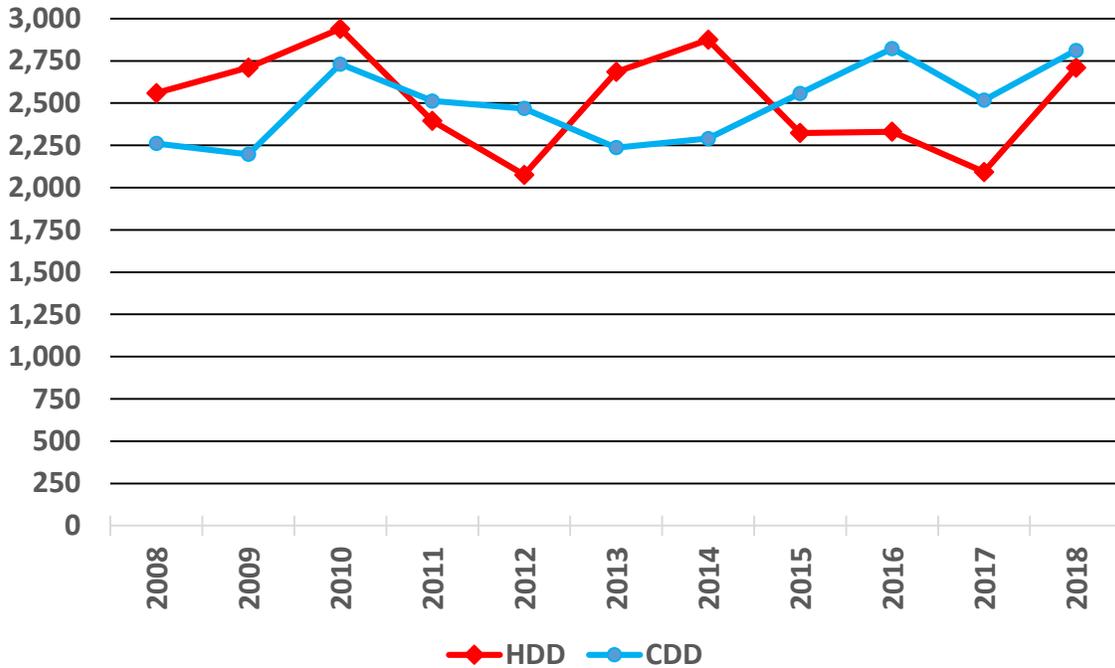
## Degree Days

A tracking tool often used to evaluate the performance of either new equipment or major upgrades to heating and cooling systems within the City of Winston-Salem is known as degree-days. The two primary uses for degree-days in buildings are:

- to estimate energy consumption and carbon dioxide emissions due to space heating and cooling for new build and major renovations
- for on-going energy monitoring and analysis of existing buildings based on historical data

Simply translated, degree-days are calculated from the difference between a reference base temperature and the average temperature of the day. When we are below that base, energy, along with greenhouse gas, is being generated for heating (a heating degree-day). When we are above a base temperature of 60 degrees we are producing cooling which produces energy and greenhouse gases for cooling (a cooling degree-day).

Cooling degree days were 10.5% higher than average over the past year resulting in greater air conditioning usage in city facilities than normal. Heating degree days were almost 23% higher than 2017 resulting in increased natural gas use in the city’s buildings. See Figure 5 below for the summary of heating and cooling degree days since the baseline year of 2008.



**Figure 5:** Heating and cooling degree days overtime at a 60 degree balance point

## Conclusion

The City of Winston-Salem Office of Sustainability aims to find ways to make our city and community a more sustainable place. Through actions like annual reporting, research and social media efforts, the office works to boost awareness and measure the annual impact of these efforts. Additionally, the Office of Sustainability tracks annual greenhouse gas emissions from municipal operations. This year, total emissions increased by 7.32% from the previous year yet is still 1.08% lower than the 2008 baseline year. Much of this rise in total emissions can be attributed to additions to the square footage of city-owned facilities, variable weather patterns leading to increased stress on heating and cooling systems, and increased use of certain facilities. The Office will continue efforts with the help of the Community Sustainability Program Committee to reinvigorate sustainability programming.