Table of Contents

1. Forward
2. Guiding Commitments
3. Energy and the City of Winston-Salem
4. Community Awareness and Education
5. City’s Built Environment
6. Waste Management and Recycling
7. Transportation
8. Tomorrow and Beyond
FORWARD

The City of Winston-Salem Sustainability Office was created in 2010 to research and recommend improvements concerning Greenhouse Gas Emissions and Energy use on an annual basis. The Sustainability Office was also given the appointment to analyze the latest in trends of what the City was doing today in providing services that reflect the City’s leadership in energy and environmental awareness, along with the internal operations. This report is the first to go beyond just analyzing Greenhouse Gas Emissions and Energy, it provides a review of city activities and programs that are taking place now, and provides perspective of those services and what to consider as the City moves forward.
City of Winston-Salem

Guiding

Commitments

Today the City of Winston-Salem’s leadership continues to watch over our local environment through a foundation built on the following commitments:

- A MORE RESILENT AND SUSTAINABLE CITY
- AN ENERGY EFFICIENT CITY INFRASTRUCTURE
- IMPROVED AIR QUALITY THROUGH REDUCED GREENHOUSE GAS EMISSIONS
- TRANSPORTATION ALTERNATIVES – HYBRID BUSES, ELECTRIC VEHICLE CHARGING STATIONS, NATURAL GAS PUMPING STATIONS AND BIKE LANES
ENERGY & THE CITY’S PLAN

Focused Efforts towards Measuring and Managing the City’s Energy Usage and Carbon Footprint are Paving the Way for Reductions with an Ultimate Goal of Improved Air Quality and Energy Efficiency.

Emissions

In May of 2007, the Mayor and City Council adopted a resolution supporting the U.S. Conference of Mayor’s Climate Protection Agreement with the following specific commitments in mind:

- Make energy efficiency a priority through building code improvements, retrofitting city facilities with energy efficient lighting and urging employees to conserve energy and save money;
- Increase the use of clean, alternative energy by, for example, investing in “green tags”, advocating for the development of renewable energy resources, recovering landfill methane for energy production, and supporting the use of waste-to-energy technology

The initial Greenhouse Gas Emissions (GHG) report utilized FY 2000 data as its starting point; however, the most recent GHG report was updated using 2008 data as its baseline. With the FY 2008 baseline utilized in the latest report, the City saw a carbon footprint that went from 154,537 tons of Greenhouse Gas Emissions (GHG) to 141,665 tons of GHG, a reduction of 16.4%. (The reduction was based on equivalent loads without including added facilities.)

The GHG emission improvements are a combination of several factors. First, the City has made considerable improvements in HVAC and lighting throughout City facilities. Second, our regional energy providers such as Duke Energy are utilizing or installing natural gas fuel systems that provide a cleaner source of energy to their clients. While the City of Winston-Salem is making upgrades, the key is tracking this data to see how we are doing.
The centers are a mix of electrical and gas systems which vary in age. Since 2008, selected upgrades have been made concerning infrastructure within identified recreation centers. The results of these upgrades show a reduced electrical usage since being completed. The tick up in natural gas usage can be attributed to the increase in heating days during the 2012 winter season and again in the 2013 winter season as well.

Energy/Greenhouse Gas Tracking
A tracking tool often used to evaluate performance of either new equipment or major upgrades to heating and cooling systems within the City of Winston-Salem is known as degree-days. While the formula can be a little difficult to understand, simply translated, degree-days are useful in calculating the difference from a base temperature, say 60 degrees. When the City is below that base, energy is being generated for heating along with greenhouse gases. And when the City is above a base temperature of 60 degrees, the City is producing cooling which generates energy and greenhouse gases for cooling.
Education and Awareness

The City of Winston-Salem has year-round programs when it comes to providing educational and volunteer opportunities for keeping our city clean and green. Many of our own departments offer education and awareness from home energy-efficiency audits (provided by the City’s Sustainability Office) to the multiple events throughout the year.

The city’s “Keep Winston-Salem Beautiful” (KWSB) program offers yearly events such as:

- **Big Sweep**: An annual event where on the first Saturday of October citizens come together to clean up local waterways

- **Community Roots Day**: An annual tree planting project held each fall, at various locations throughout the city, in coordination with the WS/FC Community Appearance Commission, and the City’s Vegetation Management Division

KWSB also provides various opportunities in providing educational programs such as the ‘Clean & Green’ program in the local school system.

Schools from the elementary level to High School compete during Earth Week in April and the winners are recognized annually.

The City’s Stormwater Division is another department that works with various groups throughout the city and county to bring all age groups the opportunity to learn about our local bodies of water and how our actions can contribute to keeping pollutants out of the local waterways. The Stormwater Division holds an annual event called ‘Creek Week’. Creek Week is a week full of activities that provide many opportunities for residents to discover, explore and enjoy local waterways through recreational activities, educational programs, and a volunteer service project.

Water is a vital and finite resource for all living creatures; it is what helps all of us to ‘connect-the-dots’ in recognizing that our quality of life depends on healthy creeks and streams.

Source/s:
http://www.cityofws.org/departments/keep-winston-salem-beautiful

http://www.cityofws.org/departments/stormwater-erosion-control
Education and Awareness

Just as the City offers educational programs, the community is fortunate to have an abundant amount of local, regional, and state resources at our fingertips as well. One such resource is the NC Cooperative Extension office; a branch is located within Forsyth County. One such program that is highly utilized by residents is the ‘Community Gardens’ program here in both the city and county.

These days community gardens can be found almost anywhere: public parks, religious centers, schools, backyards, and even rooftops. They are spaces where individuals come together to grow food, build relationships, and celebrate their communities, and they are as diverse as the people gardening in them. Forsyth Community Gardening supports the growing efforts of the more than 120 community gardens across our county.

Annual Earth Day Fair – City of Winston-Salem

Each year the Piedmont Environmental Alliance (PEA) holds an annual Earth Fair at the Winston-Salem Fairgrounds. The City’s Office of Sustainability invites all city departments to participate in the Earth Day Fair. This allows the participants to come together in one place as a city unit to educate and make residents aware of sustainable projects and programs going on within the city now and in the future. This year, new programs in greenways and bicycle infrastructure, along with the announcement of a new electric vehicle charging station, were just a few of the new and exciting projects in sustainability that were taking place.

Source/s:

http://peanc.org/

https://www.forsyth.cc/CES/
The City’s Built Environment

The City of Winston-Salem has a long and interesting history concerning buildings and the role they have played in our city’s development. From the beginning of the official merger of Winston and Salem in 1913 to the present, the City skyline has been anchored by such structures as the R.J. Reynolds office and its unique scaled down version of the Empire State Building.

In 1920 the city purchased the land for our current City Hall where the first meeting of Aldermen (now known as the City Council) was held in 1926. In fact, City Hall was not just a government facility like it is today but was used as a retail space on the Main Street side of the building. Multipurpose buildings are once again being utilized to maximize use in the downtown core and surrounding areas.

City Structures

Currently, the City of Winston-Salem manages and maintains approximately 3.9 million square feet of space under roof, divided into 41 structures. Of this space, about 65% to 70% is what is known as ‘conditioned space’, that which requires heating and/or cooling. Our City buildings range in age from greater than 25 years to some less than two years old. While age is considered when deciding whether to upgrade or start over, there are many other factors to consider as well.

Since 2008, the Mayor and City Council has been concerned with not only the cost of new builds, upgrades, and/or repairs, but has emphasized the environmental impact of each new project. Along with costs, environmental impacts such as greenhouse gases, equipment performance, air-quality (indoors and outdoors), water usage and even building envelopes (how well a building is sealed) have become key indicators of a project’s sustainability.

When utilizing sustainability as a strategy, not only does the City improve the environmental impact on our citizens but also lowers the cost of operations and maintenance brought on by the newer and more efficiency systems.

Beginning in 2010, the City was awarded an American Recovery Reinvestment Act grant, which allowed the City to begin reinvestment in the long-term facility infrastructure that the City operates and/or maintains.
One example of how the City utilized the grant was in the Public Safety Center, which houses Police and Fire Support. The example below shows how the City can move to new technology and, at the same time, see it as an investment with a relative short pay-back period:

Public Safety Center Lighting and Roofing Upgrades ($329,166)

• Original roof replaced with a highly insulated, highly reflective roof. All fluorescent lighting fixtures retrofitted with high efficiency fluorescent lamps/ballasts. LED exit signs and occupancy sensors were installed where appropriate.

• Electric energy has decreased over 400,000 kWh annually (22%), reducing electric costs over $25,000/year. GHG emissions have been reduced over 400 tons/year.

The above project had a projected Return-On-Investment (ROI) in approximately 24- to-30 months.

While the energy savings stand out, the City realizes other benefits as well. From this project alone, air quality is just one additional benefit residents and staff achieve with this reduction. But what does that mean to the everyday person? It equals the emissions produced by over 84 passenger vehicles annually.

These equations can be found at the following link which explains how these numbers are calculated:

http://www.epa.gov/cleanenergy/energy-resources/refs.html#vehicles

Source/s:

http://www.cityofws.org/home-center/discover-winston-salem
Recycling has long been a resource of the City of Winston-Salem to reduce our waste stream from going to the city’s landfill. This waste reduction not only extends the life of our current landfill, but the City is also turning our recyclables into a new revenue stream.

The evolution of recycling continues in the City with new programs always being evaluated and considered for implementation. One such program, ‘Recycle Today’ is currently the latest. The program targets recycling items that can be sold onto a secondary market providing the City with a new source of revenue.

The Recycle Today program provides recycling collection to single-family households, some small businesses, and multi-family units that have requested recycling service. Collection is performed by a private contractor, Waste Management.

Recycling generated 12,690 Tons in FY 14-15 (July 1, 2014 to June 30, 2015):

- **Paper Products** 7,307 tons
- **Plastic Bottles** 993 tons
- **Glass Jars/Bottles** 3,906 tons
- **Aluminum/Steel Cans** 484 tons

To provide an example of just what removing 7,307 tons of paper products equates out too, the following estimate is provided: for every ton of recovered paper that is converted into new recycled paperboard for packaging and other end uses, 3.6 million tons of CO2 emissions are eliminated.

http://www.paperrecyclingcoalition.com

The foundation of the Recycle Today program is known as what we refer to as the 3 Rs:

**Reduce** - to prevent waste before it’s created. The best way to reduce trash is to make less trash in the first place!

**Reuse** - using products over again in their current form for the same purpose or another use. People sometimes mistakenly think that they are recycling something when they are actually reusing it. Think in terms of whether the item can be used beyond its original intent before tossing it in the trash.

**Recycle** - making something old into something new. Recycling is the process of collecting used materials and manufacturing them into new products. Also, recycling can go beyond what you put into a recycling container. You can recycle grass clippings and food waste by starting a compost bin.

**Where do Winston-Salem's recyclables go?**

Recyclable materials are taken to a materials recovery facility (MRF), where they are separated, baled, and prepared for market. Ultimately, those recyclables will come back in the form of new products.
Recycling has a long history within the City of Winston-Salem, from the schools to local non-profits providing education and program building within our community.

There are annual efforts to hold no-waste events at collegiate sporting events and environmentally locally held fairs, such as the Earth Day Fair held each spring.

Each year the City offers the public the opportunity to take part in the city’s vegetation mulch recycling program. Residents are provided the opportunity to pick up and utilize mulch for their home projects.

**Beyond Recycling**

While our recycling is done in tandem with Waste Management, the City’s curbside pick-up is run by the Sanitation Department. Over the years, the Sanitation Department has been involved in finding innovative ways of keeping refuse collection to a minimal cost for our citizens. Efficiency has been a driving force and technology has been a way to improve our operations, which improves our air quality by keeping required fuel to the least amount possible.

Sanitation has moved to single-arm trucks to minimize the time spent on each collection route, along with utilizing specialized software to maximize route efficiency as well.

As Winston-Salem grows so does our refuse:

Refuse Collected (2013-14)

52,008.35 Tons Collected

Refuse Collected (2014-15)

53,219.99 Tons Collected

While Refuse collection can vary from year-to-year depending upon many variables such as disasters, increased population, and redevelopment, it is important to recognize how the technological and program improvements, such as Recycle Today, are improving the quality of life when there is an increase of less than 1 percent going to the City’s landfill.

**Source/s:**

http://www.cityofws.org/departments/sanitation

http://www.cityofws.org/departments/sanitation/collections/recycle-today
Transportation

Winston-Salem has long been a city in which transportation has played a key role in commerce and everyday activities for its local residents, from the early days of rail transportation for existing heavy industry of the early to late 20th century to today’s highly complex highway and street system. And with this Highway/Street System comes concern for local air quality and its effects on the local population.

Local transit alternatives utilized today in the city include the personal automobile, bicycles, buses (divided up between the local systems, the Winston-Salem Transit Authority (WSTA), along with the Piedmont Authority for Regional Transportation (PART)).

Currently, the most utilized option for transportation is the personal automobile, and has been over the past 30 years.

With the use of the personal vehicle comes some adverse effects as well. The prominent concerns over time have been air quality through Co2 emissions and public health issues dealing with respiratory ailments.

The way each person travels everyday has a tremendous impact on air quality. While the majority of individuals drive a personal vehicle to their destination, it is often only themselves in the vehicle. So good planning is key, and mapping out routes and merging the trips can reduce miles driven along with the amount of Co2 we place in the atmosphere. To improve air quality even more, citizens can possibly carpool or even utilize public transit.

While this is the City’s history, great strides have been made in increasing transportation options along with improved air quality. As mentioned previously, today residents have increased opportunities to bike to work with the City’s development of greenways and routes with bike lanes now being provided with planning for future routes to come. The WSTA and PART are making ways to not only move within city boundaries but allow for reduced vehicular travel within the region.

Ongoing efforts are underway to help change the popular mindset of one-person automobile trips. Ride sharing plans, carpooling practices, and mass transit
initiatives are all possible solutions. The Winston-Salem Transit Authority's 2013 Strategic Plan summarizes various perspectives of the public and outlines their plans going forward as funding allows.

For commuter traffic entering and leaving the City of Winston-Salem and Forsyth County, the Piedmont Authority for Regional Transportation (PART) has established several Park and Ride lots and has an annual ridership of just over 497,000 riders averaged over the last 5 years (2010-2014).

An example of how WSTA has modified its fleet over the past decade is how the introduction of Hybrid buses have become utilized on their routes. Currently, WSTA has 25 Hybrid buses which are serving 19 of the 25 routes running. In addition to the city’s current Hybrid fleet, an additional 18 large and 12 smaller Hybrid buses are being added to the fleet.

The ability to offer alternatives is taking hold in the city as well as the county. The most recent Triad Air Awareness 5-Year Assessment indicates that our Ozone Attainment levels have continued to decline as shown on the 2013 Forsyth County Ozone Seasonal recap. The season normally runs at its peak beginning of April each year with the cap coming around November 1st. The green bars indicated the number days of ozone levels that were ‘Good’, while the yellow bars indicate ‘Moderate’ levels of ozone days. The scale to the left of the graph indicates days of attainment with the highest number showing 120 days.

A combination of factors contributed to the lower ozone readings. Ozone production across the Triad and the entire state of North Carolina was much lower due to a weather pattern throughout the summer months that was cooler and wetter than normal. In addition, emissions from mobile sources continue to decrease due to a steady turnover of older, more polluting vehicles to newer more fuel efficient vehicles, cleaner fuels, and heightened public awareness. (Source: 2013 Forsyth County Ozone Seasonal Recap Report)

The actual 5-yr assessment can be found at:

FLEET MANAGEMENT

Not only has the City looked to develop ways to improve air quality, as mentioned in the previous pages, but the City’s fleet is key in keeping its vehicles in top performance via enhanced vehicle maintenance along with replacing older vehicles with higher mpg alternatives such as hybrids, natural gas, and the testing of several electric vehicles.

The City now utilizes Automatic Vehicle Location (AVL) technology to monitor common and unique aspects of its fleet. One such attribute is the ability to track idling of vehicles. The AVL devices monitor those vehicles and their GHG emissions. There is equipment that is required to idle such as Fire and Police Department vehicles to keep onboard systems functioning.

As of November 2015, City management has revised the Vehicle Management Policy. This revision will further the City’s efforts not only in public safety but with the City’s ability to lower greenhouse gas emissions, along with energy use within the City’s ongoing fleet operations.

Source/s:
http://www.cityofws.org/departments/transportation/biking
http://www.wstransit.com
http://www.cityofws.org/departments/property-facilities-management/fleet-services
http://www.partnc.org
Tomorrow and Beyond

Since 2008, the Mayor and City Council have made sustainability and economic resilience a central tenet in the City of Winston-Salem and its future. This report is the first to show examples of efforts taking place throughout the City departments and partners within the community. The sustainability efforts within the City have targeted those areas that not only make municipal projects effective but reach into the community as well.

To date, the reporting of Greenhouse Gas Emissions has been done on an annual basis, but this report is the first to review just what is actually going on to reduce those emissions and improve public health along the way.

Much of this report discusses the air quality issue and its improvements; however, many of the improvements the City makes can be altered by weather events. A hot summer can affect our ozone levels as discussed in the Triad Air Awareness Assessment; on the other hand, a cold winter can reduce our energy efficiency.

CAUTION AHEAD

While this analysis reports the City of Winston-Salem’s success in improving our air quality and energy efficiency, this success will not continue without realizing that sustainability is a long term process that requires constant review of programs and policies. While sustainable products may be 5 to 10% more costly upfront, at times even with comparable products within the same classification such as lighting it is the Return-On-Investment (ROI) that is key. However, not all sustainable systems should be reviewed in the same way concerning ROI. For example; the LED lighting project completed in the Public Safety Center had a 2 ½ year payback on this investment, however, an HVAC system (heating/cooling system) will not show this same return. The difference is the size/scope/price of such a project.

The project size is not the only way to review ROI on sustainable endeavors; efficiency, life-cycle costs and cost avoidance should be other considerations. The equipment that may provide more efficiency and less GHG Emissions most likely may cost more. However when ‘life-cycle’ costs, such as energy saved over the lifetime of the equipment, along with reduced costs in operations and maintenance, the possibilities of showing improvements in sustainability become obvious. A project of this caliber needs to be looked at realistically, with a much longer ROI. Without continued investment in energy saving improvements, there is a chance the gains made in reduced GHG emissions along with efficiency will be lost in the not-too-near future.

RECOMMENDATIONS

While the City began with a sustainability committee to oversee grant projects, now may be the time to take the sustainability information to all citizens on an annual basis through community forums. Staff recommends that with the beginning of the 2016 Earth Day Fair and the introduction of this report, the city’s Sustainability Office would hold multiple community forums to allow residents to provide feedback on what is currently being done and what they would like to see moving ahead.
While the operations of the City of Winston-Salem only account for a total of 2% of all GHG Emissions within Forsyth County, its sustainability efforts continue to reduce the cost of operations within its infrastructure. Much of these efficiencies and cost savings can be passed on to the city residents. But at the same time, a small amount of these savings should be set aside for developing trials to find out how newer technologies could assist the municipality in improving air and water quality, fleet management, waste reduction with increased recycling efforts, and an improved alternative energy portfolio. Currently the city has energy that is provided by coal and natural gas power plants, diesel, steam, electricity, and particulars in our wastewater treatment plants. Now is the time to try energy sources such as solar at smaller levels to examine it and find out if it is one alternative source the city should consider at a later date. A trial at the 5-kilowatt to 25-kilowatt system would provide valuable data when considering the use of solar at the city level. At the same time, new construction or remodeling projects need to consider the ROI of LED Lighting and WaterSense fixtures (which can help reduce water consumption), along with other sustainable technologies in the built environment.

Many people are involved in planning the sustainable future of Winston-Salem, and the City leadership wants to be there with each and every one of you. Planning for a sustainable tomorrow starts today.