Greenhouse Gas Mitigation Final Report

The Borough of State College

2013

In 2007, the Borough of State College passed Resolution 944 based on research done by students partaking in the ongoing course *Geography 493, Service Learning: The Centre County Community Energy Project.* Their coursework produced a greenhouse gas inventory for the Borough as well as an action plan for greenhouse gas mitigation. Many of the goals were set to be completed by 2012 and this report summarizes the achievements in addressing each of them, the goals, which were not feasible and the overall successes of the sustainability programs.

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Introduction and History

In 2007, the Borough of State College passed Resolution 944, declaring State College as Climate Protection Community. This resolution included 17goals within municipal operations and five community goals consistent with climate change mitigation strategies. In order to lead the community by example, State College pursued a myriad of projects and programs over the next six years with the ultimate goal of reducing our greenhouse gas emissions (GHGs) and reducing our negative impact on the environment.

Resolution 944 was spurred from work done by the Department of Geography at the Pennsylvania State University. Beginning in the fall of 2006, students from the Pennsylvania State University enrolled in the two-year geography class, *Geography 493 Service Learning: the Centre County Community Energy Project,* conducted research and compiled reports to outline the management of energy resources and the mitigation of greenhouse gas emissions, which enabled the Borough of State College to create a list of goals to reduce emissions and encourage environmentally sustainable practices. A greenhouse gas inventory was compiled in 2006 and the report was finalized in 2008, demonstrating the amount of emissions from electricity, transportation, onsite fuel combustion, solid waste and liquid wastes, and synthetic chemicals in the Borough.[1]

During the fall and spring semesters of 2007, students held focus-group sessions to develop greenhouse gas emission strategies. Stakeholders and community members prioritized the strategies for feasibility and effectiveness and ranked them into time period goals (short-term, mid-term, and long-term goals). These strategies outlined three different source categories: transportation, energy and waste, which were compiled into a formal report, *Action Plan for Greenhouse Gas Mitigation for State College Borough*.

In April of 2010, the Manager established the Sustainability Committee which holds regular meetings with representatives most of the Borough Departments to discuss efforts and projects for sustainability both in municipal operations and the community.

Similarly, the Centre Region Council of Governments published the *Centre Region Greenhouse Gas Pilot* in 2011. Produced by the Department of Geography at Penn State, the pilot outlines a baseline inventory of GHG in the Centre Region, GHG mitigation options generated from the community, an analysis of those options, prioritization of the options, and finally a Regional Climate Action Plan. A model resolution was drafted for the surrounding municipalities. At the January 24, 2011 General Forum of the Council of Governments a motion was made that the General Forum, as recommended by the Public Services & Environmental Committee, refer the Model Resolution 2011-1: Centre Region Energy Efficiency Model Resolution[2] to the participating municipalities for implementation as they deem appropriate. The motion passed unanimously.

Although this model resolution was not adopted by any of the surrounding municipalities at this time, the Borough of State College continues to look for ways to work regionally in reducing emissions, conserving resources and creating a sustainable and vibrant community.

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[1] A Greenhouse Gas Emissions Inventory
for the Borough of State College, Daniel P.Morath, 2008
[2] Model resolution available at http://www.crpr.org/agency/Legals/COG_Green_Res2011.pdf

Reports and studies by the Department of Geography at Penn State were vital in obtaining baseline data from the Borough and surrounding municipalities on greenhouse gas production from electricity and energy production, transportation, and waste management, as well as for drawing a course of action to reduce greenhouse gas emissions.

Many of the goals in Resolution 944 have been met, are nearing completion and, in some cases, have exceeded the outlined metrics. Due to baseline inventory contained in the aforementioned documents and continued community interaction and prioritization of strategies for greenhouse gas mitigation, there is a need to re-strategize and update the goals originally set forth in Resolution 944. Increased staff time and research, including the establishment of a Sustainability Committee and cooperation with local concerned groups and citizens on issues of sustainability, has given the Borough more opportunities to set forth achievable goals that will have an impact on making State College truly a Climate Change Protection Community, ensuring a stable and continued vitality of the region.

Municipal Goals

Resolution 944 was passed in 2007 with the overall goal to lead the community by example and reduce net emissions of carbon dioxide and other greenhouse gases by the end of 2012 by 10% from 1990 levels. Seventeen goals were outlined to change municipal practices in order to reduce negative impacts on the environment and lower overall emissions.

1. Residual Waste

By 2012, through the recycling of plastics, metals, glass, organic waste, electronics, etc., reduce residual waste (and land filled material) to 35% of waste stream

The Borough has worked consistently over the years to reduce the amount of waste sent to the landfill. Rudimentary leaf collection began in 1961 and placed in a static pile undisturbed at the landfill site and eventually becoming compost and returned back to the community.

In May of 1991, the Borough began collecting grass clippings, composting them along with leaves and, eventually, collecting other green waste such as brush in 2009 with more sophisticated and frequent turning and quicker conversion to compost.

Along with surrounding municipalities, the Borough's recycling is handled by the Centre Region Recycling and Refuse Authority and is required by State Law and local ordinances. The Authority accepts most paper, glass, plastic, aluminum, electronics and hazardous material for recycling. Despite these recycling efforts, landfill-bound waste was still above the 35% goal, averaging from 2008-2012 as 62% of the total waste stream.

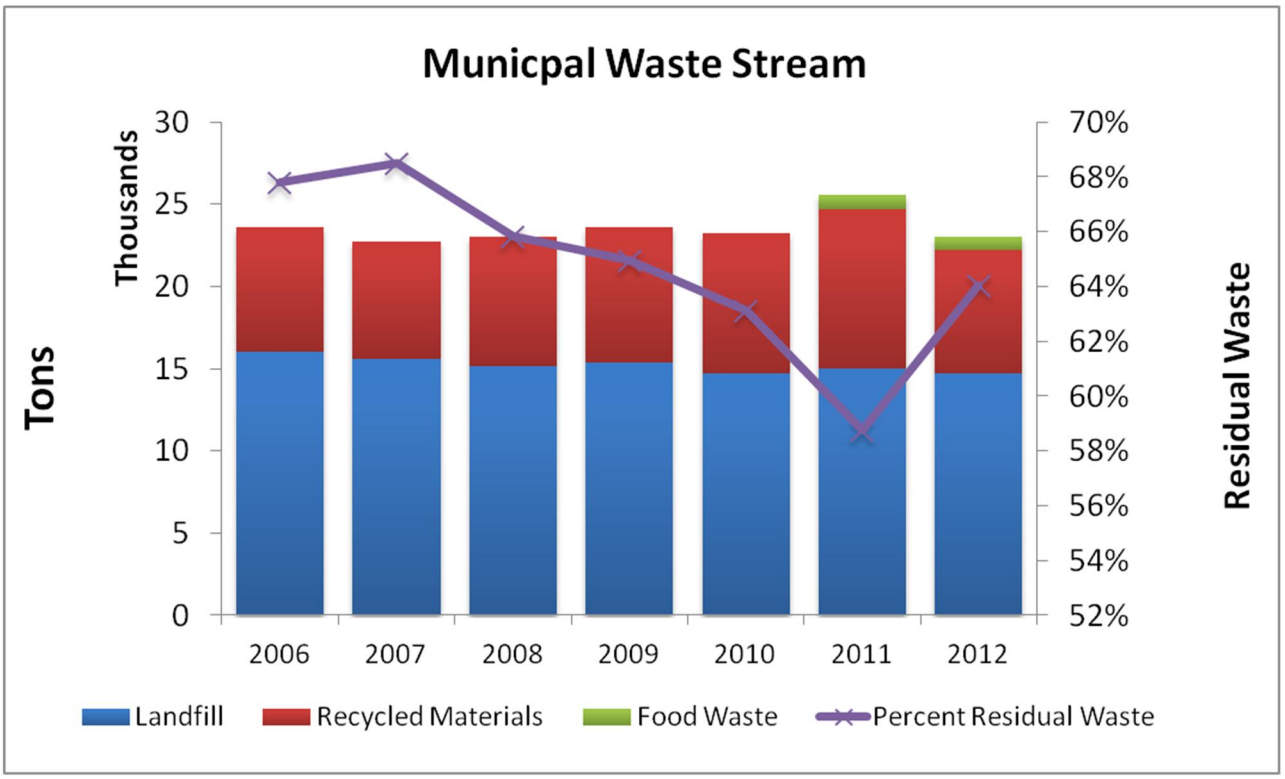


Figure 1

Note that heavy rains in 2011 during the move out period for Penn State account for the larger weight for landfill items, namely from increasing the water weight of mattresses. In this chart, green waste is accounted for recycled materials.

In 2003, a statewide waste audit determined that the most prevalent materials bound for the landfill were organic, with the largest category consisting of food waste. These findings were consistent with other waste audits conducted in the United States and Europe. The Borough decided to pursue a grant and temporary permit from the Department of Environmental Protection to expand the composting program to collect food waste, in order to greatly reduce the amount of waste sent to landfill.

The Borough received a grant from the DEP to hold a pilot project for organics collection in 2009 and began collecting from over 500 households, a local grocery store and several restaurants in 2010. Findings from the Pilot Program demonstrated that combining the collection of food waste and green waste, and converting the collection to an automated system would save time and funds. In April of 2013, the Borough began collection of organic waste from residential accounts using this new automated system. With the purchase of more sophisticated composting equipment, such as a tub grinder, mixer and screener, the Borough is able to collect and compost items such as food scraps, meats, bones and cheese. The Borough of State College is the first municipality on the east coast to collect and compost food-waste throughout the entire municipality.

The program will be expanded in the future to include multi-family housing units and businesses, as well as other accounts that do not receive curbside refuse or recycling pick up.

State College also conducted two waste audits of the Municipal Building, which showed high levels of food waste and mixed office paper being sent to the landfill. Although traditional recyclable materials were not found in large amounts, these audits demonstrate the importance of education for employees to recycle office paper as well as an opportunity to significantly lower residual waste by participating in the composting program. Based on these audits, yearly estimates were calculated that demonstrate recycling food waste and other compostable materials and recycling paper could reduce the amount of waste sent to the landfill by over 50% (figure 2). Beginning in May of 2013, the Borough began the "We Can Too" campaign based on similar efforts by the Pennsylvania State University to create recycling stations and eliminate trashcans by employees' desks. Recycling stations are now located on each floor, in lobbies, and in lunchrooms and include separate receptacles for paper, cans, plastic, compost and refuse.

Through the Borough's efforts to recycle, Staff expects to see a reduction in municipal residual waste to 25% of the waste stream as these programs progress.

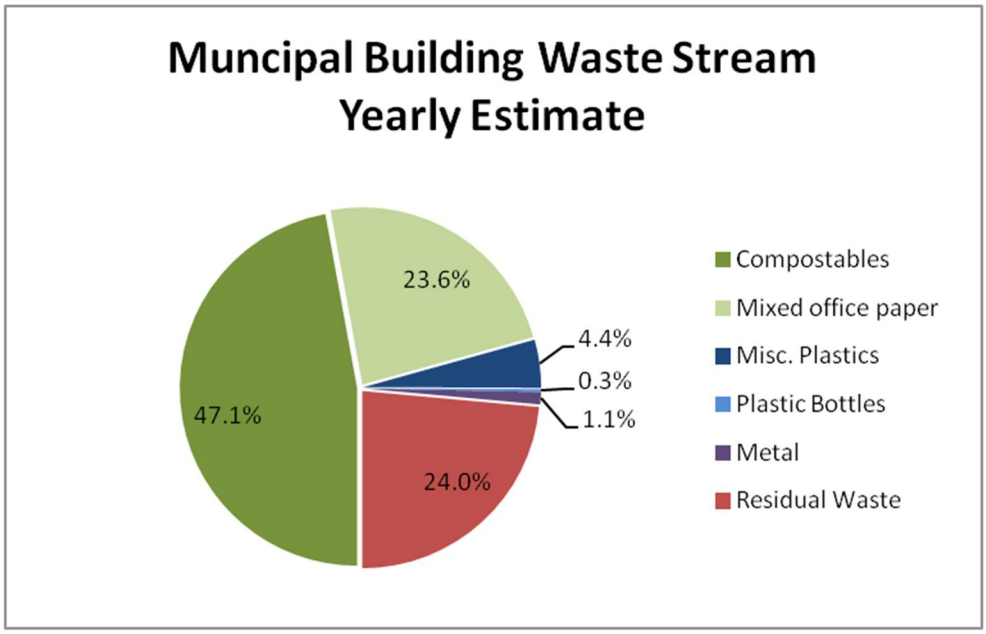


Figure 2: Municipal Building Waste Stream Estimates

2. Passenger Fleet

By 2016, 20% of Borough's passenger car fleet shall be comprised of the most energy-efficient vehicles.

The Borough began purchasing hybrid vehicles in 2009, and currently has five Toyota Camry Hybrids and six Ford Fusion Hybrids as part of the passenger fleet in the Public Works, Planning and Police Departments. These 11 hybrid vehicles represent 42% of the Borough's passenger fleet. Upon reaching the goal set forth in 2007, an analysis

was conducted comparing four hybrid vehicles with two Ford Taurus vehicles. That analysis showed that on average 5642 lbs. of CO2 and $383.75 in fuel and maintenance costs were saved per vehicle. Although the overall life cycle cost is higher due to the initial purchase price of the hybrids, the Borough will continue to look into purchasing alternative fuel vehicles as part of our commitment to reduce greenhouse gas emissions.

	Average Hybrid Vehicle	Total for all 11 Hybrids
Co_2 Savings *	5641.75 lbs. per year	31 tons per year
Cost Savings ($ per year)*	$383.75 per year	$4221.25 per year

Figure 3

*Based on cost of fuel at $2.65 per gallon, and 19.42 pounds of carbon dioxide per gallon.

Although there are currently no hybrid police fleet vehicles, the State College Police Department does operate a motorcycle and bicycle fleet.

3. Bio-Diesel

By 2012, use B-30 diesel (70% diesel petroleum, 30% bio-diesel) for all Borough heavy equipment and trucks.

Since May of 2007, all heavy equipment trucks have utilized B-5 bio-diesel fuel as that is the only bio-diesel available that engine manufacturers cover under warranty. With the implementation of the new waste collection system, two new refuse trucks were purchased in 2012 that are powered by compressed natural gas (CNG). One of these trucks picks up organics and the other collects refuse. Currently, one B-5 diesel powered truck also collects refuse; however, the CNG powered truck completes more stops to eliminate the use of diesel trucks as much as possible.

Estimates show a 21-26% reduction in greenhouses gases and a 50% reduction in noise pollution by switching refuse trucks from diesel to compressed natural gas[3].

4. Bike Connectivity

By 2010, establish a network of off-street and on street designated bike lanes.

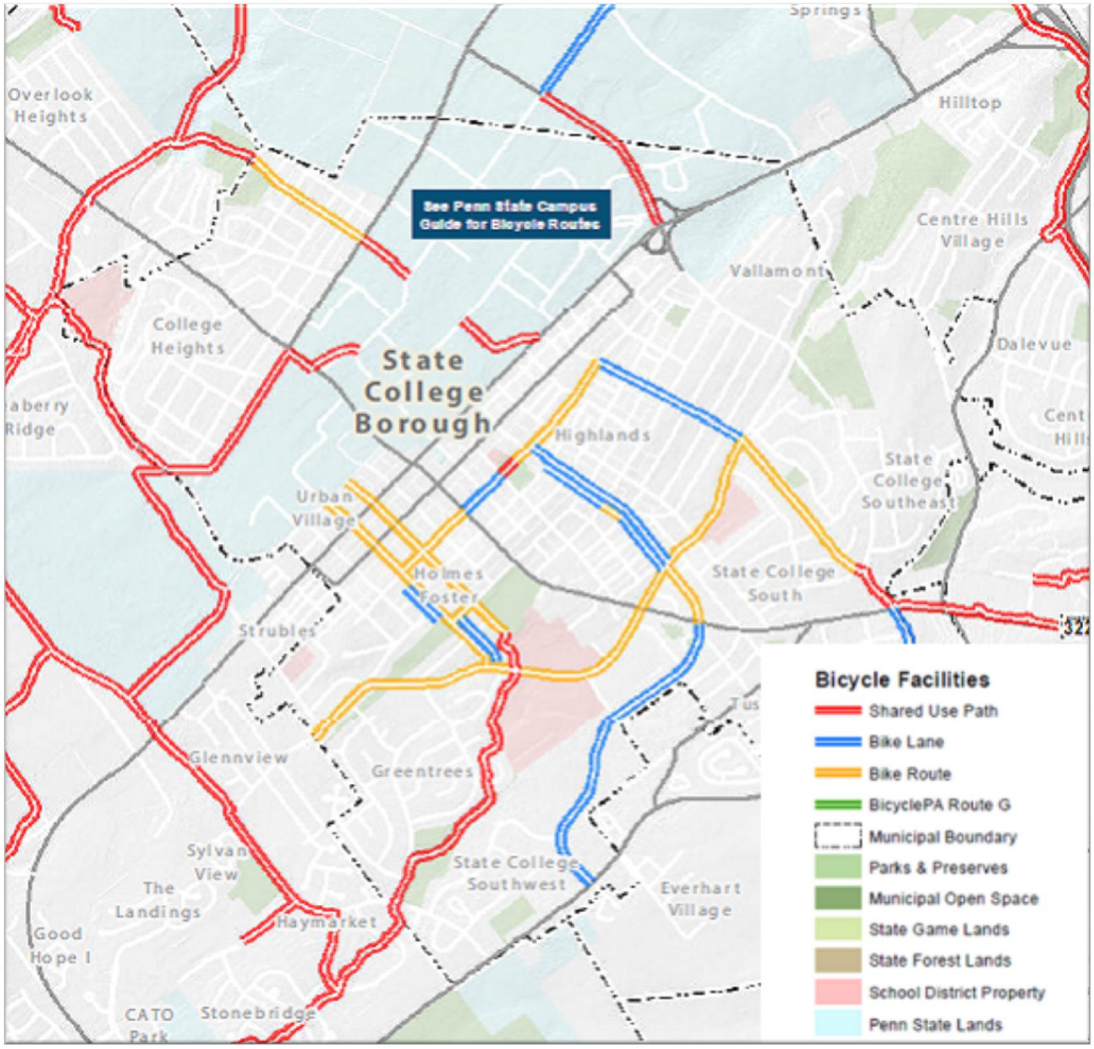
In 2012, State College and the Centre Region received bronze-level Bicycle Friendly Community status through the League of American Bicyclists, recognition that demonstrates the commitment State College and the Centre Region have made to create an excellent bicycle network. The State College Borough worked with Centre Region Council of Governments, surrounding municipalities and the Centre Region Bicycle Coalition to compile an exhaustive list of data regarding the five E's outlined by the League of American Bicyclists: Engineering, Education, Encouragement,

[3] "Clean Cities Niche Market Overview: Refuse Haulers, Shannon Shea, U.S. Department of Energy, September 2011, DOE/GO-102011-3297, http://www.afdc.energy.gov/pdfs/51588.pdf

Enforcement and Evaluation & Planning. In 2004, the Borough submitted an application to the League, but did not receive recognition at that time. It was determined by staff that a regional approach through a partnership with the Centre Region Bicycle Coalition and the Centre Regional Planning Agency would improve the community's application and open up a dialogue on regional efforts to improve alternative transportation options.

State College and the Centre Region demonstrated strengths in the engineering and evaluation and planning categories. The State College Borough has nearly 9 miles of bike lanes, 2 miles of shared-road markings, and over 16 miles of signed bike routes. There are also 5 miles of shared-use-paths in the Borough that connect to the surrounding municipalities in the Centre Region. Many of these routes were created within the last five years, as we worked toward encouraging alternative transportation through this goal of establishing a strong bicycle network.

Figure 4: Bicycle Facilities in the State College Borough



In the 2013-2018 Capital Improvement Plan, $65,000 was designated for bicycle facility improvements, including bike lanes, signage, racks and covered bike racks.

In 2013, a bike parking shelter was put in at the Schlow Centre Region Library and Borough staff will continue to look for other opportunities to place covered parking facilities in the downtown.

While the Bicycle Friendly status demonstrates a strong existing bicycle network, there is still room for improvement and stronger connections. State College will continue to work with the Centre Region to tackle measures outlined in the feedback report provided by the League of American Bicyclists, including measures for engineering such as improving coordination between state officials, accommodating bicyclists at intersections and multi-use path crossings and expanding the bike network.

The Downtown Master Plan, adopted in August 2013, includes many recommendations for increasing bicycle facilities and creating stronger connections in the downtown. Notable recommendations include designating Garner Street (between Foster Avenue and College Avenue) as a Bike Route, widening existing campus sidewalk on College Avenue to accommodate two-way bicycle and pedestrian traffic, and consideration to allow counter-flow bicycle traffic along Calder Alley. While not every recommendation may be realized, a multi-transportation model in the downtown has been a consistent theme throughout the Downtown Master Plan, and the Borough will look to create stronger connections in the bicycle network where feasible.

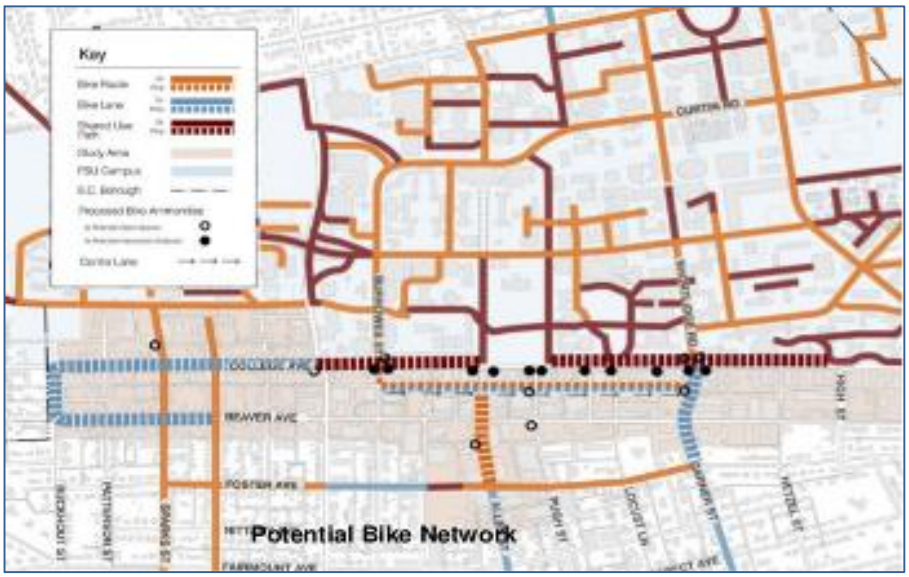


Figure 5. Potential Bike Network from the Downtown Master Plan Final Draft Recommendations

5. Construction and Demolition

By 2010, incorporate sustainable construction and demolition practices into Borough ordinances, including the requirement of LEED certifications.

Under Council's direction, the Planning Commission formed a subcommittee in 2011 to meet and discuss issues related to planning and zoning and sustainable construction and demolition. These discussions are summarized in a final matrix, which outlines choices available to incentivize or require aspects of LEED certification and green planning alternatives. The matrix is divided into categories of energy consumption, water conservation, air quality, materials management, design aesthetics and productivity, as well as options from a comprehensive approach. The Planning Commission directed staff to prioritize some of the options from the Matrix in order for Planning Commission to send a concise recommendation to Council.

Staff researched case studies for communities that require LEED certification or have their own points system for green planning and through this research concluded that establishing a LEED building certification was not practicable for the Borough, because the Borough does not expect to see a significant amount of new development activity, staff members at the Borough or Regional level have not been trained to verify LEED standards, and there are a limited number of peer communities in terms of size and density that have adopted requirements for non-municipal buildings to meet LEED standards. Planning staff did summarize a list of six possible actions that Planning Commission recommended to Council, which are listed in Appendix A. These recommendations were forwarded to Borough Council to consider and provide feedback to the Planning Commission.

Through information obtained in the Subcommittee's extensive look into green planning, a "Green Planning" website has been established to provide information to the public regarding energy options, sustainable construction and demolition practices and various elective green building certifications that development projects can achieve.

Sustainable practices were incorporated into the development of two new zoning districts in 2012 and 2013. The first, the Residential Office Overlay (RO-O) zone, includes an incentive for achieving LEED certification from the US Green Building Council. In exchange for certification, a developer is able to increase the overall permitted building height by one story. The Planned Commercial 3 (CP-3), a neighborhood mixed-use district, also included incentives for sustainable practices, but also incorporated some elements directly into the required provisions of the ordinance. The incentive allows for an increase in the permitted residential density as well as a reduction in required on-site parking in exchange for the development of a green roof. The provisions of this ordinance also allow for green roofs, bioswales or bio-retention areas to be included as part of a site's required open space and require bicycle parking at a rate that is based on the size of residential and commercial uses.

6. LEED Certification

By 2010, all municipally owned construction shall be LEED Gold or Silver certified.

State College's planned municipal construction project for a new maintenance facility at 330 Osmond Street was originally designed to be LEED silver certified, but in accordance with a recommendation from the Facility advisory committee, the LEED accreditation will not be sought. State College strives to incorporate environmental sustainability wherever fiscally responsible and appropriate. The facility will incorporate many sustainable attributes from the LEED checklist and will be LEED-eligible, but will save the costs associated with verification for other purposes. Some of the environmental sustainable features include LED lighting, rainwater collection for sewer line cleaning and tree watering that includes a 15,000-gallon tank with a filtration and pumping station, a truck washing station with water filtration and reuse, and a reduction in the overall impervious area of the site. An adjacent playing field will be present to manage storm water and allow for additional groundwater retention.

In addition to seeking environmental sustainable features on new construction, the Borough has included many improvements for energy conservation in the Municipal Building. In January of 2012, we installed two variable frequency drivers in the energy recovery unit of the HVAC system, slowing down the fans and lessening the amount of air that is taken in the system. We have concluded we are saving 60% on energy costs, approximately $6,400 each year, which is equivalent to a reduction of 209 pounds of carbon dioxide each month.

In December of 2012, we installed 55 occupancy sensors with an annual projected energy savings of $4693.

A parking garage lighting project is also being planned by staff. Borough staff is looking to replace approximately 260 High-pressure sodium light fixtures with higher efficiency LED lights.

We will also be incorporating daylight harvesting sensors (photo cells) and occupancy sensors throughout the facility to maximize efficiency and cost savings.

Additionally, five municipal facilities received energy audits in 2012 and staff is currently reviewing the recommendations to reduce energy consumption for cost and greenhouse gas emission savings.

7. Insecticides, Fertilizers and Herbicides

By 2012, eliminate the use of non-biological spray insecticides by the Borough. Additionally, reduce the use of all fertilizers and herbicides by 50% from 2007 levels.

The use of some pesticides and herbicides continues to be necessary to maintain the health of the public trees. Most pesticides in the tree program are applied as direct injection or a soil drench. In previous years, various chemicals were used on American elms to attack the Dutch elm disease fungus or kill the insect vector. The need for these chemicals was greatly reduced with the rapid decline and eventual elimination of the American elms from the urban canopy. However, a recent threat to the health of ash trees, the invasive Emerald Ash Borer, will continue to necessitate the use of pesticide

injections to preserve some of the Ash trees present in the urban canopy. With the many environmental benefits the urban canopy provides, staff believes it is appropriate and necessary to use pesticides unless an effective biological control is found. Additionally the use of pesticides will help reduce loss of all ash trees in a short period of time, which would create a financial burden and management issue.

Fertilizers and herbicides are still used when necessary in public landscape beds and along streets but as minimally as possible. Their use is significantly lower than 15 years ago, but has been steady for the last several. In 2013, an herbicide delivery system called a weed seeker was installed on the street sweeper that has sensors, which read and detect chlorophyll in the gutter line. Once detected herbicide is automatically applied, saving manpower and excess chemical use. Although liquid fertilizer is no longer applied when public beds are watered, State College continues to use about 36 lbs. of fertilizer to public beds during planting to ensure success of flowers for the aesthetic quality in the neighborhoods and downtown.

Within the past five years, the Custodial staff has researched environmentally friendly cleaning products and purchases such products when available.

8. Purchasing Recycled Content

By 2009, establish purchasing policies, which give preference to products with 50% or more recycled content.

State College adopted an environmental-preferred purchasing policy in 2011, which describes the guiding principles set forth by the Environmental Protection Agency and views a product's entire life cycle to determine those that prevent pollution and eliminate or reduce up front potential risks to human health and the environment. The policy mandates the purchase of environmentally preferable products or products with recycled or recyclable content over a virgin product if the cost is not greater than 5 percent. Additionally, the policy ensures that specifications and performance standards of goods and services do not require the use of products made from virgin materials nor specifically exclude the use of environmentally preferable products.

The Borough consistently purchases many products with recycled content, including toilet tissue, paper towels, copy paper, cleaning supplies, office supplies, and printed materials. With the incorporation of the We Can Too campaign, compostable paper ware products are also now purchased for Authorities, Boards and Commissions lunches as well as for office use.

9. Transit Service

By 2015, establish a free transit service within the Borough.

The Centre Area Transportation Authority received a grant to hire a consulting firm for a Universal Access study beginning in 2012. The study is currently comparing different revenue structures that look into no fare paid at point of service, including looking into

neighborhood/employer pass structures, and forming a new partnership with the Penn State University[4].

State College provides bus passes to municipal employees, which resulted in nearly 2,000 trips taken in the past year.

10. Lighting

By 2012, eliminate the use of incandescent bulbs in Borough facilities.

Floodlights in the Council Chambers are still incandescent, as a cost-effective alternative is not currently available, but no other incandescent bulbs have been purchased for Borough facilities since 2009. Additionally, some desk lamps may still currently have incandescent light bulbs, but 3-way CFL bulbs are now available and will be purchased for future needs.

State College also conducted energy audits of municipal garages and will be converting all lighting to LED, in addition to LED lights that will be present in the new Service Facility.

11. Impervious Surface Reduction

By 2012, reduce the existing impervious area within the Borough by 2% through zoning incentives, innovative surface treatments, street narrowing and other best management practices.

In 2013, the Borough enacted an ordinance establishing the Planned Commercial 3 (CP-3) zoning district. The ordinance includes residential density and parking reduction incentives for construction of a functional green roof on new structures in this district. In addition to benefits to stormwater filtration, green roofs help to cut down on the negative impacts to surface runoff generated by impervious building coverage.

In 2013, a consulting team prepared a Downtown Master Plan for College. This Master Plan outlined many recommendations for downtown, including an increase in the tree canopy downtown by incorporating additional street trees and planter boxes where applicable. Additionally, a component of the plan calls for the widening of sidewalks on the south side of College Avenue. A feature of this widening would be an “amenity zone’ in the center of the sidewalks, allowing space for many site furnishings such as benches and street trees. These zones would also be beneficial for tree and flower plantings, and act as miniature rain garden filtering water as it reaches the subsurface stormwater pipes

[4] The interim reports are available on the Transportation Consultants Inc. website at: http://lsccs.com/projects/statecollege/

In June of 2011, the Department of Conservation and Natural Resources completed an urban tree canopy report for the State College Borough that analyzed canopy coverage and possible expansion of the canopy to reduce impervious surface. The study's findings demonstrated that 43% of State College land, or 967 acres, is covered by the urban canopy and 30% or 671 acres is impervious surface that is not covered by the urban canopy, with a little less than half considered "possible" impervious surface area where the urban canopy could be increased.

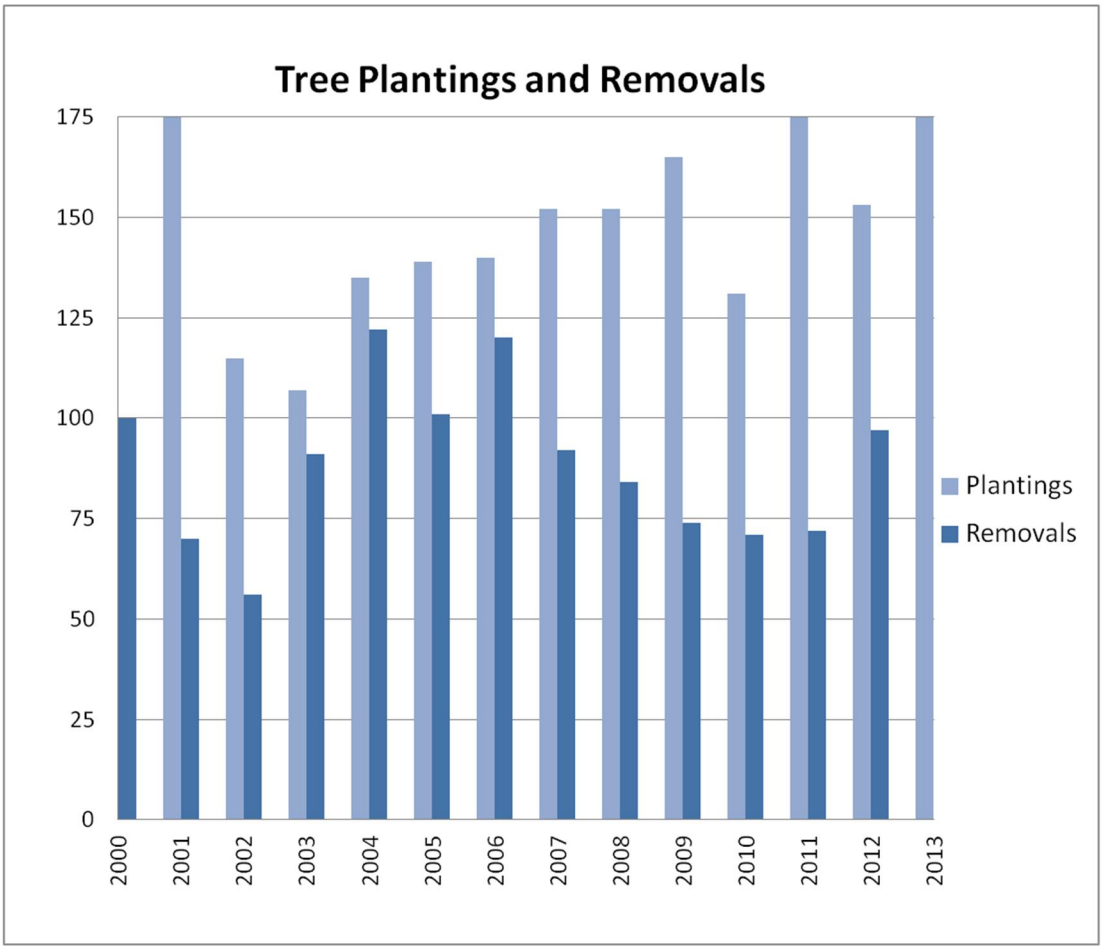


Figure 6: Tree planting and removals from 2000 to the present

Much of this land is not managed by the Borough and would entail encouraging private landowners to maintain and if possible plant more trees. There are however, also opportunities to increase Street Tree coverage in the public right-of-way, with 176 possible acres of increased Street Tree coverage (based on 20' buffer around road surface area).

Using high-resolution imagery, the report defined the total impervious surface, including parking lots and buildings, in the Borough as 28.5 million square feet. Seven million square feet of impervious surface is comprised of parking lots that can be managed by planting more trees, with an additional 1300 trees needed to reach the 2% impervious surface reduction goal. If an average of 65 trees is added to the canopy each year, this

goal could be realized in 20 years. Although State College has on average realized a net gain of trees each year, tree management from threats of insects and disease will continue to play a factor in reaching this overall increase.

12. Stormwater Best Management Practices

By 2012, establish incentives for the installation of green roofs, rainwater cisterns, and other best management practices to reduce urban runoff.

The Borough of State College constructed a green roof over the Community Room in 2010 through the assistance of a grant from the Department of Environmental Protection. State College recognizes the importance of best management practices for stormwater management and hopes to lead the community by example through the construction of three rain gardens in the downtown, a green roof and constructed wetlands. Two rain gardens were constructed in 2012 in the heart of downtown on Allen Street and include educational signs to inform the public on the importance of groundwater recharge, the protection of the area's streams, and minimization of impacts from urbanization.

State College also completed a constructed wetland, the Westerly Parkway Wetland Education Center in 2012, with trails, educational signage, bridges and butterfly gardens. Upland and lowland seed mixes were planted to establish beneficial vegetation that will help reduce sediment and pollutants from entering Slab Cabin Run, and eventually Spring Creek, as well allow for groundwater infiltration. This facility was converted from a stormwater detention basin that was closed off from the public, into a public green space that allows for infiltration and stormwater management in an area with one of the highest densities of impervious surface in the Borough.

In 2013, the Borough enacted an ordinance establishing the Planned Commercial 3 (CP-3) zoning district. The ordinance includes residential density and parking reduction incentives for construction of a functional green roof on new structures in this district. Additionally, this ordinance permits green roofs, bios wales, bio-retention areas and other landscaped stormwater treatment features to be included in a site's calculation for required open space.

In September of 2013, State College will be hosting the second annual Light Step, Right Step Festival to celebrate the sustainability initiatives in the Centre Region and provide a fun and educational resource to the community. The focus of the festival will be *Our Community, Our Water* and State College is collaborating with Clearwater Conservancy to host a rain barrel workshop in addition to a variety of exhibitors and workshops related to water resource protection and best management practices.

The Department of Ordinance Enforcement and Public Health (DOEPH) encourages the use of rain barrels and other bio swales on private property as a tool to improve our water quality. However, as with any standing water, the threat is present for mosquito breeding and the introduction of the West Nile Virus. Thus, the DOEPH encourages the use of "Mosquito Dunks" which are bacteria that can be added to water in a rain barrel, which is safe for use on plants but is toxic to mosquito larvae.

Lastly, State College's urban canopy provides many environmental benefits, including the management of stormwater. Over 6 million gallons of rainfall are intercepted annually by the Borough's public urban canopy, saving an estimated $152,180 in stormwater management costs each year.[5]

13. Anti-engine Idling

By 2009, adopt an anti-engine idling ordinance.

The Pennsylvania State Legislature adopted a statute that prohibits idling for more than five minutes with statewide applicability for diesel-powered vehicles.

State College is also exploring ways to improve traffic flow and locating parking spaces in the Downtown through traffic signal synchronization, adding way finding signage, and incentivizing parking in the municipal garages. All these efforts are designed to help reduce idling and unnecessary travel looking for parking or other destinations.

14. Land-use Policies

By 2013, complete a review and implement changes to land use policies as necessary to reduce urban sprawl, preserve open space and create a compact, walkable community

The update to the 2010 Centre Region Comprehensive Plan includes future land use maps for each of the Centre Region municipalities. This map identifies general land use categories for commercial, residential, institutional, transportation and parks and open spaces. It is the intent that this map will be one tool that municipalities can utilize when making decisions about policies, zoning and development/redevelopment activity. This map also corresponds with the Regional Growth Boundary and Sewer Service area, which encourage new development to occur within reasonable proximity to existing development, public infrastructure and utilities. This helps to preserve open space and reduce sprawl by concentrating development into a defined area of the Region.

The consulting team that prepared the Downtown Master Plan for the Borough in 2013 also considered strategies that would help encourage greater density in downtown, which would help relieve the pressure in Borough neighborhoods, discourages sprawling development in the townships, and improve connectivity and transit services. The Plan suggests that by increasing residential density in downtown, residents of our community will have many more services available within a walkable distance and the number of car trips would be greatly reduced. Additionally, a larger population downtown makes options for bus service, bike infrastructure and expanded pedestrian amenities more feasible and efficient.

[5] Based on calculations done with iTree software in August 2013

15. Energy Star

Effective immediately, purchase only Energy Star appliances for Borough facilities

The Borough has done this through practice beginning in 2008 and a requirement has been included in the Borough's purchasing manual. In 2011, Energy Star appliances were purchased for the Borough-managed housing facility, Bellaire Court, including washing machines, air conditioners and refrigerators. Dryers were also replaced with the most energy efficient model, as no energy star appliance was available. Below is a summary of some of the calculated benefits for using Energy Star appliances at Bellaire Court.

	Life Cycle Energy Saved	Life Cycle CO_2 Reduction
Washing Machines(18)	44,352 kWh	68,302 lbs.
Refrigerators (18)	22,833 kWh	35,162 lbs.
Air Conditioners (18)	10,087 kWh	15,534 lbs.

16. Green Power

By 2012, purchase 20% of energy used by the Borough from "green" power sources

Since 2011, significant savings from our energy contracts have allowed us to purchase 100% of our energy from Renewable Energy Credits (RECS). For this effort, State College became a Green Power Partner with the Environmental Protection Agency (EPA), demonstrating a commitment to exceed the EPA's guidelines for purchasing clean renewable energy. In 2013, State College signed an energy contract with Direct Energy for the next 3 years. We were able to get a 5.5 cent per Kwh rate for energy, which is lower than our previous contract, allowing State College to save over $20,000 in energy costs. Staff will once again recommend that we purchase RECS through the savings.

17. Regular Progress Reporting

By January 2008, establish a procedure for regular reporting of progress under resolution to Borough Council and the community.

In 2010, the Borough manager established the Sustainability Committee, formed with representatives from each department in the Borough to meet regularly to discuss progress for the goals set forth in Resolution 944. The State College Borough Council and community received bi-annual updates from the Environmental Coordinator on the progress on greenhouse gas reduction from 2010 to the present.

Community Goals

Resolution 944 also includes five goals related to sustainability measures and greenhouse gas emission reduction in the community. State College was in many cases able to reach or exceed the goals set forth for municipal operations, but the measures targeted at community-wide changes proved more challenging. State College made a commitment to reduce greenhouse gases and lead the community by example. However, in the future, municipal staff will explore additional ways to involve the community in realizing sustainability and look into defining measurable and attainable goals.

18. Electricity Reduction

By 2012, reduce electricity usage by 10% from 2000 levels

The Greenhouse Gas Emissions Inventory compiled by the Department of Geography at Penn State established a baseline for electricity usage using data from the year 2004. The energy provider in the Borough of State College, West Penn Power (Allegheny Power), provided the researchers with 18 months of energy data categorized by zip code and rate code. The researchers normalized that data for the year 2004 and calculated energy usage on a per-capita basis to provide an estimate the Borough population in each zip code.

Borough Electricity Use (based on 2004 data)				
	Residential	**Commercial**	**Lighting**	**Total**
MWh/year	58851	40087	379	99317
kWh/Capita	1501	1023	10	2534
$MTCO_2E$/year	60025	40887	387	101299

Using population data for the year 2000, we can estimate electricity usage and determine the baseline and 10% reduction.

Goal: Reduce Borough-Wide electricity usage by 10% from 2000 levels by 2012				
	Residential	**Commercial**	**Lighting**	**Total**
Estimated MWh used in 2000	57687	39294	372	97353
10% reduction from 2000 levels	5769	3929	37	9735

The energy data is limited by the previous year's monthly record and necessitates per capita scaling because Borough boundaries are not congruent with zip codes. The Greenhouse Gas Emission Inventory also demonstrated that the electricity sector comprised 31% of the Borough's greenhouse gas emissions. According to data by the

provided by the Environmental Protection Agency, that percentage is consistent with national trends.[6]

Borough energy usage was not yet available at the time of this publication but will be used to measure success.

State College participated and organized community events aimed at encouraging and educating the local residents on ways to lower electricity usage and, in conjunction with goal 22, encourage the purchase of green power. A sustainability page was created on State College's website and includes information on programs such as First Energy's Watt Watchers that provides free Compact Fluorescent light bulbs (CFL) and options for the community to purchase green power.

In 2012, State College worked with a local community organization to host an inaugural sustainability festival. State College collaborated with Transition Town State College, local chapter of a well-known international organization aimed at providing a grassroots response for a sustainable energy future in a world of diminishing resources. The Light Step, Right Step's inaugural event focused on energy conservation, energy reduction, and options for residents and the community to learn about sustainable energy. Over 25 local organizations and businesses attended to provide information and educational opportunities for the community.

19. Alternative Transportation

By 2012 increase the percentage of residents walking, biking or using transit to commute to work by 10% over 2007 levels

According to the American Community survey, over half of Borough residents in the 2007 baseline year commuted to work by walking, biking or using public transportation.

When ranking State College among similar municipalities nation-wide, residents rate State College above average in terms ease of bus travel and ease of walking and slightly above average in ease of bicycle travel[7]. The Bicycle Friendly Community designation demonstrates the Region's efforts to create strong bicycle infrastructure. The Borough is also served by the Centre Area Transportation Authority with routes that provide transportation around the Region. State College also began a Bicycle Ambassador Program in 2012, which aims to: promote bicycling and alternative transportation through community outreach and share the-road practices, educate the community on safe bicycling techniques and local conditions, and increase bicycle enforcement to encourage safe and legal riding. The program is based on volunteer Ambassadors who reach out to the community on safe and smart bicycling. The Bicycle Ambassadors run campaigns such as giving away bike lights to riders without any lighting after dark, completing a Traffic Skills course for bicyclists, and attending community events to promote bicycling and educate motorists and bicyclists on share-the-road behaviors.

[6] http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html

[7] Based on 2012 National Citizen Survey in which 89% , 76% and 70% of respondents rated ease of walking, bicycling and bus travel as "excellent" or "good" respectively.

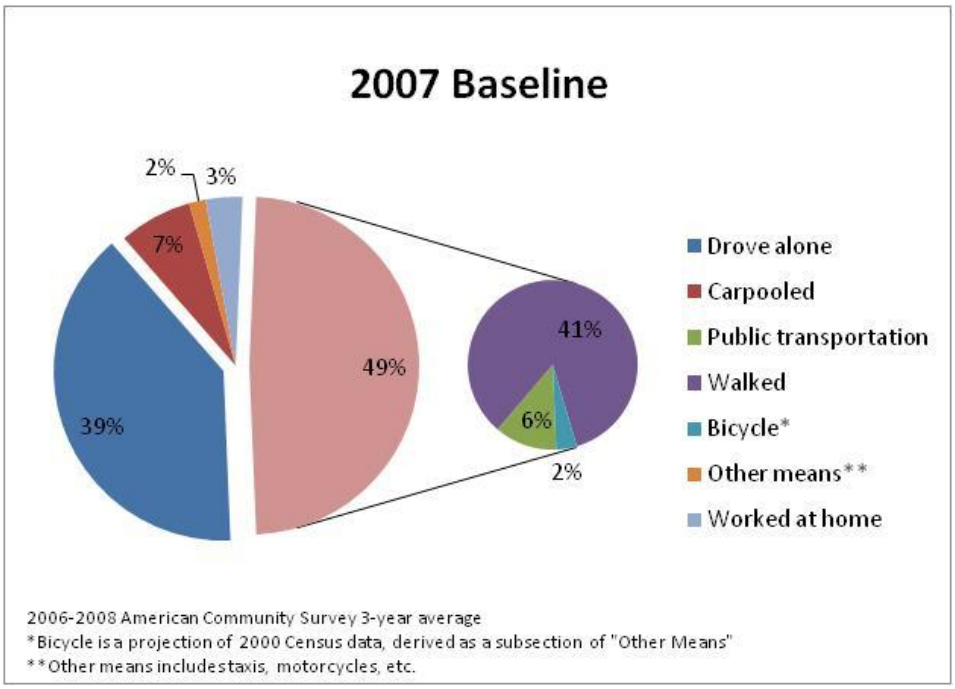


Figure 7: Means of Transportation to Work for the State College Borough in 2007

The most recent American Community Survey shows similar results to the baseline in 2007, demonstrating that reaching the 10% goal may not have been a feasible goal. State College will continue to look into ways to encourage alternative transportation in the community, including the Bicycle Ambassador Program, promoting Cat's services through their bus routes and vanpool programs and responding to the needs of community to create walkable, and bicycle friendly neighborhoods and downtown.

20. Energy Efficient Vehicles

By 2012, 15% of all personal vehicles shall be the most energy efficient vehicles

In reality, this lofty goal may be beyond the realms of State College's power to change. Staff has not found any resources for measuring vehicle purchases; however under consideration in the Downtown Master Plan is suggestions for putting special parking with recharging stations for electric vehicles. State College will continue to look for ways to support energy efficient vehicles as it becomes feasible.

21. Reduce Single Occupancy Vehicles

By 2012, less than 24% of residents commute via single occupancy vehicle

This goal is a slight variation of the goal to increase alternative transportation, which, as was previously discussed, State College is looking to promote through community campaigns and excellent infrastructure.

State College has information regarding CATA's vanpool programs available on the website for community members, and will look to incorporate Sustainable Communities projects with Penn State to devise methods of tackling the barriers that prevent carpooling, bicycling and other alternative methods of transportation. State College completed an internal survey of Borough employees as part of the process in applying to be a Bicycle Friendly Business from the League of American Bicyclists, which showed that over 70% of respondents commuted to work by single occupancy vehicle (SOV) at least once a week, though most responded they commuted by SOV 4 or 5 times a week. Many factors affect commuting choices, including the distance of commute, weather and the availability of bus routes. Many employees commented they ride to work during the warmer months and would travel by bus if a route was close to their home.

The Sustainability Committee is now in discussion with the Wellness Committee to look into ways to incentivize alternative transportation and a healthy lifestyle for Borough employees.

The 2009-2011 3-year American Community Survey estimates that 42% of residents commute by single occupancy vehicle, which is slight increase from the 2007 survey.

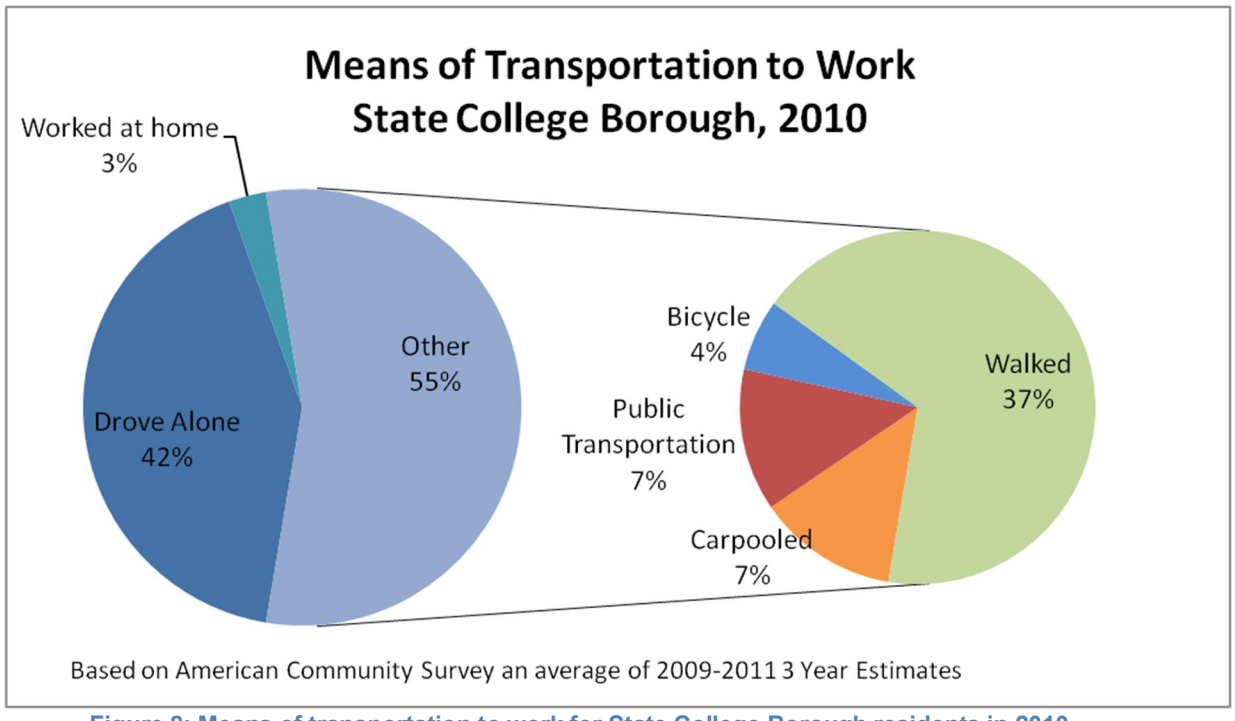


Figure 8: Means of transportation to work for State College Borough residents in 2010

22. Green Power

By 2015, purchase 20% of electricity from green power sources

Beginning in spring of 2012, Borough Staff worked with Penn State University classes taught by Dr. Brent Yarnal and Professor Howard Greenberg on studying energy efficiency in rental units in the downtown. A Geography Graduate course outlined the syllabus for an undergraduate course for 4 semesters. That undergraduate course, the Green Leases Project Geography 493, is aimed at studying the landlord-tenant conundrum, which the students describe: "While many landlords and tenants are interested in improving energy efficiency and reducing greenhouse gas emission, tenants are reluctant to invest in rental property and landlords are reluctant to invest when their tenants pay the energy costs" In the Spring of 2013 past semester they worked to interview student-renters on factors that students consider when renting a unit, and inhibitions to making energy efficiency improvements, as well as whether electric, heat or both is included in the rent cost. Throughout the next three semesters, this course will continue to look into this landlord-tenant conundrum and provide the Borough with recommendations on steps to move forward in reducing greenhouse gas emissions, amongst the many benefits of energy efficiency improvements in rental housing. There are many renters in the Borough, and targeting energy efficiency improvements for this group could have significant impacts on our local environment and energy reduction.

What's Ahead

As envisioned in 2007, State College Borough has become a leader in community sustainability. Much of the work to date has been to improve municipal functions and develop projects that can be used as examples for the community at large. The Borough has also become a disseminator of sustainability information and has begun to form a coalition of community partners with similar goals.

It is anticipated that this community leadership role will be strengthened over the next several years and a local sustainability network will emerge. The Borough is committed to establishing new sustainability goals that will guide our functions over the next five years or more.

APPENDIX A.

Priorities

- Tackle Low-Hanging Fruit First
- Address 944 Goals in a Meaningful Way
- Use Energy Savings as the Primary Performance Metric
- Engage All Residents from Tenants to Homeowners
- Address All Building Types and Building Projects

Recommendation of six Concrete actions

The following recommendations should effectively meet the abovementioned priorities and goals and provide both short-term and long-term steps that the Planning Commission or Borough Council can pursue to encourage green building practices:

1. **Educate residents on green building options and practices on the Borough website.**
    a. Provide a clearinghouse of information from state agencies and non-profits related to green buildings.
    b. Provide an FAQ that addresses steps residents can take to be more environmentally responsible.
2. **Host a "Green Resident Challenge" that provides residents with information on and incentives to take concrete steps to become more environmentally responsible.**
    a. Advertise the program: Create a name and logo for the challenge and publicize.
    b. Interested residents fill out an interest form.
    c. Participants are then contacted by staff about the program and invited to attend a workshop.
    d. At the workshop participants are given examples of how they can improve the energy efficiency of their home, protect water resources, and decrease embodied energy.
    e. Participants are then asked to be part of a challenge, by signing a pledge and committing to a series of actions related to transportation, waste management, energy use, water conservation and peer-to-peer environmental education.
    f. Based on these pledges participants can be honored on the borough website for meeting certain standards (green, silver, gold, and platinum levels of participation)
    g. At the conclusion of the program, participants from each level are then entered into a random drawing to win a prize corresponding to the level of their participation.

3. **Develop or adopt third-party verified green building checklists for renovation and new construction, residential and commercial buildings: If a building design is verified as meeting the specified criteria on the checklist the Borough could offer incentives in building height, floor area, reduced parking or other incentive structure.**
    a. The Planning Commission or a task force appointed will identify which third-party verified checklist(s) or modified checklist(s) best meet local conditions and Borough priorities.
    b. Current zoning green building policies (e.g. CID green building incentive structure) would need to be updated to meet the new standards.
    c. Checklists would be submitted with site plans for consideration by staff.
4. **Develop a Borough ordinance or region-wide program that would require construction and demolition waste diversion. Interest in including county-wide participation if feasible.**
    a. Requires and/or encourages building and demolition contractors to reuse and recycle a pre-determined percentage of their waste rather than disposing of it in landfills. Scale of projects could determine whether it should be mandatory or encouraged or both.
    b. By issuing a construction and demolition (C&D) ordinance, jurisdictions gain the authority to enforce waste diversion requirements. At minimum a C&D Ordinance should require building and demolition contractors to develop a waste management plan. C&D Ordinances typically require:
        i. Issuance of project permits tied to ordinance requirements
        ii. Requirement of a waste management plan to be completed prior to the start of construction or demolition, which identifies:
            1. Construction and demolition waste materials that will likely be generated on site.
            2. Procedures that will be used to collect and sort the waste materials.
            3. The location to which the materials will be hauled.
            4. How the materials will be reused or recycled.
        iii. Proof of compliance with weight tickets and diversion facility receipts
        iv. A deposit that is proportional to project size (by sq. ft. or weight) to be returned upon proof of compliance (typical deposit ($50 per estimated ton of waste of $0.35 per sq. ft. of building.)
        v. Random field inspections of on-site practice.
5. **Review and Discuss the Model Lighting Ordinance developed by the International Dark-Sky Association (IDA) the Illuminating Engineering Society (IES) and the for Possible Adoption.**
    a. Permits the use of outdoor lighting such that it does not exceed the minimum levels specified in IES recommended practices for night-time safety, utility, security, productivity, enjoyment, and commerce.

b. Minimizes adverse off-site impacts of lighting such as light trespass, and obtrusive light.
c. Curtails light pollution, reduces sky glow and improves the nighttime environment for astronomy.
d. Helps protect the natural environment from the adverse effects of night lighting from gas or electric sources.
e. Conserves energy and resources to the greatest extent possible.

6. **Encourage Council to pursue state lobbying efforts to improve the outlook for green buildings:**
    a. Establish financial incentives that currently lack enabling legislation.
    b. Enact building codes that provide the most current base minimum requirements for energy conservation and green building, by encouraging the RAC's adoption of the 2012 International Energy Conservation Code and the International Green Construction Code.