

Ozone Advance Program Action Plan Cumberland County, North Carolina



A joint effort by US EPA Region 4, North Carolina Department of Environment and Natural Resources, and the Cumberland County Board of Commissioners, Town of Falcon, City of Fayetteville, Fort Bragg Military Reservation, Town of Godwin, Town of Hope Mills, Town of Linden, Town of Spring Lake, Town of Stedman and Town of Wade and the Fayetteville Area Metropolitan Planning Organization

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1. Purpose of the Ozone Advance Program

1.0 Introduction

The Ozone Advance is a collaborative effort between the EPA, states, tribes, and local governments. The program encourages expedited emission reductions in ozone attainment areas to help these areas continue to meet the National Ambient Air Quality Standards (NAAQS) for ground-level ozone. Specifically, the Ozone Advance Program will:

- Help attainment areas reduce emissions in order to ensure continued health protection,
- Better position areas to remain in attainment, and
- Efficiently direct available resources towards actions to address ozone problems quickly.

Ozone Advance promotes local actions to reduce ozone precursors in attainment areas to help these areas continue to maintain the ozone NAAQS. The program encourages states, tribes, and local governments to take proactive steps to keep their air clean.

Ozone Advance is distinct from the former Early Action Compact (EAC) program in that it focuses on attainment areas, and it does not provide regulatory flexibility in the form of deferred designations or otherwise. The programs are similar, however, in terms of their encouragement of early actions to reduce ozone precursors, and the development of stakeholder groups.

1.1 Background and Stakeholders Involvement

The Clean Air Act (CAA), as amended in 1990, is the most recent version of a law first passed in 1970. The 1990 Amendment made some major changes in the Act, by empowering the US Environmental Protection Agency (EPA) to set up permitting and enforcing programs for larger sources that release pollutants into the air.

On July 17, 1997, the EPA promulgated revised National Ambient and Air Quality Standards, addressing changes in the Ozone and moving from 1-hour standard to an 8-hour standard, as longer exposure to ozone have been proven to have a significant impact on people and the environment. The new primary and secondary standard was set to 0.08 parts per million (ppm) for ground-level ozone.

In 2002, the EPA proposed a new program: The Early Action Compact (EAC), to areas in the country that would meet certain criteria. Each participating area was to have an Early Action Compact Memorandum (EAC) of Agreement signed by December 31, 2002. The Chairman of the Cumberland County Board of Commissioners originally signed the EAC Memorandum of Agreement on December 13, 2002. The Early Action Plan, a document outlining local, state, and federal strategies to reduce ozone precursors, followed. Milestones set by EPA were met by Cumberland County resulting in designation as an Ozone Attainment Area in April 2008. Ground level ozone standards were changed once more in 2008 and set at 0.075 ppm and updated again in

2015 to .070ppm. Cumberland County elected to continue with the air quality regional efforts in the hope that uninterrupted work would further the ozone precursors reduction. The Cumberland County Air Quality Stakeholders Committee, which was formed as a part of the EAC, now meets quarterly ten years after first assembling to review and promote air quality improvement strategies.

As a former Early Action Compact Region this area decided it was advantageous to participate in this program and the Cumberland County Board of Commissioners approved participation in the Ozone Advance (OA) Program to continue the efforts initiated in 2002. Chairman W. Marshall Faircloth signed the letter of interest on September 4, 2012. Every municipality within Cumberland County signed a resolution of support and commitment to participate in the OA program in 2013. Cumberland County and the City of Fayetteville proclaimed May as Air Quality Awareness month annually in 2014 and 2015. The towns of Eastover and Spring Lake signed new resolutions in 2015 and Sustainable Sandhills is working to renew resolutions with the other Stakeholder municipalities in 2016-2017.

Table 1A. Air Quality Stakeholders of Cumberland County 2016	
NAME	Affiliation
Carolyn Justice Hinson	Fayetteville Public Works Commission (PWC)
Commissioner Larry Lancaster	Town of Fayetteville/ Cumberland Co. Representative
Commissioner Peggy Raymes	Town of Stedman
Councilwoman Kathy Jensen	City of Fayetteville
Russ Rogerson	Economic Development
Shanelle B. Harris	Fayetteville Area System of Transit (FAST)/ FAST Civil Rights Activist
Dr. Ana MacDowell	Medical Rep.
Francis Collier	Town of Linden
Gary Slater	Major Industry
Hanah Ehrenreich	Sustainable Sandhills
Janice Lucas	Town of Falcon
John Gillis	Homebuilders Association
Johnny Lanthorn	Town of Wade
Jon Parsons	Environmental Rep./ Energy Mgr @FSU
Celestine Raineri, REHS	Environmental health
David Heins	Fort Bragg
Natalee Ezzell	Town of Godwin
Kim Nazarchyk	Town of Eastover- Town Manager

Table 1B. Combined Air Team (CombAT) Members	
Al Miller	Cumberland County Schools (CCS)
Cecil Combs	Deputy Director Planning & Inspection Cumberland County
Faye Lewis	Mid Carolina Council of Governments (MCCOG)
Gary Cullen	Air Program Mgr @ Ft Bragg Public Utilities
Glen Prillman	Fort Bragg
James Bush	Cumberland County School District
Jeff Brooks	Fayetteville State University (FSU)
Jeffery Brown	Engineering and Infrastructure Director Engineering and Infrastructure Department of County Cumberland
Jennifer McHone-Sides	North Carolina Department of Environmental Quality
Jerry Dietzen	City of Fayetteville
Eddie Dancausse	North Carolina Department of Transportation
Joe Levister	Fayetteville Technical Community College
Karen Hilton	Combat Contacts
Lee Jernigan	City Traffic Engineer
Phillip Hart	COF- Transportation Planner
Mike Rutan	FAMPO

The Stakeholders (Table 1A.) revised by-laws in early 2016 to mandate a quarterly meeting schedule in conjunction with the CombAT team members.

The Stakeholders' committee is supported by the Combined Air Team (CombAT) (Table 1B.) that includes members of Cumberland County, City of Fayetteville, Fayetteville State University, Public Works Commission, Fayetteville Area System of Transit (FAST), the Fort Bragg Air Team, and is coordinated by the community environmental nonprofit, Sustainable Sandhills. CombAT is on call to provide the Stakeholders with technical information and administrative assistance. The public involvement does not end with the Stakeholders. An aggressive process of education and outreach into the community has been documented since the beginning of this endeavor, to include involvement of the Public School Systems (Cumberland County and Fort Bragg), utility providers, the Plant Managers Association, and public education requesting presentations. The Air Quality web page, maintained by FAMPO staff, provides information on the local effort and related links (<http://www.fampo.org/airquality.htm>). FAMPO contracts with Sustainable Sandhills to plan and implement air quality related programs throughout their region. Minutes of the Stakeholders' meetings and list of outreach and presentations are on file and open to the public.

1.2 Cumberland County Characteristics

Cumberland County is a mixture of urban and rural areas. The 2014 census updated for Cumberland County was 326,328. The 2010 census population for Cumberland County was 319,431 of which 42,702 rural population and 276,729 located within the Urbanized Area.

1.3 Local Efforts

In April 2001, Fort Bragg Military Reservation began planning and implementing strategies to become a sustainable installation. As part of this effort, several individuals within the surrounding Counties began working with the Military Installation to aid in the process, including the planning and implementation schedule of air quality initiatives for the metropolitan statistical area. At that point, building partnerships in support of a sustainable region was the next logical and necessary step. In partnership with the North Carolina Department of Environment and Natural Resources and stakeholders from the surrounding counties and communities, this partnership evolved into an independent community-based environmental nonprofit called Sustainable Sandhills in February 2003, with the mission to provide education, demonstration, and collaboration to preserve the environment of the Sandhills within a six county region.

The local and regional efforts to attain sustainability began prior to the development of the EPA's Early Action Compact, demonstrating the commitment of this area in attaining and maintaining healthy environment now, and for generations to come. The Cumberland County Air Quality Stakeholders/Technical Committee, Sustainable Fort Bragg, and Sustainable Sandhills participants are working together to ensure a united campaign and to avoid duplicated efforts.

Population density is varied, as shown in **Table 2A**. Because of the difference in land use and densities, care was exercised when proposing and selecting strategies to be implemented by several jurisdictions.

Table 2A. Census 2010 Demographic Information

Jurisdiction	Population	Land Area (sq. mi)	Density (People/sq. mi)
Eastover	3,628	11.33	320.3
Falcon(Part)	258	1.21	213.2
Fayetteville	200,564	145.84	1375.2
Godwin	139	0.52	269
Hope Mills	15,176	6.94	2186
Linden	130	0.51	257.2
Spring Lake	11,964	23.06	518.8
Stedman	1,028	2.08	493.9
Wade	556	1.79	311.4
Cumberland County	319,431	652.31	489.7

2. Overview of Air Quality in Cumberland County

The North Carolina Department of Environmental Quality: Division of Air Quality (DAQ) monitors levels of all criteria pollutants in Cumberland County and reports these levels to the EPA.

According to the most recent data, Cumberland County is meeting NAAQS for all of pollutants. Federal enforcement of the ozone NAAQS is based on a 3-year monitor “design”. The design value for each monitor is obtained by averaging the annual fourth highest daily maximum 8-hour ozone values over three consecutive years. If a monitor’s design value exceeds the NAAQS, that monitor is in violation of the standard. The EPA may designate part or all of the metropolitan statistical area (MSA) as nonattainment even if only one monitor in the MSA violates the NAAQS. There are two ozone monitors in Cumberland County. One of the monitors is located northeast of Fayetteville (**Wade**) and the other was formerly located in Golfview but switched to a new location southeast of Fayetteville (**Honeycutt**) in Spring 2015 (March/April). For the 2016 update, the new monitor will be labeled “Honeycutt” although older graph information may still list “Golfview”.

Figure 1. Map of Ozone Monitor Locations

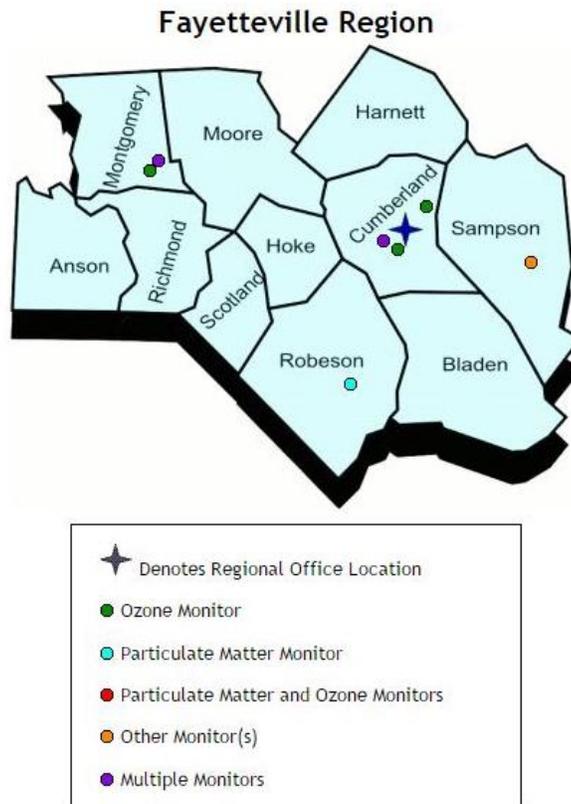


Table 3. Summary of 4th Highest 8-Hour Ozone Values (ppb)

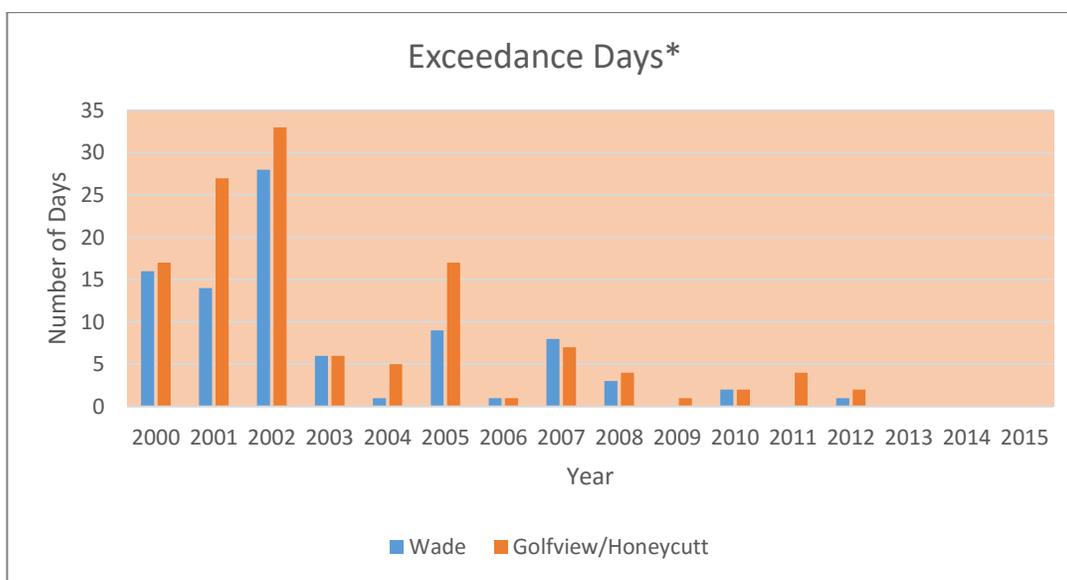
Fayetteville	4 th Highest Maximum Daily 8-Hour Average Ozone Concentration (Parts Per Billion)															
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Wade	86	80	94	86	72	84	72	80	75	64	71	73	68	62	61	60
Honeycutt	83	84	95	82	77	91	74	82	75	65	73	76	69	62	66	62

Table 3A. Annual Number of Exceedance Days*

(Maximum Daily 8-hr Average Ozone Concentration*)

	Number of Exceedance Days															
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Wade	16	14	28	6	1	9	1	8	3	0	2	0	1	0	0	0
Honeycutt	17	27	33	6	5	17	1	7	4	1	2	4	2	0	0	0

Graph 1. Annual Number of Exceedance Days by Monitor

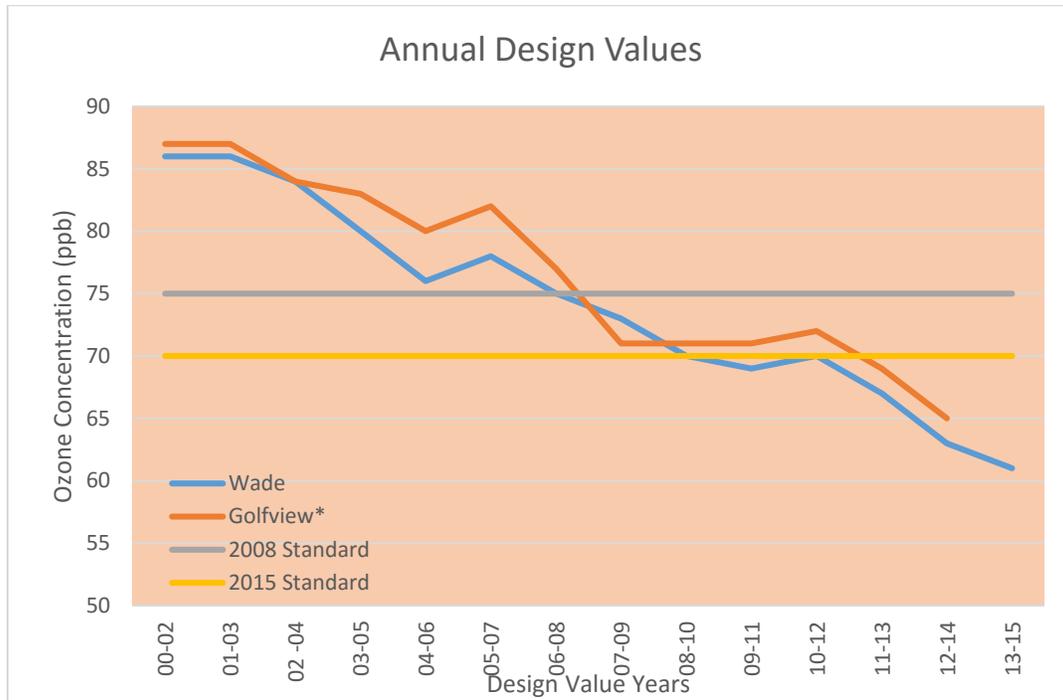


*2000 -2014 exceedance days based on maximum Ozone Concentration of >75ppb. 2015 exceedance days based on maximum Ozone Concentration of >70ppb

Table 4. Summary of Design Values (ppb) – Shaded areas exceeded O₃ NAAQS Standard

Fayetteville														
	00-02	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10	09-11	10-12	11-13	12-14	13-15
Wade	86	86	84	80	76	78	75	73	70	69	70	67	63	61
Golfview*	87	87	84	83	80	82	77	71	71	71	72	69	65	--

Graph 2. Fayetteville Monitoring Sites Design Values



*The calculation of design values for Golfview have been discontinued. Design values for Honeycutt will be released in 2017.

The EPA finalized that Cross-State Air Pollution Rule (CSAPR) on September 6, 2016. CSAPR was adopted to improve air quality in areas of non-attainment that were affected downwind. The new rule updated the 2008 NAAQS.

North Carolina Department of Environmental Quality provided Cumberland County with the following information regarding the CSAPR prior to adoption.

EPA Cross State air pollution projections for the area in 2013 show both region monitors with ozone values below 70 parts per billion (ppb) as indicated in **Table 5**.

Additional published projections can be found shown on **Table 6** from the **Appendix B 8-Hour Ozone Design Values for Air Quality Modeling Scenarios** of the 2012 *Air Quality Modeling Technical Support Document: 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards Final Rule* (EPA-45/R-12-004

Table 5. EPA Cross State air pollution rule projections in ppb

Monitor Location	A	B	C	D		E	F	G	H
Wade	78.0	80.0	67.7	69.4		65.4	67.1	65.0	66.7
Honeycutt	81.7	83.0	70.7	71.8		68.4	69.5	68.1	69.2
A: 2003-2007 Average Ambient Values B: 2003-2007 Maximum Ambient Values C: 2012 Base Case Average Values D: 2012 Base Case Maximum Values					E: 2014 Base Case Average Values F: 2014 Base Case Maximum Values G: 2014 Remedy Average Values H: 2014 Remedy Maximum Values				
The Base cases are emissions that are “on the books”. The Remedy case includes emissions reductions from the Cross State air pollution rule.									

Table 6. Model Ozone Projections

Monitor Location	2009-2013 Average Design Value	2009-2013 Maximum Design Value	2017 Projected Average Design Value	2017 Projected Maximum Design Value
Cumberland (Wade)	68.7	70.0	59.3	60.4
Cumberland (Honeycutt)	70.7	72.0	60.2	61.3
According to the EPA Transport for the 2008 Ozone NAAQS: 2009-2013 base period and projected 2017 design values at individual monitoring sites based upon EPA's updated air quality modeling released in the July 2015 Notice of Data Availability. The 2009 - 2013 base period average and maximum design values. The projected 2017 average and maximum design values. http://www.epa.gov/airtransport/ozonetransportNAAQS.html				

Table 7. 8-Hour Ozone Design Values (ppb) for 2017-2025 LD GHG Scenarios

State	County	2005 Baseline DV	2030 Reference Case DV	2030 Control Case DV
North Carolina	Cumberland	81.7	57.62	57.68
Where Reference Case DV is with projections without new vehicle standards and Control Case DV is with projections that include new vehicle standards Source: http://www.epa.gov/otaq/climate/documents/454r12004.pdf				

Both observed data and projected data reinforce the downward trend that shows a reduction of NO_x and VOCs, with ground level ozone values ranging from 0.094/95 ppm in 2002 to 0.068/69 ppm in 2012 and projected DVs of 0.062 ppm in 2018 and 0.57 ppm in 2030.

3. Ozone Health Effects and Sources

3.0 Overview of Ozone

Ozone (O₃) is a tri-atomic ion of oxygen. In the stratosphere or upper atmosphere, ozone occurs naturally and protects the Earth's surface from ultraviolet radiation. Ozone in the lower atmosphere is often called ground-level ozone, tropospheric ozone, or ozone pollution to distinguish from upper-atmospheric or stratospheric ozone. Ozone does occur naturally in the lower atmosphere (troposphere), but only in relatively low background concentrations of about 0.030 parts per million (ppm), well below the NAAQS. The term "smog" is also commonly used to refer to ozone pollution. Although ozone is a component of smog, smog is a combination of ozone and airborne particles having a brownish or dirty appearance. It is possible for ozone levels to be elevated even on clear days with no obvious "smog". In the lower atmosphere, ozone is formed when airborne chemicals, primarily nitrogen oxides (NO_x) and volatile organic compounds (VOCs), combine in a chemical reaction driven by heat and sunlight. These ozone-forming chemicals are called precursors to ozone. Man-made NO_x and VOC precursors contribute to ozone concentrations above natural background levels. Since ozone formation is greatest on hot, sunny days with little wind, elevated ozone concentrations tend to occur during the warm weather months, generally May through September. In agreement with EPA's guidance, North Carolina operates ozone monitors from April 1 through October 31 to capture high ozone events.

3.1 Ozone Health Effects

The form of oxygen humans need to breathe is O₂. When we breathe ozone, it acts as an irritant to our lungs. Short-term, infrequent exposure to ozone can result in throat and eye irritation, difficulty drawing a deep breath, and coughing. Long-term and repeated exposure to ozone concentrations above the NAAQS can result in reduction of lung function as the cells lining the lungs are damaged. Repeated cycles of damage and healing may result in scarring of lung tissue and permanently reduced lung function. Health studies have indicated that high ambient ozone concentrations may impair lung function growth in children, resulting in reduced lung function into adulthood. In adults, ozone exposure may accelerate the natural decline in lung function that occurs as a part of the normal aging process. Ozone may also aggravate chronic lung diseases such as emphysema and bronchitis and reduce the immune system's ability to fight off bacterial infections in the respiratory system. Asthmatics and other individuals with respiratory disease are especially at risk from elevated ozone concentrations. Ozone can aggravate asthma, increasing the risk of asthma attacks that require a doctor's attention or the use of additional medication. According to the EPA, one reason for this increased risk is that ozone increases susceptibility to allergens, which are the most

common triggers for asthma attack. In addition, asthmatics are more severely affected by the reduced lung function and irritation that ozone causes in the respiratory system. There is increasing evidence that ozone may trigger, not just exacerbate, asthma attacks in some individuals.

All children are at risk from ozone exposure because they often spend a large part of the summer playing outdoors, their lungs are still developing, they breathe more air per pound of body weight, and they are less likely to notice symptoms. Children and adults who frequently exercise outdoors are particularly vulnerable to ozone's negative health effects because they are repeatedly exposed to elevated ozone concentrations while breathing at an increased respiratory rate.

3.2 Ozone Sources

Ozone-forming pollutants or precursors are volatile organic compounds (VOCs) and nitrogen oxides (NO_x).

3.2.1 Volatile Organic Compounds

Volatile organic compounds (VOCs) are sometimes referred to as hydrocarbons. In North Carolina, large portions of precursor VOCs are produced by natural, or biogenic, sources, which are primarily trees. Man-made or anthropogenic VOCs also contribute to ozone production, particularly in urban areas. Sources of anthropogenic VOCs include unburned gasoline fumes evaporating from gas stations and cars, industrial emissions, and consumer products such as paints, solvents, and the fragrances in personal care products.

3.2.2 Nitrogen Oxides

Nitrogen oxides (NO_x) are produced when fuels are burned and result from the reaction of atmospheric nitrogen at the high temperatures produced by burning fuels. Power plants and highway motor vehicles are the major contributors in urban areas, and off-road mobile source equipment (such as construction equipment, lawn care equipment, trains, boats, etc.) are the major sources of NO_x. Other NO_x sources include "area" sources (small, widely-distributed sources) such as fires (forest fires, backyard burning, house fires, etc.), and natural gas hot water heaters. Generally, North Carolina, including the Fayetteville area, is considered "NO_x-limited" because of the abundance of VOC emissions from biogenic sources. Therefore, current ozone strategies focus on reducing NO_x. However, VOC reduction strategies, such as control of evaporative emissions from gas stations and vehicles, could reduce ozone in urban areas where biogenic VOC emissions are not as high.

3.2.3 NO_x and VOCs

The following lists the sources, by category, that contribute to NO_x and VOC emissions:

Biogenic: Trees and other natural sources

Mobile: Vehicles traveling on paved roads: cars, trucks, buses, motorcycles, etc.

Non-road: Vehicles not traveling on paved roads: construction, agricultural, and lawn care equipment, motorboats, locomotives, etc.

Point: "Smokestack" sources: industry and utilities

Area: Sources not falling into above categories. For VOCs, includes gas stations, dry cleaners, print shops, consumer products, etc. For NOx, includes forest and residential fires, natural gas hot water heaters, etc.

Table 8. Cumberland County Emissions Estimates (ton/year)

	Point		Area		On-road		Non-road	
<i>Year</i>	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC
2007	669	1,078	231	3,925	9,222	4,618	1,575	1,246
2011	379	811	234	2,666	6,415	3,366	808	853
2018	370	808	234	2,666	3,008	1,603	485	620

ftp://ftp.epa.gov/EmisInventory/2011v6/v2platform/reports/2011ed_2018ed_2011eh_2017eh_county_annual_totals.xlsx
<ftp://ftp.epa.gov/EmisInventory/2011v6/v2platform/reports/DetailsAboutEmissionsDataFiles07232015.pdf>

4. Control Measures

Several control measures are already in place and being implemented as part of the original Early Action Compact Plan for Cumberland County, which continues to focus on reductions in point, highway mobile, and non-road mobile source emissions. Fort Bragg Military Reservation continues to implement strategies to meet its sustainability goals, to include zero waste, construction of US Green Building Council LEED certified buildings, transportation multi-modal choices, and reforestation. Retrofitted and new municipal buildings still include white/light roofing and are periodically inspected, through the energy saving guarantee program, to verify that they still meet energy efficiency goals.

4.0 Proposed Local Control Measures

The following list of Air Quality Action strategies indicate several new and ongoing techniques that will be used locally to reduce ozone precursors. Although some are not quantifiable, all of these strategies are directionally correct. Strategies marked as “Ongoing” continue to serve the objectives of reducing ozone levels. As part of the Ozone Advance Program Action Plan, Cumberland County will submit an annual report verifying activities and implementations. Additional strategies may be communicated as they develop.

Appendix A. Stakeholder Directory

Appendix B. FSU Air Quality Stakeholder Updates

Prepared by Sustainable Sandhills staff: Denise Bruce, Environmental Outreach Coordinator, and Hanah Ehrenreich, Executive Director, in cooperation with the Air Quality Stakeholders of Cumberland County, Gary Slater, Chair, and Carolyn Justice Hinson, Vice-Chair, the Combined Air Team (CombAT) including US Army Fort Bragg, the North Carolina Department of Environment and Natural Resources Division of Air Quality and the Fayetteville Area Metropolitan Planning Organization

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**AIR QUALITY STAKEHOLDERS OF CUMBERLAND COUNTY
SELECTED OZONE CONTROL STRATEGIES AND IMPLEMENTATION SCHEDULE**

AWARENESS

City of Fayetteville/Transit	Strategy: Promote Bus Ridership in the	Implementation Date: 02/2012	Updated/revised: 2016
Strategy Description:	Cumberland County High Schools		
Fayetteville Area System of Transit will implement a Transit Marketing/Outreach Campaign in the high schools. This strategy impacts 3,500 students within the FAST service area. Planned impact is reduced NOx emissions by increasing future mass transit use and reducing private vehicle miles travelled. Program began in April 2014			
Updated Description:			
Updated in 2016. FAST continues to offer transportation to Cumberland County School District students and offers transportation to sports events and jobs from 3:30pm to 11:00pm Monday through Friday. For the 2015 - 2016 School year more than 300 passes were distributed to students.			

FAMPO/Sustainable Sandhills	Strategy: Air Quality Poster Contest	Implementation Date: 2002/2003	Updated/revised: 2016
Strategy Description:			
Promote art contest with Air Quality themes. Twelve winners included in calendars distributed to Stakeholders and the community to promote conservation efforts and air quality education for grades K-5. Offered in Cumberland County and plans to expand to the portions of Hoke, Robeson, and Harnett counties, that are in the Metropolitan Planning Area for the Fayetteville Area Metropolitan Planning Organization (FAMPO).			
Updated Description:			
Ongoing. For the 2016 update, the contest saw more than 400 participants from Schools (Public and Private) in Cumberland County. In order to engage more participation the contest will be promoted along with a short air quality awareness lesson to teachers that teach health and wellness in grades K - 5 through the Cumberland County Public Schools.			

FAMPO/Sustainable Sandhills	Strategy: Direct Community Outreach	Implementation Date: 2011/2012	Updated/revised: 2016
Strategy Description:			
Display Air Quality information at community events and festivals, using educational collateral and games. Enhanced collaboration included info booths at FireAntz Hockey team Kids Nights and Swamp Dogs Green Night.			
Updated Description:			
Information booths were at the Go Green Earth Day Event, Mother and Other's for Clean Air Climate Event, Swamp Dogs Green Night and Fire Antz Kids night. New Collateral has been created which includes the Air Quality Open Book Quiz Game. Participants are given a question about air quality, and the answers can be found on a custom infographic.			

AWARENESS

Fayetteville Public Works			
Commission	Strategy: Tree Power	Implementation Date: 04/2005	Updated/revised: 2016
Strategy Description:			
Program implemented to commemorate their 100 year anniversary by planting 100 dogwood trees along the Fayetteville Dogwood Trail, as well as educate customers about benefits of trees to the environment and air quality while demonstrating the proper placement of trees near utilities. 1,000 free tree seedling will be provided during community education seminars and events.			
Updated Description:			
Program continues to reach out and educate customers on how trees reduce/absorb air pollution and help reduce energy consumption, proper planting and tree trimming, how trees provide shade and windbreaks to help reduce energy costs, and beautify the community. The program has been updated to include distribution of more than 700 Choke Cherry bushes and the planting of the long leaf pine.			
Fort Bragg			
Strategy: Train Building Monitors		Implementation Date: 2013	Updated/revised: 2016
Strategy Description:			
Fort Bragg trains Repair and Upgrade Soldiers to look for energy conservation possibilities at the facility level. This strategy will reduce the demand for electricity and the amount of fossil fuel required for power generation.			
Updated Description:			
Fort Bragg continues ongoing training for Repair and Upgrade Soldiers. Quarterly updates are added to Energy Profile and Energy Use index.			
Fort Bragg			
Strategy: Utility Consumption Reports		Implementation Date: 2013	Updated/revised: 2016
Strategy Description:			
Building Occupants receive a monthly utility consumption report to create awareness on energy use in facilities. This education and awareness initiative has developed to promote energy conservation in assigned/rental housing.			
Updated Description:			
Fort Bragg does not continue to give building occupants a monthly utility consumption report to create awareness on energy use. Discontinued due to non-renewal of contract. Meter data is now reviewed and audits are completed on buildings where energy use is high.			

AWARENESS

Cumberland County Schools	Strategy: Education Reports	Implementation Date: 2015	Updated/revised: 2016
Strategy Description:			
Each of the Cumberland County Schools participate in Air Quality Awareness using the color coded flags. The Flags are raised each day along with the United States Flag and North Carolina Flag. For schools that offer a morning TV program, air quality is one of the discussion topics.			
Updated Description:			
For the 2016 - 2017 school year each school will be checked to ensure they are using the flags as part of the their daily raising of the colors.			

City of Fayetteville/Transit	Strategy: Increase Ridership	Implementation Date: 2014	Updated/revised: 2016
Strategy Description:			
The construction of a multi-modal transit facility provides opportunity to layer mass transit and low-emissions transit. This strategy ranges from improving air and water quality to reducing solid waste, benefitting owners, occupiers, and society as a whole.			
Updated Description:			
Plans to open facility were approved in August 2014. The facility is under construction and will open Feb 1, 2017.			

City of Fayetteville/Transit	Strategy: Green Business Certification	Implementation Date: 2012	Updated/revised: 2015
Strategy Description:			
Transit system received Sustainable Sandhills Green Business certification in 2012. This strategy reduces solid waste, water consumption, and reduces operating costs.			
Updated Description:			
Fayetteville Area System of Transit received a Sustainable Sandhills Green Business re-certification in 2015 and adopted the strategy for green infrastructure, including hybrid buses, fleet vehicles, carpooling, and the addition of more buses with bicycle transportation attachments.			

Fort Bragg		Implementation Date: 2016	Updated/revised: --
Strategy Description:	Strategy: Awareness activities and public relations		
Fort Bragg Energy Team creates energy awareness articles for the local newspaper, the Paraglide, and the Public Works digest. They also have a presence on social media with periodic updates on the Fort Bragg Facebook page and Sustainable Fort Bragg Facebook page. Fort Bragg also participates in Energy			
Updated Description:			
Newly listed measure - see above.			

AWARENESS

City of Fayetteville	Strategy: Develop alternative energy production opportunities that are financially viable	Implementation Date: 2013	Updated/revised: 2016
Strategy Description:	Exploring options for photovoltaic solar farms, biomass-to-energy, low-flow hydro and Methane gas-to-energy production. Clean energy sources reduce volume of fossil fuel burning required for power generation.		
Updated Description:	Cumberland County has a methane-reuse program that captures landfill gas and sells it under the name Fayetteville Gas to the Cargill Inc. processing plant across the Cape Fear River for use as a fuel source for the Combined Heat & Power system (CHP). Continuing strategy to explore and implement alternative and renewable energies in residential, commercial, and municipal use. City of Fayetteville is working with Cumberland County on pro-solar land use regulations. Methane re-use at Cargill will continue but no other renewable energy will be developed by the city at this time.		

City of Fayetteville	Strategy: Retrofit City buildings expand existing smart building monitoring system	Implementation Date: 2013	Updated/revised: 2015
Strategy Description:	Through moderate general fund appropriations, retrofit City buildings for more energy efficient lighting, HVAC units/motors, purchase energy star rated appliances & further reduce energy consumption. Strategy reduces the regional demand for electricity & fossil fuel used for power generation.		
Updated Description:	13-15 buildings monitored by Parks and Recreation from a centered facility have received efficient lights, AC unit replacements, and the Rec Center received new reflective roofing.		

City of Fayetteville	Strategy: Building Efficiency	Implementation Date: 2012	Updated/revised: 2015
Strategy Description:	Through moderate general fund appropriations, retrofit City buildings for more energy efficient lighting, HVAC units/motors, purchase energy star rated appliances and further reduce energy consumption by expanding the City's existing smart building monitoring system.		
Updated Description:	Better efficient lighting, AC unit replaced with upgraded equipment, building codes changed for better (30% residential and 15% commercial) energy efficiency increase.		

AWARENESS

City of Fayetteville	Strategy: Land Use Open Space Development	Implementation Date: 02/2012	Updated/revised: 2016
Strategy Description:	Enforce the adopted and revised Unified Development Ordinance for developing properties requiring open space dedication, parkland dedication, tree-save areas, buffer zones, significant tree preservation and landscape requirements all of which reduce the heat island effect and prevent ground level ozone production.		
Updated Description:	Unified Development Ordinance revised in 2016 to promote environmentally conscious development of the Cape Fear River called the Cape Fear River Overlay.		

Sustainable Sandhills	Strategy: Alternative Energy Development and Promte Rooftop Solar	Implementation Date: 06/2015	Updated/revised: 2016
Strategy Description:	Sustainable Sandhills opened a Solarize Sandhills program in 2015 to develop small-scale commercial and residential solar energy production in Fayetteville, Cumberland County, and the region.		
Updated Description:	The final for the 2015 program was the installation of rooftop PV systems on two homes, to for a total of 9 Kw of renewable electrical generation. The 2016 - 2017 Solar Sandhills plan is being developed to open in the early Fall of 2016 with a goal of adding 250 Kw of renewable electrical generation		

Sustainable Sandhills	Strategy: Green Business Certification Program	Implementation Date: 2009	Updated/revised: 2016
Strategy Description:	Sustainable Sandhills began the Green Business Certification Program in 2009 to recognize businesses who were leaders of environmental stewardship. A key component of the program is raising awareness about multiple environmental impacts including Air Quality and Transportation Alternatives.		
Updated Description:	Currently, the transportation portion of the program is under review. Sustainable Sandhills would like to increase the use of alternative modes of transportation to work for commuters through 2017.		

AWARENESS

Sustainable Sandhills	Strategy: Burnwise Awareness	Implementation Date: 2016	Updated/revised:--
Strategy Description:			
Sustainable Sandhills will begin promoting the EPA Burnwise Campaign beginning the Fall of 2016. These efforts will be to increase awareness to reduce pollution from burning wood for heat.			
Updated Description:			
New Program - See Above			

Town of Spring Lake	Strategy: Educational Outreach	Implementation Date: 2016	Updated/revised:2016
Strategy Description:			
Providing educational outreach to citizens and businesses by providing solutions to reduce pollution and improve air quality. The Town will publicly support initiatives such as Bike to Work Day, National Dump the Pump Day and Air Quality Awareness Week.			
Updated Description:			
The Spring Lake Board of Aldermen unanimously approved a proclamation supporting “Dump the Pump” in an effort to reduce fuel usage and emissions by utilizing public transportation.			

Town of Spring Lake	Strategy: Advisory Committee	Implementation Date: 2016	Updated/revised:2016
Strategy Description:	Awareness		
The Sustainability Advisory Committee was created to assist the Board of Aldermen adopt and promote sustainable practices in air quality, water quality, energy reduction and efficiency, reduction of waste, recycling, transportation, and resource conservation.			
Updated Description:			
The committee and bylaws have been adopted by the Board of Aldermen and appointments are currently underway. The first goal of the committee is the development of a Sustainability Plan that will guide future policy and ordinance adoption.			

Fort Bragg	Strategy: Green Barracks Contest	Implementation Date: 2016	Updated/revised: --
Strategy Description:	Public relations		
Fort Bragg Energy Team created the Green Barracks contest to promote energy conservation and waste reduction in barracks facilities. This is a quarterly contest.			
Updated Description:			
Newly listed measure - see above.			

ENERGY REDUCTION

Sustainable Sandhills	Strategy: Local Food Access Program	Implementation Date: 2012	Updated/revised: 2016
Strategy Description:			
Educate community on benefits of sourcing food locally, reducing miles traveled by food and consumers. Liaison with Downtown Restaurant Association, Slow Food Fayetteville in the Sandhills, Sandhills Farm to Table Cooperative.			
Updated Description:			
Sustainable Sandhills works with local farm cooperative to create a local food system, including the growth of local produce box subscriptions to a Community Supported Agriculture (CSA). For the 2016 year Sustainable Sandhills coordinated three CSA pick up sites, with an average of 18 subscriptions. Sustainable Sandhills partners with Slow Foods and Pop-up Dinners with an aim to connect chefs with local food producers to reduce vehicle emissions and carbon emissions related to food sourcing in the Sandhills.			

Fayetteville Public Works	Strategy: Advanced Metering	Implementation Date: 06/2014	Updated/revised: 2016
Strategy Description:	Infrastructure		
Completion estimated for June 2017, installation of Advanced Metering Infrastructure to provide utility through computer based remote control, automation and two-way communications. System will provide 115,000+ PWC customers better technology to better manage and reduce energy and water consumption. Benefits will also include reduction in service trips/vehicle usage. This strategy will lower NOx emissions by reduction of energy consumption and significant reduction of vehicle use/fuel consumption.			
Updated Description:			
Since beginning of installation 152,000 of the 185,000 meters have been installed and annual service trips/vehicle usage has already been reduced by 456,000 miles.			

Fayetteville Public Works	Strategy: LED Street Lighting	Implementation Date: 06/2014	Updated/revised: 2016
Strategy Description:			
Conversion of 15,000+ streetlights to LED because LEDs have a longer life span and use less energy than traditional street lights. Immediate benefits will include reduction in energy consumption and in service trips/vehicle usage. This strategy will lower NOx emissions by reduction of energy consumption and significant reduction of vehicle use/fuel consumption. Slated to be complete by June 2017.			
Updated Description:			
To date 10, 645 LED streetlights have been installed with a total energy savings of 2 million kwh.			

ENERGY REDUCTION

Fayetteville Public Works	Strategy: Retro-Commissioning	Implementation Date: 2015	Updated/revised: 2016
Strategy Description:			
Retro-commissioning project on main operations facility/building (replacement lighting, energy improvements to heating/ventilation/AC units).			
Updated Description:			
Completed. Upgraded automation system to improve operating efficiency of chiller plant and reduce air handling unit run times. Energy usage reduced by 33% at the completion of the project.			

Fayetteville State University	Strategy: LEED Silver or Equivalent	Implementation Date: 2012	Updated/revised: 2016
Strategy Description:	Building Standard		
Saving goal related to projected new building space starting 2012. A 20% electrical and natural gas savings, GHG reduction of 154 tons (CO ₂ Equivalent) annually and total of 2,000 tons by 2025			
Updated Description:			
Two buildings on campus are LEED Silver Certified. One building on Campus is awaiting certification. Two additional buildings will be renovated to meet LEED Silver Certification by 2018.			

Fayetteville State University	Strategy: FSU Energy-Savings	Implementation Date: 2015	Updated/revised: 2016
Strategy Description:	Performance Contract (ESPC) Program		
A 15% electrical and natural gas savings, GHG reduction of 183 tons (CO ₂ equivalent) annually and total 2,000 tons by 2025; Upgrade applied to 900,000 SF of FSU facilities (savings to begin in 2015)			
Updated Description:			
For the 2015 -2016 school year FSU reported a 41% decrease in total energy usage from the baseline year 2002.			

Fayetteville State University	Strategy: UNC-GA ESPC	Implementation Date: 2015	Updated/revised: 2016
Strategy Description:	(Lighting Only)		
Upgrades applied to 370,000 SF of FSU facilities with demonstrated energy savings to begin in 2015. 20% savings of lighting system electrical, GHG reduction of 23 tons (CO ₂ equivalent) annually and total 250 tons by 2025.			
Updated Description:			
Completed in Fall of 2015. 60% of exterior lighting has been converted to LED and 75% interior lighting has been retrofitted to energy efficient lighting.			

ENERGY REDUCTION

Fayetteville State University	Strategy: Continuous Re-Commissioning Program	Implementation Date: 2016	Updated/revised: 2016
Strategy Description:	Re-commission facilities to maintain efficiency as use and occupancy changes during the school semesters/year.		
Updated Description:	Program will begin in 2016. Delayed while both Energy Savings Performance Contract projects are ongoing and incomplete.		

Fayetteville State University	Strategy: Improved Space Utilization and Building Scheduling	Implementation Date: 2015	Updated/revised: 2015
Strategy Description:	5% electrical and natural gas savings, GHG reduction of 455 tons (CO ₂ Equivalent) annually and total 5,000 tons by 2025; Savings applies to all building. Savings ramp from 2% (2017) to 5% (2020)		
Updated Description:	Project delayed by ESPC timeline. Targets may need to be revised downward. A 5% ultimate savings is more realistic by 2020.		

Fayetteville State University	Strategy: Food Waste Composting	Implementation Date: 2014	Updated/revised: 2016
Strategy Description:	Capture 100% of food waste, both pre- and post- consumer; GHG reduction of 50 tons (CO ₂ equivalent) annually and total 600 tons by 2025.		
Updated Description:	FSU capturing 80% of food waste by 2015. FSU has replaced the food waste dehydrator with a contract with a commercial compost hauler.		

Fort Bragg	Strategy: Retro-Commissioning	Implementation Date: 2011	Updated/revised: 2016
Strategy Description:	Facilities surveyed to ensure systems are performing as they were designed. Improvements such as occupancy schedules and sensors, variable frequency drives, etc. are normally installed during this process. This strategy ensures equipment is functioning efficiently.		
Updated Description:	Retro-commissioning of facilities is ongoing.		

ENERGY REDUCTION

Fort Bragg	Strategy: Thermal Energy Storage	Implementation Date: 2011	Updated/revised: 2016
Strategy Description:			
Water is chilled in the evening when energy prices are lower. Chilled water is used in district system. This strategy is used to reduced cost.			
Updated Description:			
Thermal Energy Storage has been implemented and continues to run extra thermal energy storage tanks for chilled water, shifting energy use from peak hours to off-peak hours. Chilled water runs from six to eight hours a day and in circulating mode for four to six hours of the day.			

Fort Bragg	Strategy: Purchase Energy Star	Implementation Date: 2011	Updated/revised: 2016
Strategy Description:	Equipment		
Energy efficient products are procured and installed. This strategy reduces energy consumption.			
Updated Description:			
Fort Bragg's green prorument policies provide ongoing purchasing of Energy Star certified equipment.			

Fort Bragg	Strategy: Implement "Low-cost/No-cost"	Implementation Date: 2011	Updated/revised: 2016
Strategy Description:	energy conservation measures		
Improve facility energy use intensity by installing weather stripping around windows and doors. This strategy improves the building envelope, thus reducing energy consumption.			
Updated Description:			
Fort Bragg continues to improve facilities with weather stripping and other measures to conserve energy consumption.			

Fort Bragg	Strategy: Load management	Implementation Date: 2011	Updated/revised: 2016
Strategy Description:	incubicle/office space		
Received funding for "smart strips," a load sensing power strip. This strategy reduces energy consumption by 30% based on meter data.			
Updated Description:			
Energy Office continues to maintain data on reduced energy consumption by the "smart strips."			

ENERGY REDUCTION

Fort Bragg	Strategy: LEED certifiable facilities	Implementation Date: 2011	Updated/revised: 2016
Strategy Description:	Improve federal facilities resource efficiency. This strategy ranges from improving air and water quality to reducing solid waste, benefiting owners, occupants, and society as a whole.		
Updated Description:	Energy conservation and subsequent savings are achieved through several lighting strategies. The north/south orientation of the building and window placement enables LEED facilities to reduce consumption of bulb wattage and harvest natural light in 90% of all regularly occupied spaces.		

Fort Bragg	Strategy: Renewable Energy	Implementation Date: 2000's	Updated/revised: 2016
Strategy Description:	Renewable energy is implemented where life-cycle cost is most effective.		
Updated Description:	A large geothermal field (five well fields) is currently in development to supplement heating and cooling loads in four buildings with plans to integrate three additional facilities. Other renewable technologies include: solar thermal, solar photovoltaic, solar walls, and ground source heat pumps.		

Fort Bragg	Strategy: Lighting Upgrades	Implementation Date: 2000's	Updated/revised: 2016
Strategy Description:	Eliminate inefficient lighting with more efficient lighting, such as LEDs, to reduce energy consumption.		
Updated Description:	Fort Bragg continues to upgrade inefficient lighting to LED lighting and plans to upgrade five aircraft hangers with LED lighting. Area lighting levels are also lowered in the evenings when not needed.		

ENERGY REDUCTION

Fort Bragg	Strategy: Energy Audits	Implementation Date: 2000's	Updated/revised: 2016
Strategy Description:			
Audit facilities with high energy use indices to determine if high every use is due to mechanical failure or building occupant behavior.			
Updated Description:			
Address mechanical issues and/or work with building occupants to use energy more efficiently.			

Fort Bragg	Strategy: Building level micro-grid demonstration	Implementation Date: 2000's	Updated/revised: 2016
Strategy Description:			
A green and energy efficiency initiative for Fort Bragg facilities. Facility will be installing approximately 150 KW of PV, DC fans, DC lighting, and battery storage.			
Updated Description:			
Project is currently in the evaluation phase.			

Fort Bragg	Strategy: Building controls and metering	Implementation Date: 2000's	Updated/revised: 2016
Strategy Description:			
facilities that are utilizing excess energy when compared to similar facilities.			
Updated Description:			
Fort Bragg continues to implement this strategy in new and existing facilities.			

Fayetteville Public Works Commi	Strategy: Electric Vehicle Charging Stations	Implementation Date: 2015	Updated/revised: 2016
Strategy Description:			
PWC received \$37,000 grant from NC Green Technology Center to purchase, install, and promote use of four Level 2 Dual Electric Vehicle Charging stations throughout PWC service areas.			
Updated Description:			
Charging Stations were installed in 4 locations around the Fayetteville Area. The Charging Stations are free for public use and are managed and reported through the Chargepoint Network. Installation completed December 2015. Since installation, 194 gallons of gas have been saved, 1.5 MWh energy savings and 648 kg Greenhouse Gas savings.			

ENERGY REDUCTION

City of Fayetteville/ Transit	Strategy: Fuels Efficient Bus Upgrades	Implementation Date: 2016	Updated/revised: --
Strategy Description:			
Upgrading buses for maximum fuel efficiency.			
Updated Description:			
16 small capacity busses have been converted to propane. Resulting in a 40% savings of fuels savings. All transit buses regardless of age have been upgraded with new radiators to improve engine cooling and fuels efficiency.			

City of Fayetteville/ Environmental Services	Strategy: Hybrid Vehicle Adoption	Implementation Date: 2016	Updated/revised: --
Strategy Description:			
City of Fayetteville Environmental Services along with other city agencies will purchase hybrid fleet vehicles for employees to use			
Updated Description:			
Environmental Services purchased one hybrid vehicle in 2016, with plans to purchase more in 2017.			

City of Fayetteville	Strategy: Improved Traffic Flow	Implementation Date: 2016	Updated/revised: --
Strategy Description:			
The City of Fayetteville has implemented numerous traffic round - about within the city to reduce idle time normally seen at traffic stops. Four traffic around about were completed in 2016 and plans for 3 more projects to be completed in 2017.			
Updated Description:			
New strategy see above.			

Town of Spring Lake	Strategy: LED Street Lights	Implementation Date: 2016	Updated/revised: 2016
Strategy Description:			
The Town of Spring Lake worked with Duke Energy Progress to begin converting all existing street lighting (800+) to LED bulbs to reduce energy consumption and provide a \$10,000/year savings cost to the Town (\$100,000 over 10 years).			
Updated Description:			
Approximately 50% of the street lights have been converted to LED. Project is scheduled to be completed in September 2016.			

ENERGY REDUCTION

Town of Spring Lake	Strategy: Transportation	Implementation Date: 2016	Updated/revised: 2016
Strategy Description:			
The Town is currently working with FAST to offer additional routes to Spring Lake residents to increase public transportation ridership and reduce emissions from vehicle usage.			
Updated Description:			
This is an ongoing project.			

Town of Spring Lake	Strategy: Idle Reduction Policy	Implementation Date: 2016	Updated/revised: --
Strategy Description:			
Development of policy for reduction of idle time of Town fleet vehicles to reduce fuel use and emissions.			
Updated Description:			
Policy is currently being drafted and is anticipated to be implemented by end of 2016.			

Fayetteville Public Works		Implementation Date: 2016	Updated/revised: --
Strategy Description:	Strategy: Community Solar Infrastructure		
Fayetteville Public Works Commission has a proposal for a 500kw solar farm that will be funded through a community solar model.			
Updated Description:			
PWC is working with the North Carolina State Clean Technology Center to complete solar farm will be completed in 2018.			

Fort Bragg	Strategy: Load management	Implementation Date: 2016	Updated/revised: --
Strategy Description:	Demonstration Projects		
Fort Bragg regularly participates in DoD funded demonstration projects focused on implementing energy efficiency technologies. Examples include a high efficiency dehumidification HVAC unit and phase change insulation material.			
Updated Description:			
Newly listed measure - see above.			

TRANSPORTATION

City of Fayetteville/Transit	Strategy: Sidewalks	Implementation Date: --	Updated/revised: 2016
Strategy Description:			
Fayetteville Area System of Transit, in conjunction with the city of Fayetteville, acquired New Freedom funds that constructed over 2.1 miles of sidewalks from Murchison Road and Hogan Street to enhance connectivity, air quality, and safety. This strategy will enhance transportation options for ADA residents and creates a pedestrian friendly community which in turn reduces gasoline consumption.			
Updated Description:			
Ongoing construction to enhance the connectivity to sidewalks and bus stops if "right of way" is available.			

City of Fayetteville/Transit	Strategy: New Transit Routes	Implementation Date: 2013	Updated/revised: 2016
Strategy Description:			
The purpose of this service is to provide transportation options in a high growth area for commercial and institutional development. This strategy will assist with reduction of Vehicle Miles Travelled (VMTs)			
Updated Description:			
Two additional routes have been added or extended to bring connectivity to neighborhoods and shopping centers. These routes began operation in 2016.			

City of Fayetteville/Transit	Strategy: Providing Transportation service to	Implementation Date: 2014	Updated/revised: 2016
Strategy Description:	FSU students.		
Fayetteville State University students will be provided free bus transit passes to by FAST. Transportation corridor service costs will be assisted by Fayetteville State University. This strategy will help reduce emission, promote bus-ridership, and assist university access.			
Updated Description:			
Fayetteville Area System of Transit's partnership with Fayetteville State University is ongoing. Scheduled times for buses has expanded to run from 3:30PM to 11:00PM to assist working students, who may use transit services to get to places of employment.			

TRANSPORTATION

City of Fayetteville/Transit	Strategy: Providing free transportation to	Implementation Date: 10/2014	Updated/revised: 2016
Strategy Description:	sporting events		
High school students will be given a 30-day pass that will provide them with free transportation to sporting events or other school related activities between 3:00 and 11:00 pm. This strategy will help to reduce emissions by mass transiting students instead of multiple students driving to the same place on their own.			
Updated Description:			
Updated in 2016. FAST continues to offer transportation to Cumberland County School District students and offers transportation to sports events and jobs from 3:30pm to 11:00pm Monday through Friday. For the 2015 - 2016 School year more than 300 passes were distributed to students.			

City of Fayetteville/Transit	Strategy: Rider Promotion	Implementation Date: 2015	Updated/revised: 2016
Strategy Description:			
Fayetteville Area System of Transit newly began to promote their appreciation of customers by offering transit passes for \$.25 on their website to increase and promote ridership.			
Updated Description:			
For 2016 FAST has added Rider promotions which include "Stuff the Bus" and a "Canned Food Drive". Both endeavors have resulted in increased ridership. The Canned Good Drive saw an increased ridership average of 537 riders. These promotions will continue in the future.			

City of Fayetteville	Strategy: Blue Toad Device use	Implementation Date: 2013	Updated/revised: 2016
Strategy Description:			
Reduce idle time and travel times by monitoring vehicle timing and optimizing traffic signal timing, which will reduce gasoline consumption and emissions.			
Updated Description:			
City of Fayetteville continues to implement this strategy and monitors light signal timing at peak traffic and high use intersections. At this time there are no hard data on traffic flow and time saved.			

TRANSPORTATION

City of Fayetteville	Strategy: Perform financial analysis of future vehicle replacements	Implementation Date: 2013	Updated/revised: 2016
Strategy Description:	Analyze diesel-powered vehicles replacement with CNG-powered and/or hydraulic assisted hybrid garbage trucks. This strategy reduces NOx emission.		
Updated Description:	Ananlysis is ongoing. Four trucks have been replaced in 2015 with vehicle that burn cleaner fuel, and have particulate filters.		

City of Fayetteville	Strategy: Idle Reduction Policy	Implementation Date: --	Updated/revised: 2016
Strategy Description:	Enforce the City's Idle Reduction Policy for city-owned fleet vehicles and equipment. This strategy results in a 14-17% fuel consumption reduction with a corresponding NOx reduction.		
Updated Description:	City employees allowed to idle only 5 minutes of 30 minute sitting time. City vehicles not allowed to go through drive-thru lanes. Incentives are created to help promote bike-to-work weeks (such as free coffee) as part of an lowered idling emissions strategy.		

Fayetteville Public Works	Strategy: Fleet Management	Implementation Date: 2012	Updated/revised: 2016
Strategy Description:	Implement efforts to better manage the overall requirements of the PWC Fleet and lower fuel consumption and emissions. Automated Information Modules and GPS modules have been installed to provide information to aid in minimizing emissions and to generate information to identify and minimize unnecessary idling of vehicles. This strategy reduces NOx emissions.		
Updated Description:	PWC has been recognized at the "Champion" level of the NC Smart Fleet program for reducing fuel use. During the previous year, 221 short tons of carbon dioxide were offset with fleet best practices and using telematics software to reduce idling and conserve fuel.		

Fayetteville State University	Strategy: Student, Faculty, and Staff Community Improvements	Implementation Date: 2012	Updated/revised: 2016
Strategy Description:	3% reduction in transportation mileage, GHG reduction of 38 tons annually, and total of 500 tons by 2025; Savings applied to all students, faculty/staff; low-emissions vehicles preferred parking campaign with all current and future new building projects; bike rack campaign with all current and future new building		
Updated Description:	LEV parking and bike rack campaign ongoing. Covered bus stop for FSU students by FAST completed 2015.		

TRANSPORTATION

Fayetteville Public Works	Strategy: Alternate Fuel/Hybrid	Implementation Date: 2012	Updated/revised: 2016
Strategy Description:	Vehicles/Equipment		
Annually replacing existing fleet and equipment with vehicles that reduce emissions and lower fuel consumption. Replaced five heavy diesel trucks in 2014 with reduced emissions diesel engines, and have replaced eight bucket trucks with two hybrid bucket trucks and six lower emission diesel engines. Currently operating five other hybrid cars/SUVs. Also replaced spark ignited propane forklifts with zero emission all electric forklifts, a diesel directional board with zero emission solar powered message board, and converted construction equipment to Tier 4 emission standards (reduces NOx emissions)			
Updated Description:			
Existing fleet includes hybrid vehicles, electric vehicles, and lower emission vehicles (LEVs). Replacements of less efficient vehicles are ongoing.			

LAND USE

Town of Falcon	Strategy: Falcon Zoning Ordinance	Implementation Date: Fall 2013	Updated/revised: 2016
Strategy Description:	Amendment to include Density Development		
Density Developments allow for the division of land while requiring development on only 60% of the overall acreage with open space designation for the other 40%. Mixed Use Development allows for the flexibility of development to include commercial, residential, and open space.			
Updated Description:			
Falcon zoning ordinance strategy still projected on a 2-5 year implementation.			

Town of Godwin	Strategy: Proposed Zoning Ordinance	Implementation Date: Fall 2013	Updated/revised: 2016
Strategy Description:	Amendment to include Density Development		
Density Developments allow for the division of land while requiring development on only 60% of the overall acreage with open space designation for the other 40%; Mandate interconnectivity (lateral access) between developments, particularly commercial; Landscaping standards, encouraging retention of existing trees. Mixed Use Development allows for the flexibility of development to include commercial, residential, and open space.			
Updated Description:			
Strategy implementation still ongoing.			

LAND USE

Town of Wade	Strategy: Proposed Zoning Ordinance	Implementation Date: 02/2012	Updated/revised: 2016
Strategy Description:	Amendment to include Density Development and Mixed Use Development		
Density developments allow for the division of land while requiring development on only 60% of the overall acreage with open space designation for the other 40%; Mandate interconnectivity (lateral access) between developments, particularly commercial; Landscaping standards, encouraging retention of existing trees. Mixed Use Development allows for the flexibility of development to include commercial, residential, and open space.			
Updated Description:			
Wade is still supporting the development of green space in subdivisions. Wade also pushing for the use of LED lighting and Tier 4 emissions in new clean burning diesel tractors.			

Town of Eastover		Implementation Date: 2013	Updated/revised: 2016
Strategy Description:	Strategy: Commercial Core Overlay District		
Preserve and enhance small-scale commercial character, while providing for low-impact business opportunities with requirements for pedestrian pathways/sidewalks and amenities to include rear vehicular access, landscaping, and tree planting. This strategy reduces emissions by creating accessible walkways and reforestation of commercial areas.			
Updated Description:			
More restricted zoning codes were given to the Town, ongoing still. Eastover received an acre of land that will be left natural except for a small natural walking trail. Over 100 azaleas and 15 dogwood trees have been planted on 4.5 acres of Town property. Town received 26.5 acres of natural setting that will be used to expand the current ballpark. Town is currently working with Fayetteville-Cumberland County Parks and Rec to design a site plan which will include natural area and larger walking path.			

Town of Eastover	Strategy: Zero Lot Line Development	Implementation Date: Summer 2013	Updated/revised: 2016
Strategy Description:	Conditional Use Permit		
Zoning ordinance that requires a Conditional Use Permit for any Zero Lot Line development (residential and commercial). This strategy protects environmentally sensitive areas and provides green space which offsets emissions.			
Updated Description:			
Zero Lot live development is on going.			

LAND USE

Town of Linden		Implementation Date: Winter 2014/2015	Updated/revised: 2016
Strategy Description:	Strategy: Development-Conditional Zoning		
Landscaping standards encourage retention of existing trees; Mandatory 40% open space, development on remaining 60%; Mandate interconnectivity (lateral access) between developments, particularly commercial.			
Updated Description:			
Strategies are still ongoing			

Town of Spring Lake		Implementation Date: 2014	Updated/revised: 2016
Strategy Description:	Strategy: Land Use Open Space Development		
Riparian buffers, same as or similar to Cumberland County provisions, adopted August 2012; Tree preservation; Mandate double landscaping when clear cut, with extra credit given for retaining existing trees, similar to Hope Mills standards, adopted October 2008; Mandate interconnectivity (lateral access) between developments, particularly commercial.			
Updated Description:			
The Town Manager will review and implement strategies.			

Fort Bragg	Strategy: Creation of green space review board for construction projects	Implementation Date: 2000's	Updated/revised: 2016
Strategy Description:			
Use of the required "Tree City USA" Arbor Board to review landscape designs and site demolition plans for construction projects. This strategy minimizes tree loss during construction and assures proper plant selection/placement for passive solar design and heat island mitigation			
Updated Description:			
Fort Bragg continues to protect the Long Leaf Pine ecosystem. They have earned the Tree City USA Growth Award seven consecutive years for progress in the areas of community forestry programs, education and public relations. the provide continuing education for tree managers, planning and management, municipal funding, and tree inventory and analysis.			

LAND USE

Fort Bragg	Strategy: Creation of tree bank mitigation for	Implementation Date: 2000's	Updated/revised: 2016
Strategy Description:	construction projects		
Created a tree mitigation policy that requires onsite replanting for trees removed during construction or, if replanting is not possible on site, the funding for replanting is deposited into a mitigation tree fund that will fund replanting elsewhere on post. This strategy guarantees no deficit tree loss will result from construction projects.			
Updated Description:			
Fort Bragg continues to protect the Long Leaf Pine ecosystem by maintaining prescribed burns and replanting on unused property.			

City of Fayetteville	Strategy: Enforcement of adopted ordinances	Implementation Date: 2011	Updated/revised: 2016
Strategy Description:	for open space development		
For developing properties, require open space dedication, parkland dedication, tree preservation ordinance and landscape requirements. This strategy reduces the heat island effect and prevents ground level ozone production			
Updated Description:			
Adjustments have been made to development zones and more area has been dedicated to green space.			

City of Fayetteville	Strategy: Open Space Development	Implementation Date: 2012	Updated/revised: 2016
Strategy Description:			
Enforce the adopted and revised Unified Development Ordinance for developing properties requiring open space dedication, parkland dedication, tree-save areas, buffer zones, significant tree preservations and landscape requirements all of which reduce the heat island effect and prevent ground level ozone production.			
Updated Description:			
Unified Development Ordinance revised 2015 to incentivize land developers to retain Long Leaf pine habitat. Development plans are required to include an area of open space with 24 trees per acre.			

City of Fayetteville	Strategy: Commercial/Mixed Use	Implementation Date: 2012	Updated/revised: 2016
Strategy Description:	Development		
The UDO supports up to 24 dwelling units per acre (due) in commercial areas and 32 due in mixed use districts. Having residents in close proximity to commercial services reduces fuel consumption with a corresponding reduction in NOx. Recent amendments offer increased density in certain areas to encourage redevelopment in a more sustainable pattern.			
Updated Description:			
City of Fayetteville continues to plan and coordinate redevelopment of residential density with mixed use/commercial development.			

LAND USE

City of Fayetteville	Strategy: Tree canopy/Specimen trees	Implementation Date: 2011	Updated/revised: 2016
Strategy Description:			
Protect and retain existing tree canopy/specimen trees during and after development. Trees and landscaping reduce NOx and uptake carbon dioxide.			
Updated Description:			
The UDO has clear concise requirements of tree protection that the City of Fayetteville continuously adheres to such as public protection of trees, public maintenance of trees by walkways and streets, and replanting.			

City of Fayetteville	Strategy: Redevelopment Toolbox	Implementation Date: 2011	Updated/revised: 2016
Strategy Description:			
Incentives have been adopted to encourage redevelopment of existing sites and development of infill sites, thereby reducing sprawl with a corresponding reduction in fuel consumption and NOx.			
Updated Description:			
City of Fayetteville continues to use the "redevelopment toolbox" incentive as an ongoing strategy. It leverages private investment using City funding, capital improvement programming, federal and state grants, and promotes development of investment in priority areas and projects, such as Cottage Developments, Regional Activity Centers, Small Subdivision Alternative Standards, and Residential Density in Commercial Districts, etc.			

City of Fayetteville	Strategy: Increase use of sustainable	Implementation Date: 2011	Updated/revised: 2016
Strategy Description:	development practices		
Incentives have been adopted to encourage greater use of sustainable development practices and to support urban agriculture			
Updated Description:			
City of Fayetteville partners with Sustainable Sandhills to design a Climate Adaption Plan. The plan was completed in 2015.			

LAND USE

City of Fayetteville/Cumberland Parks and Recreation	Strategy: Extension of Cape Fear River Trail	Implementation Date: 2012	Updated/revised: 03/2016
Strategy Description:			
Once the Grove Street bridge is completed, the Cape River Trail will be extended; going south from Clark Park to Hoffer Road near Public Works Commission (PWC) water treatment plant. Asphalt sidewalks and bike paths will also be added.			
Updated Description:			
Cape Fear River Trail extension completed in early 2016.			

City of Fayetteville	Strategy: Urban Heat Island Reduction	Implementation Date: 2016	Updated/revised: --
Strategy Description:			
The City of Fayetteville has implemented a number of projects around the city to reduce the urban heat island normally caused by open pavement. These projects include road medians with tree plantings, and islands planted with flowers and grass. In 2016 there are 5 projects underway.			
Updated Description:			
New Initiative - See Above			

City of Spring Lake	Strategy: Murchison Road Landscaping	Implementation Date: 2016	Updated/revised: --
Strategy Description:			
The Town partnered with NCDOT to upgrade interior medians along Murchison Road project (NCDOT U-4444B) from asphalt/concrete to tree lined grassed median for aesthetics and to help mitigate emissions from vehicular traffic.			
Updated Description:			
Project should be completed late 2016 to early 2017.			

LAND USE

City of Spring Lake	Strategy: Sidewalk Improvement	Implementation Date: 2016	Updated/revised:--
Strategy Description:	The Town received a \$200,000 Section 5310 Grant from FAMPO to install sidewalks and pedestrian improvements along Bragg Blvd and Lillington Highway to enhance mobility for seniors and individuals with disabilities, upgrading interconnectivity between commercial and residential neighborhoods and providing		
Updated Description:	Project is ongoing and is anticipated to be completed in 2017. The Town has also applied for a \$220,000 Transportation Alternatives Program Grant for additional sidewalk improvement to increase pedestrian interconnectivity.		

City of 319:347Spring Lake	Strategy: Land Use Ordinance	Implementation Date: 2016	Updated/revised:--
Strategy Description:	The City of Spring Lake has an Land Use Ordinance in place. Proposed amendments will be reviewed by Sustainability Advisory Committee, additional amendments and/or revisions may be included based upon their review.		
Updated Description:	New Initiative - See Above		

City of Spring Lake	Strategy: Land Conservation	Implementation Date: 2016	Updated/revised:--
Strategy Description:	The Town acquired approximately 60 acres of undeveloped property along Little River to dedicate as a conservation area that will include walking trails and serve as an educational tool for educational outreach. The property will serve as a protective buffer by restricting development along that portion of Little River. The Town is proposing to acquire an additional 40 acres that is adjacent to include in the project.		
Updated Description:	New initiative - see above		

LAND USE

Town of Falcon	Strategy: Tree Plantings	Implementation Date: 2016	Updated/revised:--
Strategy Description:			
The Town of Falcon has committed to planting additional trees on public property. The trees selected for the project will include those varieties that are hearty and easy to maintain.			
Updated Description:			
New Initiative - See Above			

Town of Eastover	Strategy: Tree Plantings	Implementation Date: 2016	Updated/revised:--
Strategy Description:			
On the Site on of the new Town Hall, the Town of Eastover planted more than a dozen Dogwood Trees. Landscaping around the facility also includes hearty varieties of shrubs and grasses.			
Updated Description:			
New Initiative - See Above			

Town of Eastover	Strategy: Land Conservation	Implementation Date: 2016	Updated/revised:--
Strategy Description:			
The Town of Eastover acquired 28 acres of undeveloped land adjacent to the local ball field. A review has been set up to determine the best use for the property. Proposals currently include a park with green space and an amphitheater.			
Updated Description:			
New Initiative - See Above			

Stakeholder Directory

Name	Affiliation	ADDRESS	TELEPHONE	EMAIL
Carolyn Justice Hinson	PWC	Public Works Commission PO Box 1089 Fayetteville, NC 28302	910-223-4015	Carolyn.Hinson@faypwc.com
Commissioner Larry Lancaster	Town of Fayetteville/ Cumberland Co. Representative	2602 Dartmouth Drive Fayetteville, NC 28304	(H) 484-2774 (C) 308-9285	lll@nc.rr.com , llancaster@co.cumberland.nc.us
Commissioner Peggy Raymes	Town of Stedman	526 Rosewood Court, Stedman, NC 28391	(H) 910-323-8893 (C) 910-309-9891 (W) 910-484-3885	praymes@ccs.k12.nc.us
Councilwoman Kathy Jensen	City of Fayetteville	Council Member District 2 P.O. Box 58561 Fayetteville, NC 28305	910-433-1992	kjensen@ci.fay.nc.us
Russ Rogerson	Economic Development	2723 Fort Bragg Rd, Fayetteville, NC 28303	910 -678-7648	russ@faybiz.com
Shanelle B. Harris	Fayetteville Area System of Transit (FAST)/ FAST Civil Rights Activist	455 Grove St Fayetteville, NC 28301-0998	(W) 910-433-1157 (F) 910- 433-1064	sharris@ci.fay.nc.us
Dr. Ana MacDowell	Medical Rep.	Allergy Partners 1317 Medical Drive Fayetteville, NC 28304	(H) 910-487-9395 (W) 910-323-3890	amacdowell@allergypartners.com
Elizabeth Small, Francis Collier	Emailed two names and phones for possible replacements. Need to contact them.:	P.O. Box 228 4835 Main Street Linden, NC 28356-0228	—	ibesmall@embarqmail.com, fvcollier@embarqmail.com, linden, Commissioner@embarqmail.com
Gary Slater	Major Industry	Clear Path Recycling, LLC	910-849-6603	
Hanah Ehrenreich	Sustainable Sandhills	351 Wagoner Dr., Ste 333 Fayetteville, NC 28303	910-484-9098	hanahe@sustainablesandhills.org
Janice Lucas	Town of Falcon	PO Box 61 7370 N. West Street Falcon, NC 28342	(W) 910-980-1296 (C) 405-595-8775	JHL0717@aol.com
John Gillis	Homebuilders Association	128 S. Churchill Drive Fayetteville, NC 28303	(H) 484-9828 (W) 308-4255	jmgillisjr@gmail.com
Johnny Lanthorn	Town of Wade	6841 Main Street Wade, NC 28395	910-484-7467	johnny.lanthorn@faypwc.com
Jon Parsons	Environmental Rep./ Enery Mgr @FSU	Board Member, Sustainable Sandhills 7265 NC Hwy 87 South Fayetteville, NC 28306	910-309-8824	jparson2@uncfsu.edu
Celestine Raineri, R.S.	Environmental health		910-396-8795 910-396- 8207	craineri-smith@co.cumberland.nc.us
David Heins	Fort Bragg	Public Works Bldg3-1631, Butner Road Fort Bragg, NC 28310- 5000	--	david.a.heins.civ@mail.mill
Natalee Ezzell	Town of Godwin	PO Box 11 Godwin, NC 28344	--	njezzell0331@email.campbell.edu
Kim Nazarchyk	Town of Eastover- Town Manager	3863 Dunn Road Eastover, N.C. 28312	910-323-0707	townmanager@eastoverncc.com

FSU Air Quality Stakeholder Updates

FSU LEED Certification

Buildings LEED Silver certification status

- Renaissance Hall, LEED Silver certified
- Science and Technology, LEED Silver certified
- Rudolph Jones Student Center, pending LEED Silver certification
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Do you have any performance measures since completion?

FSU ESPC

Project Size & Financing



Why PC for FSU?	• ~ 900,000 SF
Project Background	• 22 buildings - most of the main campus (no residence halls)
Scope of Work & Issues Addressed	• \$10.4 M Project • \$940k in annual savings
Challenges	• Bank of America Financing
Results & Outcome	• 3.6% @ 17 year term + construction period
Lessons Learned	
Summary	

ESPC Scope of Work

Energy Conservation Measures



Why PC for FSU?
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Scope of Work & Issues Addressed
Challenges
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Summary

- **DDC Controls and Analytics**
 - Multiple Existing Systems
 - Existing pneumatics and multi-vendor systems
 - RCx existing controls
- **Central Chilled/Hot Water Plant**
 - **Underground piping**
- **Lighting Upgrades**
- **Water Conservation**
- **Building Envelope**
- **IT Computer “Shut Down” Software**
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FSU’s Central Chilled & Hot Water Plant In the Lyons Science Annex Basement LSA, LS, Rosenthal, Chick, TSS, LTB, Telecom, JKSA, Lilly, Capel Pool



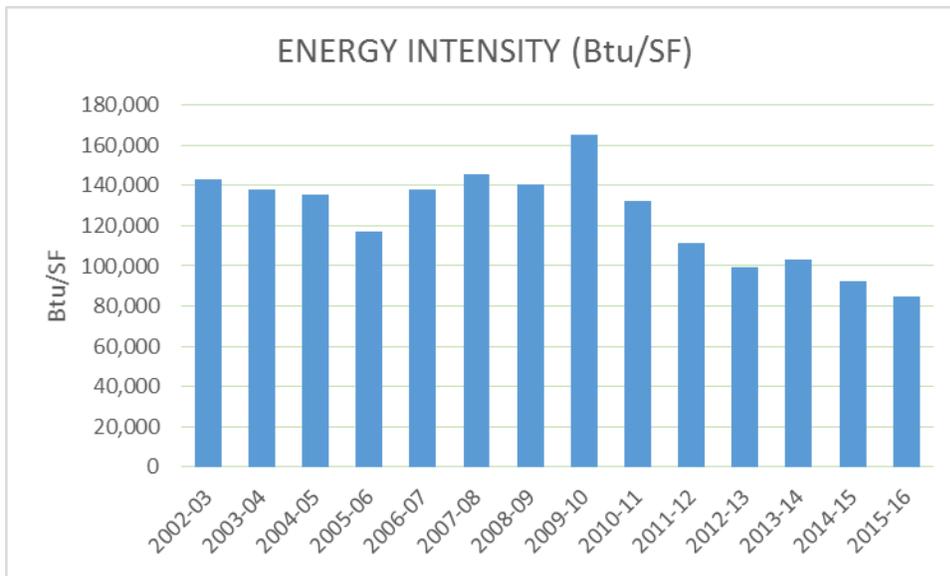
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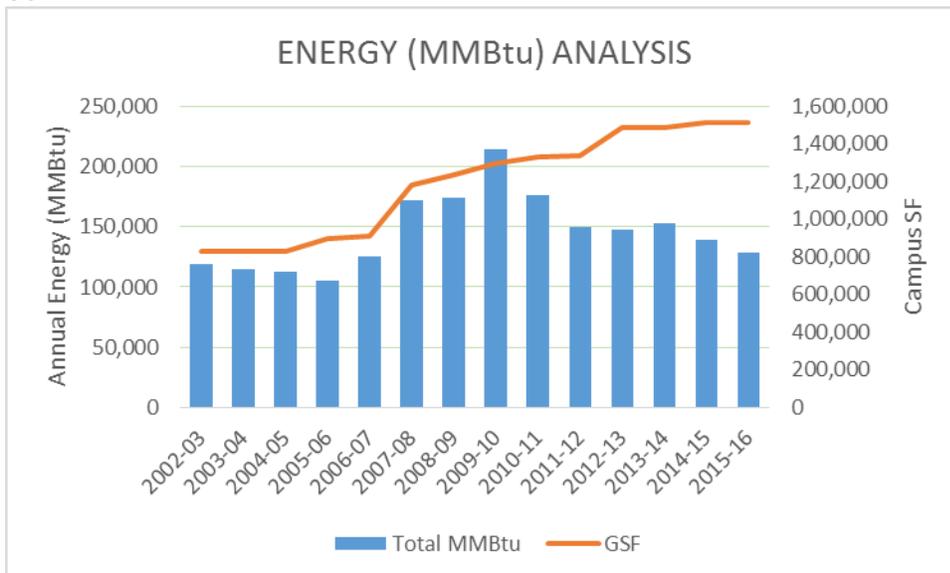


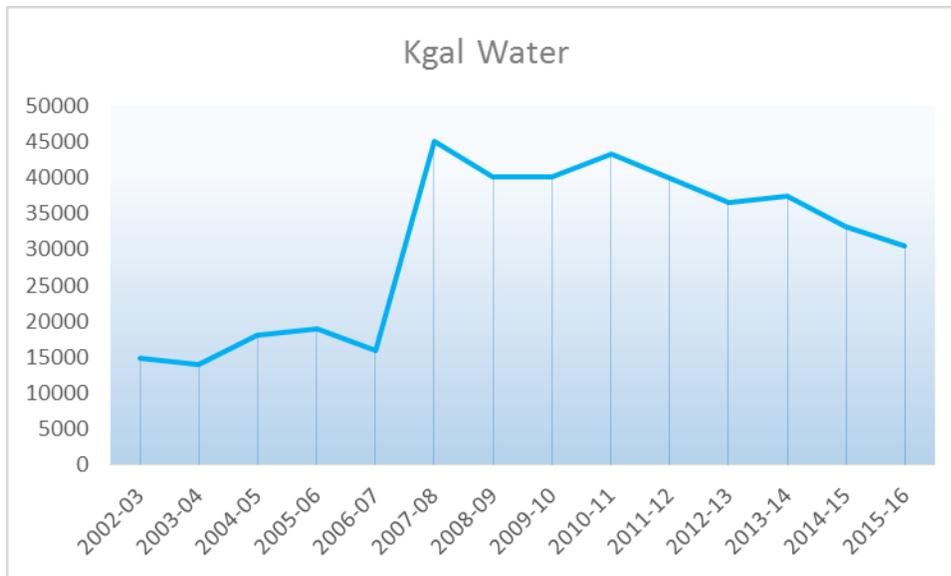
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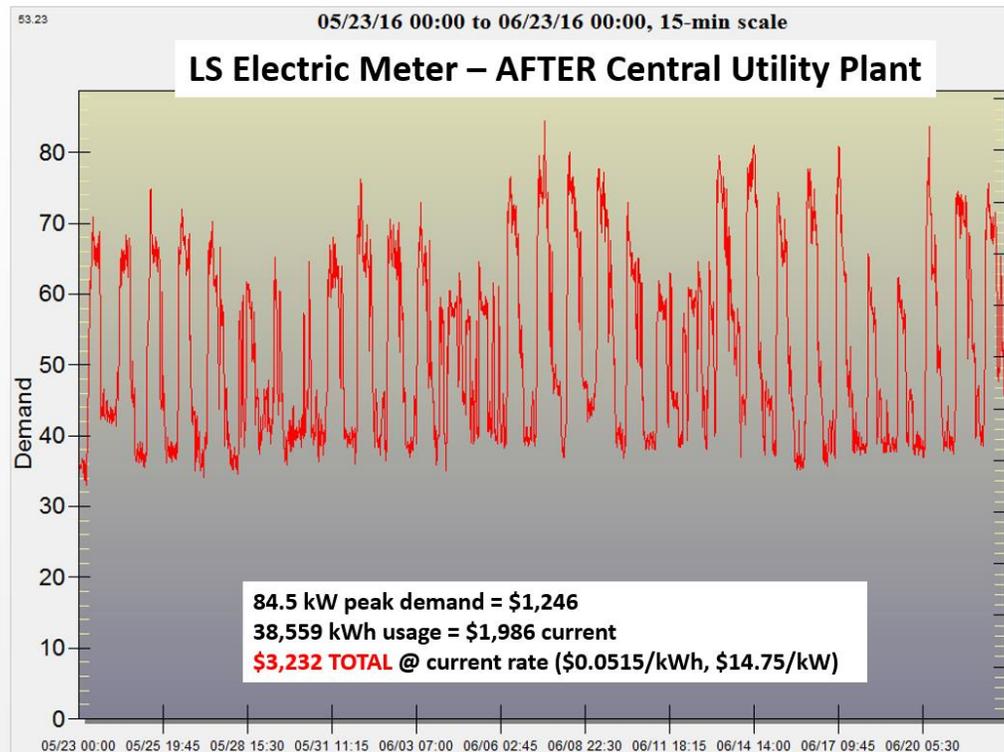
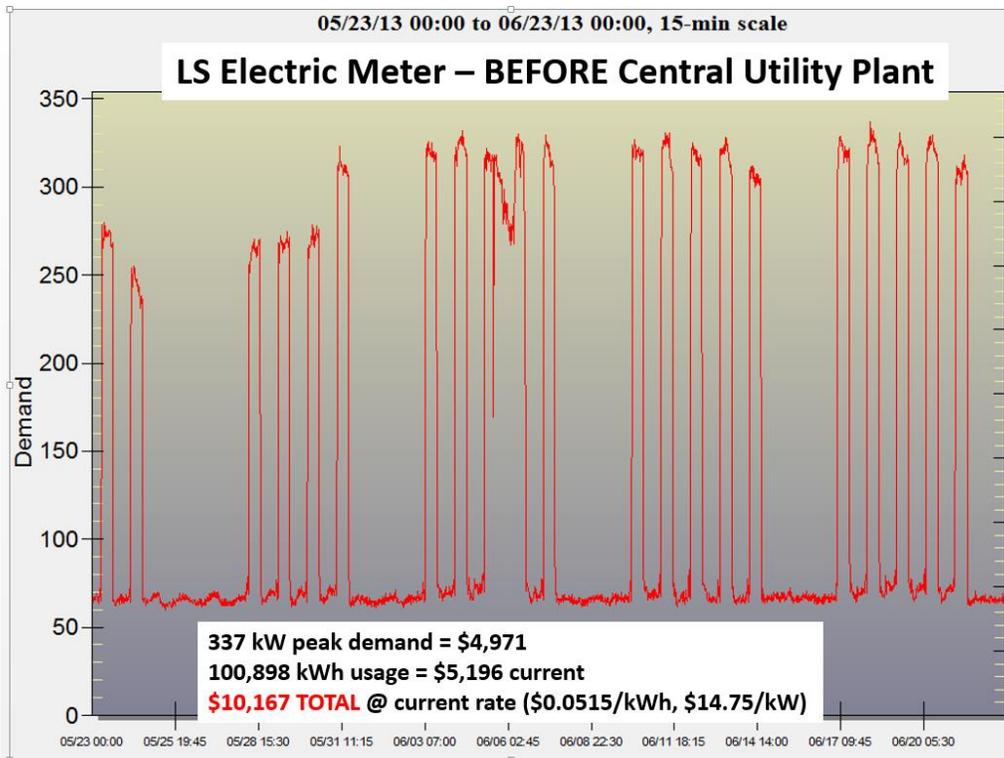


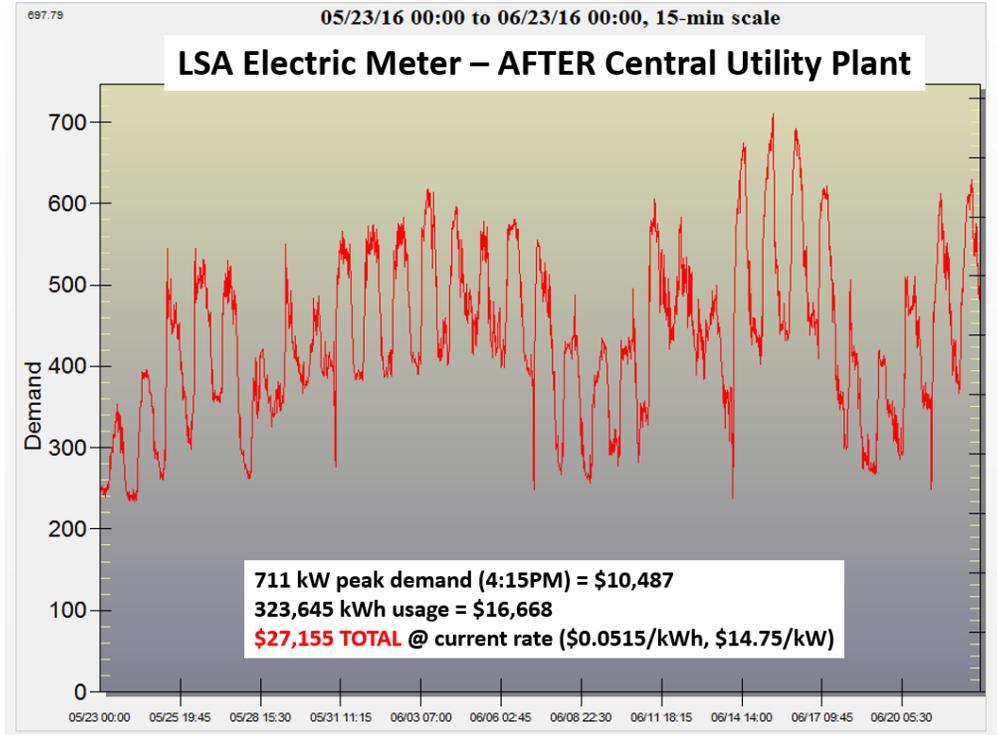
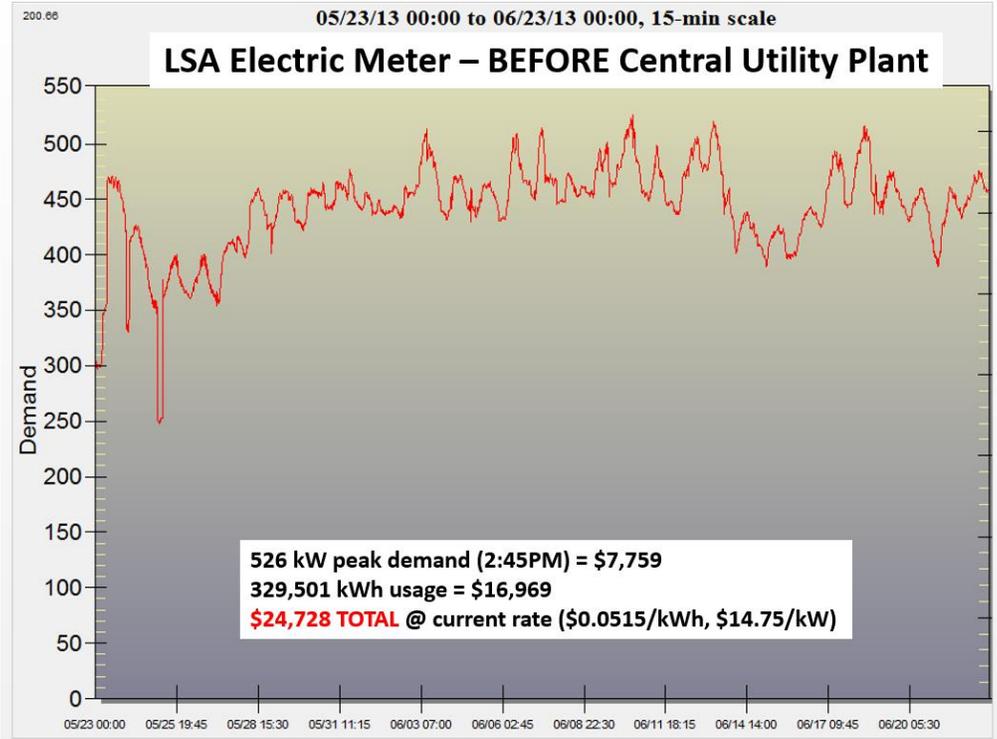


Do you have any information about energy usage for these buildings?

The following information are Renaissance Hall utility expenses

FSU Renaissance Hall FY16 Utility Expense										
month	year	kWh	peak kW	rate \$/kWh	elec cost \$	gal	W \$/mgal	Sew \$/mgal	W/S cost	Elec/W/S cost
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Mar	2016	59493.2	159.25	0.0858	\$ 5,103	466,160	\$ 2.71	\$ 4.89	\$ 3,543	\$ 8,646
Apr	2016	66205.8	154.25	0.0912	\$ 6,039	59,870	\$ 2.71	\$ 4.89	\$ 455	\$ 6,494
May	2016	38972.3	133.5	0.0891	\$ 3,471	4,270	\$ 2.81	\$ 5.00	\$ 33	\$ 3,505
Jun	2016	40163.8	80.25	0.0922	\$ 3,705	50,380	\$ 2.81	\$ 5.00	\$ 393	\$ 4,099
TOTALS=>		710,126			\$ 62,343	2,103,120			\$ 15,995	\$ 78,338
					80%				20%	
Notes										
Electric rates from PWC on master campus meter are "blended" and recalculated from each month's actual bill. The demand charges are included in total cost but the total cost is divided by kWh to get a blended rate. That is why the rate varies slightly each month. All fees and taxes are included.										
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Was the Performance Contract (ESPC) Program completed?

The ESPC was completed. Last pay application was approved on 9/1/2015.

Status of Food Waste Composting?

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What about Lighting?

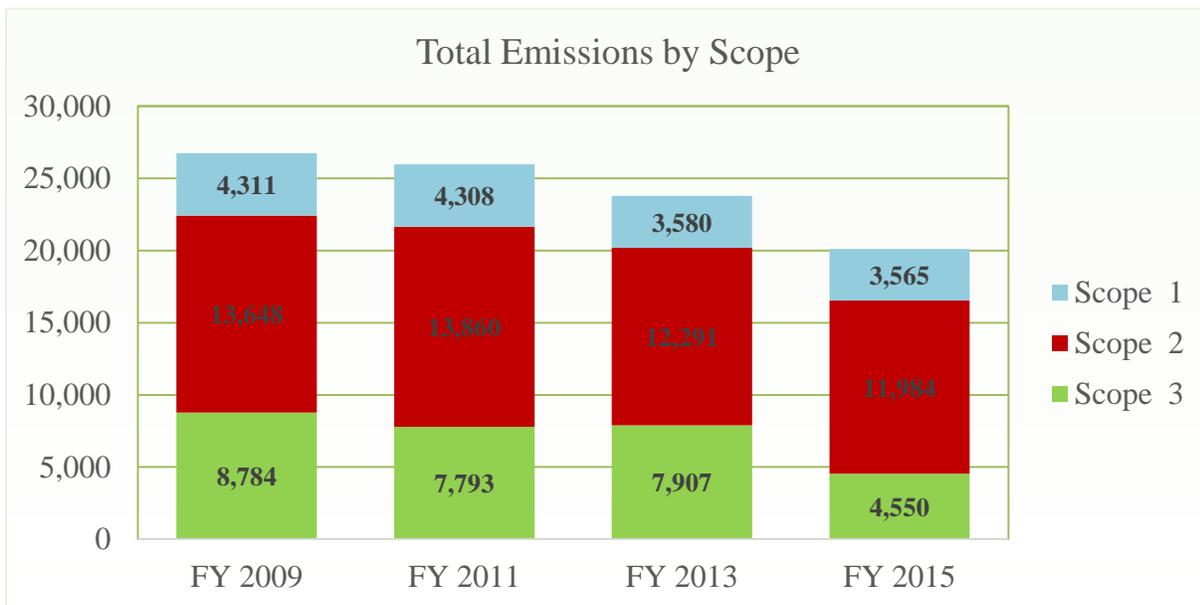
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Greenhouse Gas Emissions

Scope	Source	FY 2009	FY 2011	FY 2013	FY 2015
Scope 1 Emissions (MTCO _{2e})	Stationary Sources	4,080	4,115	3,413	3,258
	Mobile Sources	149	145	127	117
	Fugitive and Process Sources	82	42	39	183
	Agriculture Sources	0.1	5.7	0.1	6.7
	Total Gross Scope 1 Emissions	4,311	4,308	3,580	3,565
Scope 2 Emissions (MTCO _{2e})	Purchased Electricity	13,648	13,860	12,291	11,984
	Total Gross Scope 2 Emissions	13,648	13,860	12,291	11,984
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	Air Travel	890	600	404	283
	Other Directly Financed Travel	41	86	98	148
	Study Abroad Air Travel	-	-	-	46
	Solid Waste	(24)	(18)	(19)	(17.5)
	Scope 2 Transmission & Distribution (T&D) Losses	1,350	1,371	1,216	741
	Total Gross Scope 3 Emissions	8,784	7,793	7,907	4,550
Scope 1- 3 Gross Emissions (MTCO _{2e})	Total Gross Emissions	26,743	25,961	23,778	20,099
	Gross Square Footage (GSF) x1000	1,434.2	1,530.3	1,691.5	2,493.7
	Full-Time Equivalent Students (FTE)	5,382	5,116	5,149	5,083

Scope 1- 3 Net Emissions (MTCO ₂ e)	Total Gross Emission Intensity per 1000 GSF	18.6	17.0	14.1	8.1
	Total Gross Emission Intensity per FTE	5.0	5.1	4.6	3.95
	Purchased Offsets	0	0	0	0
	Carbon Sequestration	0	0	0	0
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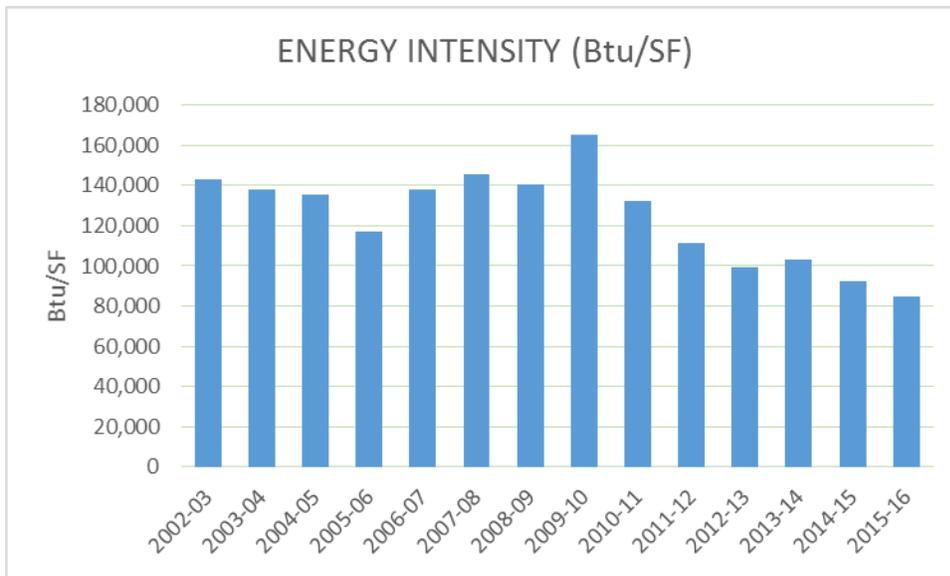
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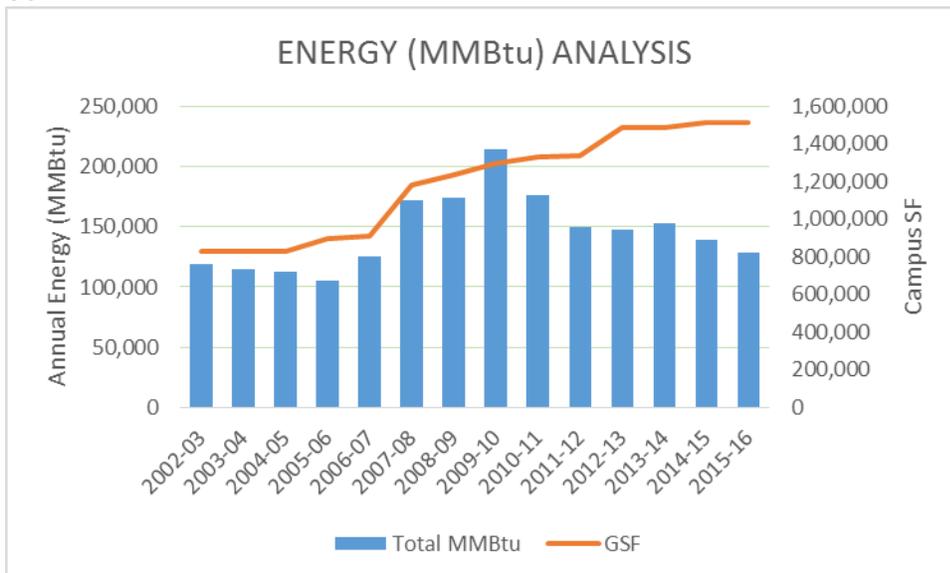


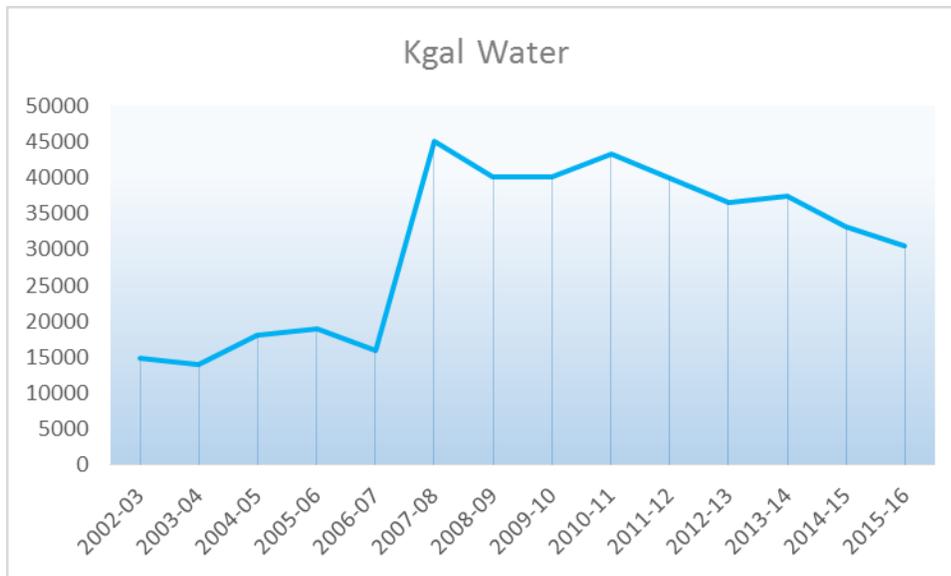
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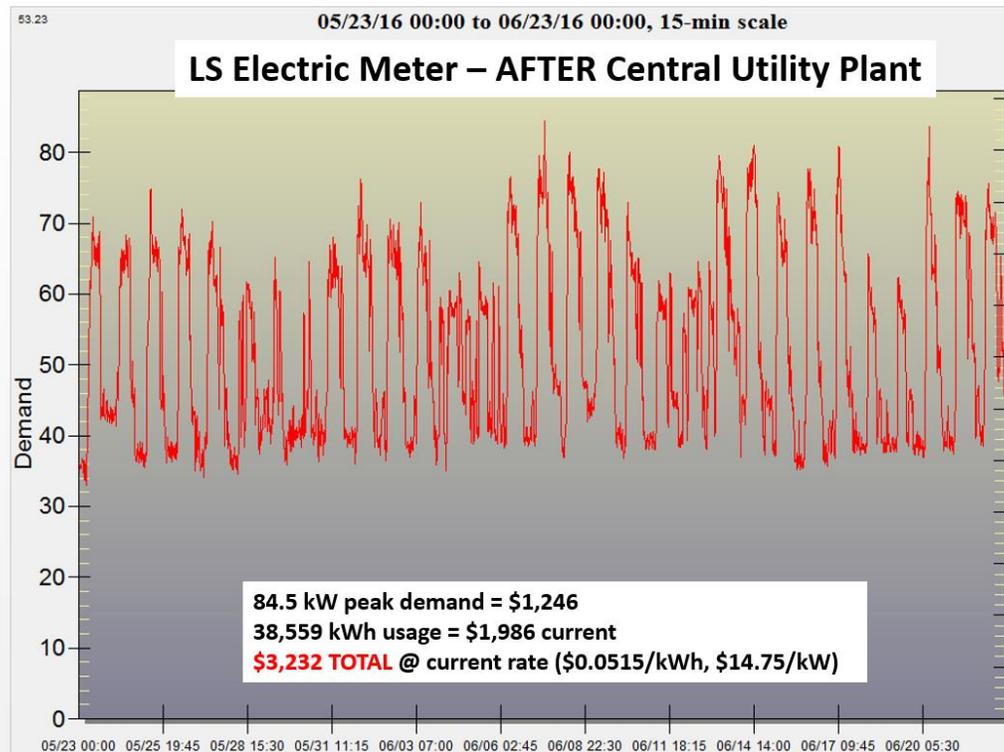
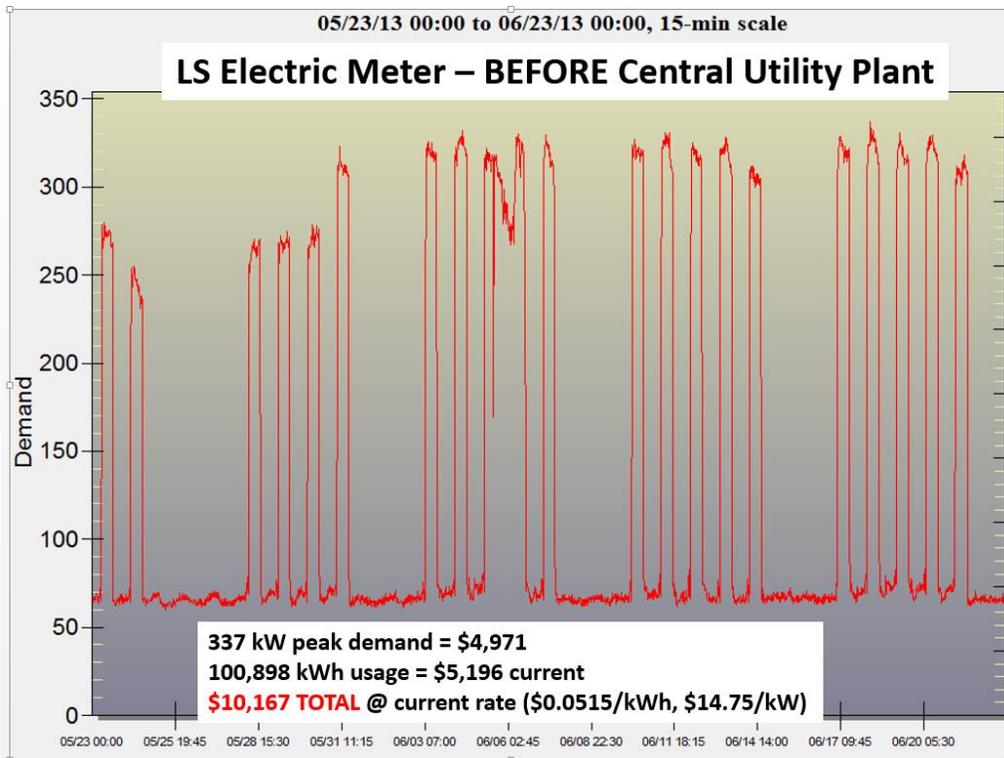


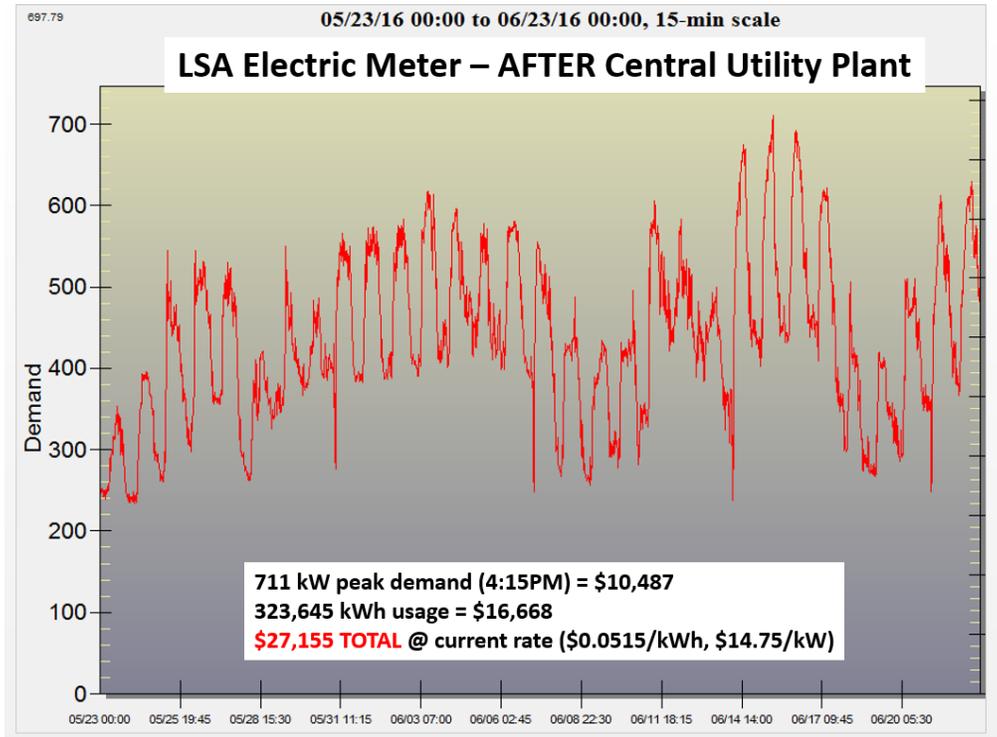
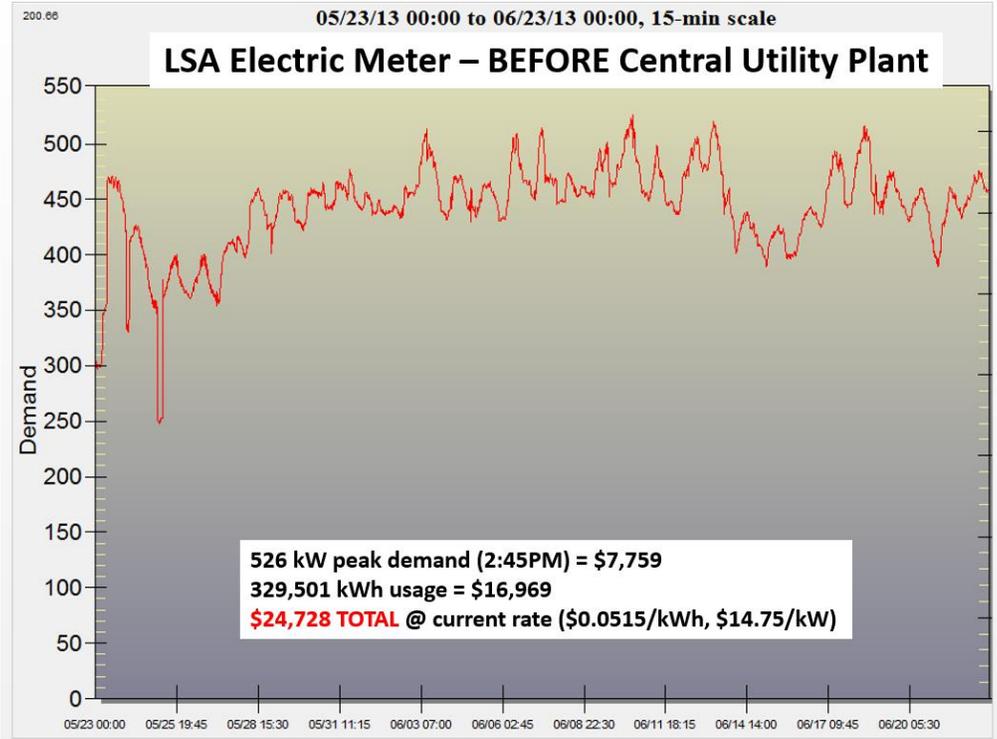


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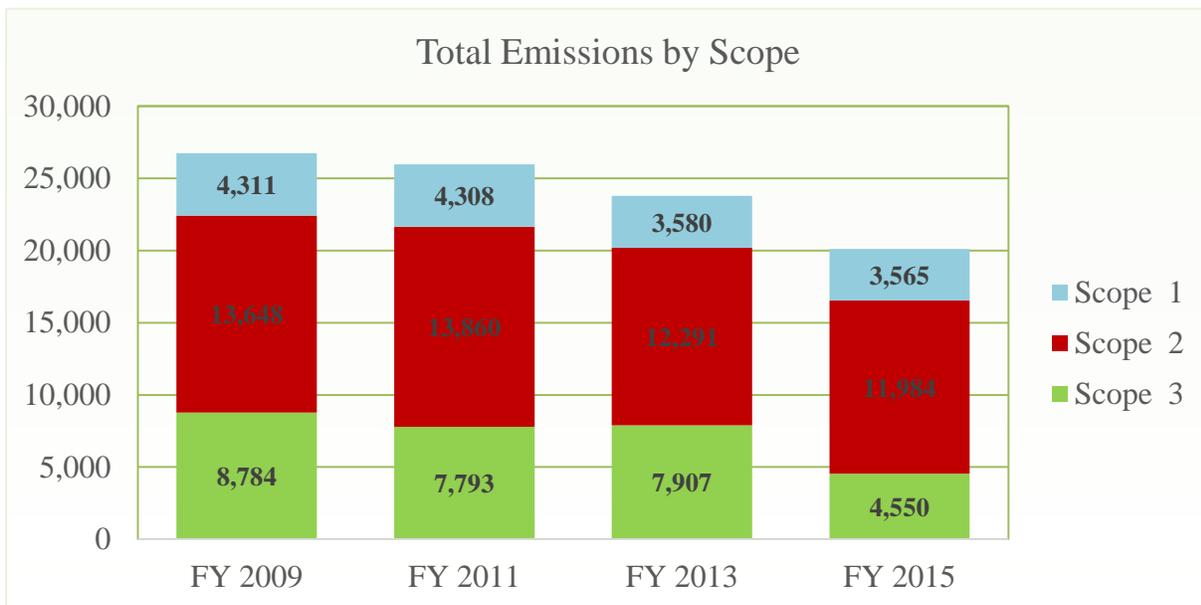
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- From 14.1 in FY 2013 to 8.1 in FY 2015, a 2-year decrease of 42.6%