

North Carolina
Division of Pollution Prevention
& Environmental Assistance

North Carolina Department of Environment and Natural Resources

Site Visit Report

Governmental Buildings

Industrial Pollution Prevention Program
Assessment Team

November 2005

Disclaimer

This report is intended to offer information and guidance for identifying opportunities and options for waste reduction. Compliance with environmental and occupational safety and health laws is the sole responsibility of each business. All legal and regulatory references within this document are intended only for informational purposes and are not to be taken as reliable sources of legal reference. Businesses should contact the appropriate legal and regulatory authorities for current regulatory requirements as well as for interpretation and implementation. All references and vendor materials (when available) mentioned in the report are included. Mention of a vendor or manufacturer does not represent an endorsement by the State of North Carolina. Neither the State of North Carolina nor the authors of this report are responsible for practices or procedures implemented by individual firms.

Executive Summary

This report identifies major energy and waste streams generated in four government buildings operated by a North Carolina town and suggests options for saving energy waste and reducing identified waste streams.

This report will cover the four buildings using the following categories:

- Lighting
- HVAC
- Water savings
- Electrical appliances and machines
- Landscaping
- Recycling

Additional information will cover town vehicle cost savings.

1.0 Introduction

In November 2005, two members of the N.C. Division of Pollution Prevention and Environmental Assistance conducted a walk-through energy and waste audit of the town hall, police department building, community center and public works building. Inquiries for helping with the town's landscaping and vehicle fleet fuel savings were also made. DPPEA is a non-regulatory, confidential, environmental state agency designed to help North Carolina facilities find ways to reduce waste and pollution, free of charge. The following summary outlines the major options that have promise for achieving energy and waste reduction in the four town government buildings. It is noted that many cost saving ideas were discussed and several information fact sheets were provided during the site visit. It is understood that town staff is already looking into some of these options. Additional options may be provided throughout the report. Each of these alternatives should be investigated for potential implementation.

2.0 Town Hall

The town hall is a one-story, slab-mounted building with a large central, open light well ceiling. The many large windows have film coating with blinds. Outside lighting is at all entrances and on the flagpoles. The building's heating, ventilation and cooling consists of three above ground heat pumps (one each for three building zones), with the inside heat pump equipment located in the attic. There is a small kitchen, three restrooms, a large file room and at least five closed-in offices surrounding the open office/public area. The building is in full sun during the day and located on a hilltop exposed to high winds.

2.1 Lighting opportunities

- Turning lights off when not needed saves more on energy bills than most other changes. It is not about doing without light, as is only using light when needed. For example, just two T8 florescent

tubes left on overnight and on weekends, will cost around \$16 a year extra to operate, at three cents a kWh “off peak” rates.

- Very often the simple action of employees consistently turning off lights when not needed will save substantial kilowatt-hours every month.
 - With today’s electronic ballasts, the myth of not turning off florescent fixtures is no longer valid. Old florescent fixture systems used mechanical/magnetic ballasts that wore out quickly. The age of the town hall building makes it unlikely its fixtures use mechanical or magnetic ballasts.
- Making as much use of daylight wherever possible may allow reduced electrical light use in several town hall areas.
 - Compact florescent bulbs should be used in those office light fixtures that still have incandescent bulbs. Compact florescent bulbs typically use less than one-third of the electricity for the same amount of light. Electricity used by incandescent bulbs typically generates somewhere around 90 percent heat and only 10 percent light. Compact florescent bulbs more than pay for themselves in saving electricity (often within a year) and outlasting seven to 10 incandescent bulbs.
 - Any florescent tube fixtures can be changed to smaller diameter tubes that save electricity and still give the same light. Note the ballasts must also be changed, if you go to smaller diameter energy saving tubes, to keep the larger ballasts from “cooking”/shortening the life of the smaller tubes. (T12s are 1.5-inch dia., and T8s are 1-inch dia.). Many of today’s florescent tubes are far more energy and cost efficient than the tubes developed 30 years ago. Unfortunately, some of the least expensive tubes today are still the old 30-year design. Environmentally safer tubes are available (green color tips on the ends) which contain far less mercury and can be disposed of more easily. (Federal universal waste laws allow some landfill disposal of these environmentally friendlier tubes.)
 - The town may want to confirm what kind of exit signs being used in the buildings. Exit signs are required to be lighted 24 hours a day. Old incandescent bulb exit signs can cost from \$80 to \$200 a year to operate. Exit signs using light emitting diodes can operate for just \$3 or \$4 a year. Replacing old exit signs with more energy efficient signs, like LEDs, have been known to pay for themselves in a matter of months.
 - Hidden lighting – Historically, as much as 30 percent more light can be recovered by dusting/cleaning the reflectors of lamps and fixtures every few years. The town hall is located near a busy intersection with the full benefit of road dust and diesel exhaust, as well as office areas tending to create slough, fibers and dust from human activity.
 - Task lighting at different desk stations may be more efficient than lighting entire rooms. This depends on how often the rooms are used by town personnel. A simple energy efficient desk lamp using 60-watt compact florescent or florescent tubes (equals lighting of two 100-watt incandescent bulbs) could save hundreds of watts in overhead lighting.

2.2 HVAC Systems

- The three heat pumps for the town hall cover different zones in the building. The thermostats need to be calibrated every few years to keep them from fighting against each other, as the sun heats up different parts of the building during the day. Better balancing may be accomplished by moving one or two of the thermostats to better locations where they will be out of direct influence from traffic (or wind) in and out of doors.
- During the site visit it was mentioned that space heaters were used during winter. A single typical space heater will burn between one to three kW each hour. The electric bill cost could be at least

\$64 for each space heater in use, at eight cents a kWh for 100 heating season days. If heating is needed at a desk, heating pads use a lot less electricity.

- During the winter, the town hall's high ceilings can trap a lot of heat that is better used down near people and the thermostats. Ceiling fans are inexpensive and often pay for themselves by pulling down heated air trapped near the high ceiling. In summer ceiling fan air movement can allow thermostats to be set as much as seven degrees higher. **Statistics, on average, show for every degree setting on a thermostat that is saved (down for heating or up for cooling), as much as three percent in electricity can be saved.**
- It was mentioned during the site visit that two restrooms off the main central area had condensate problems. The third restroom, that did not have any reported condensate problems, has its vent fan on a separate switch. The vent switch for the two problem restrooms is the same as the light switch, and thus can't be left on to vent moisture. The condensate may also be an indication that the air vents to these problem restrooms need adjusting to keep them from being too cool, causing condensation to form. Adding vent switches to allow more venting or adjusting the HVAC vents to better control temperature in these small rooms may solve the condensate issue.
- Consider using air space entrances to solve the reported problem of the wind blowing open the town hall doors. These "glass box/chambers" will have an air lock effect to save on heating or air conditioning costs for the building, and keep most wind out. The drawback is, if the doors are outside and not shaded, heat will be trapped in summer possibly increasing cooling costs, but that same trapped heat will help heat the building in winter.
- Talking with staff indicated the offices at one end of the big room would be comfortable while the other end offices were too cold or too hot. This sort of problem is typical in buildings as the sun passes over the building during the day. This could indicate a need for better balancing of the vents and thermostats from each heat pump. Vent openings can be adjusted to put more airflow in one area and less in another to meet different heating and cooling preferences.
- Many building HVAC systems have a dehumidifier step built into the mechanical system. Considerations should be made to turning off any dehumidifier system to save a lot of operation cost for the system. The traffic in and out of the building and the wind may make dehumidification ineffective anyway.
- The building heat pump systems need regular maintenance to allow maximum efficiency.
 - It is understood the air filters are changed regularly.
 - Are the outside and inside heat pump coils cleaned regularly? At the time of the site visit two of the outside coils could have used cleaning.
 - One outside unit was located in a building alcove where the walls limited ventilation on the coils.
 - Forced air systems have belts from the motor to the fans. A worn belt can use as much as 10 percent more electricity to move the same amount of air as a new belt.
 - Dust/dirt and debris on indoor coils can cost a lot of energy waste to transfer the same BTU heating or cooling to the air. Does the HVAC contractor clean the coils in the town hall attic regularly?
 - Does the HVAC contractor adjust the amount of fresh air used by the heat pumps based on winter and summer conditions? These adjustments could save a lot of heating and cooling costs.

2.3 Water Savings

- Water bills and leak detection are two items that need to be checked periodically.

- Charting the flows from water bills and comparing them to past year performance will often indicate a leak, inappropriate usage or changes in water use trends up or down.
- Comparing a monthly water bill to the same month the previous year would be a good way to check for problems.
- Many buildings have saved themselves considerable costs by checking bills for mistakes, by comparing the bill to the flow meter outside.
- Beware of machines that use water for cooling. For example, many ice machines, refrigerated vending machines or water coolers will have one-time through water flow to cool the condensers. If so, the cost is comparable to leaving a faucet running 24/7.

2.4 Electrical Appliances and Machines

- The town hall's electric bills are based on a set rate schedule from the utility company. The rate schedule should be reviewed at least once a year to make sure there are no errors or rate penalties being assessed. Under state law consumers are entitled to a rate review once a year. Electric bills should be compared to the same month of the past year to check for problems. Charting electric usage can sometimes help find where costs are incurred. Many utility companies can put these charts on the bill and provide usage breakdowns, if requested.
- Electric meters can malfunction, so electric bill numbers should be checked periodically. Often utility companies can base a bill on estimates and then charge the difference when the meter is read. Electric bill usage can be compared to past months and the same month on the previous year to see if checking the meter is warranted. Utilities can be asked to check or change out meters.
- Turning machines off when not needed may reduce peak demand charges during high electrical demand. The town hall's rate schedule has a peak demand setting and violation of that peak for more than 15 minutes will invoke a monthly penalty on the electric bills for the next 11 months. The utility is not mandated to notify you of this charge.
- Look for circuit overloads that can shorten the life of office machines. Plugging in too many office machines in the same circuit of outlets can load the circuit so much it creates a "brownout" of office machines. It affects machine performance and reduces machine life.
- Regularly turning off computers and other office machines at end of a shift can save thousands of dollars a year. University studies have shown that it can cost about \$120 a year to leave a desk computer on day and night. But, if turned off at end of a shift and sleep modes used during shift, the annual cost can be just \$20.
- Most office machines will have a steady flow of electricity while waiting to be used, especially copiers and printers that keep heating elements on even during sleep mode. Turning off office machines at end of a shift can save even more costs than the computer example above.
- Energy Star-rated and other energy efficient machines should be used (or purchased) whenever possible. It could mean significant reductions in operating cost savings for each machine. This includes appliances used in the town hall kitchen.

2.5 Landscaping

- Some buildings will capture rainwater and use it for landscaping and dust control. Stored water could also be used to wash vehicles.
- Using the stormwater basin on the town hall property may be effective in storing water to supplement pumping costs from the well and/or lowering the water bill for landscaping.

- Select only drought-tolerant plants for landscaping. Expensive plants are even more costly if they have to be constantly watered during hot weather.
- Train plants to root deeply by not over watering.
- On hot days as much as half the water never reaches the plant, if watering takes place during the heat of the day. Water only according to plant needs and during the cooler part of the day, such as early morning or at night.
- Consider using community service, volunteer students or landscaping clubs to maintain landscaping. Student projects in the town hall landscaping could be used to educate the public on water conservation and landscaping. Teachers with horticulture expertise could supervise the projects.
- A small composting box for non-meat town hall kitchen waste and landscaping waste can save the town hall transportation costs and landfill fees. A well-designed composting station can turn most food waste and landscape cuttings into usable landscaping soils in less than three weeks.

2.7 Recycling

- The town hall employees recycle a minor amount of cans. This is important because it is illegal to dispose of aluminum cans in state landfills. Recycling one aluminum can saves enough electricity to run a television for three hours. Recycling one ton of aluminum saves the equivalent in energy of 2,350 gallons of gasoline. This is equivalent to the amount of electricity used by the typical home over a period of 10 years.
- Office machines and computers can be recycled. Many office machines cannot be sent to a landfill because they contain heavy metals and other hazardous compounds. There are several options for recycling.
 - Make arrangements for sending the machine back to the vendor.
 - If usable, send these machines to a school or charity repair facility.
 - Many recycling companies that take office machines are listed on the DPPEA Recycling Markets Web site, <http://www.p2pays.org/DMRM/start.aspx>
- There are state and national programs that take rechargeable batteries. One program will send a box to collect rechargeable batteries and only charges for the return postage. The town should have many types of batteries from town maintenance communications radios, police radios, many types of emergency flashlights and other battery-operated devices. DPPEA can provide company and program contacts.
- Recycling glass at town facilities may be effective. Glass is heavy and not having to pay landfill and transportation fees may make recycling cost effective. Recycling one glass bottle saves enough energy to run a small television for four hours.
- The town generates a lot of paper that could be recycled. Every ton of recycled paper saves approximately four barrels of oil or 4,200 kilowatt-hours of energy. That amount of energy could heat and air-condition the average North American home for at least six months. Paper recycling at the town hall would save transportation and landfill costs. Perhaps a school could use the recycled paper for fund raising. It would also be a good example of environmental stewardship for the local community.

3.0 Police Department Building

Many of the energy and comfort saving opportunities found in the town hall also apply in the town police station building. Please compare the town hall energy items for energy saving ideas to any police building applications.

The town police building is a house-sized building on cement block piers, approximately two feet off the ground. Looking under the building showed no visible floor insulation and some piping was exposed. There is a small, slab-mounted garage or storage building behind the police station. Police vehicle parking is in an open parking lot next to the building. No gas pumps or oil storage tanks were evident. The building contains offices, security areas, a kitchen and restrooms with associated locker and shower facilities. All room ceilings appear to be a standard residential height and unused attic space exists. The building windows have blinds and exterior storm windows. A large electric hot water tank is used. Electronic and communications equipment are in continuous use. A large commercial soda vending machine is located outside the back door.

3.1 Lighting

- Turning lights off when not needed saves more on energy bills than most other changes. It is not about doing without light, as is only using light when needed. For example, just two T8 florescent tubes left on overnight and on weekends, will cost around \$16 a year extra to operate, at three cents a kWh “off peak” rates.
- Occupancy sensors connected to lighting may be helpful in several areas of the police building in turning off lighting when not in use. During the site visit the police building was nearly vacant, yet it appeared the majority of lights in the building were left on. Leaving that many fixtures on all day greatly increases monthly electric bills. Occupancy/motion sensors are inexpensive and commonly available in hardware and home improvement stores.
- The town may want to confirm what kind of exit signs being used in the buildings. Exit signs are required to be lighted 24 hours a day. Old incandescent bulb exit signs can cost from \$80 to \$200 a year to operate. Exit signs using light emitting diodes can operate for just \$3 or \$4 a year. Replacing old exit signs with more energy efficient signs, like LEDs, have been known to pay for themselves in a matter of months.
- Any florescent tube fixtures can be changed to smaller diameter tubes that save electricity and still give the same light. Note the ballasts must also be changed, if you go to smaller diameter energy saving tubes, to keep the larger ballasts from “cooking”/shortening the life of the smaller tubes. (T12s are 1.5-inch dia., and T8s are 1-inch dia.) Many of today’s fluorescent tubes are far more energy and cost efficient than the tubes developed 30 years ago. Unfortunately, some of the least expensive tubes today are still the old 30-year design. Environmentally safer tubes are available (green color tips on the ends) which contain far less mercury and can be disposed of more easily. (Federal Universal waste laws allow some landfill disposal of these environmentally friendlier tubes.)
- Hidden lighting – Historically, as much as 30 percent more light can be recovered by dusting/cleaning the reflectors of light fixtures every few years. Dust and dirt gather slowly so loss of lighting often goes noticed. This is especially true for the police offices with the lower ceilings.
- Task lighting at different desk stations may be more efficient than lighting entire rooms. This depends on how often the rooms are used by town personnel. A simple energy efficient desk lamp using 60-watt compact fluorescent or fluorescent tubes (equals lighting of two 100-watt incandescent bulbs) could save hundreds of watts in overhead lighting.

- The vending machine at the police station's back door station is a typical soda machine. The advertising lighting for a typical soda vending machine uses a lot of electricity and could be costing the town more than the \$16 a year in the fluorescent tube example above. If the vendor is concerned about people thinking the machine is broken a sign posted can show that turning off the lights is saving tax dollars. The state's Aquarium at Fort Fisher turned off its vending machine lights and saved a lot of electricity costs with no complaint from the vendor on sales so far.

3.2 HVAC

- It was stated during the site visit that the building is comfortable in summer but cold in winter. No insulation was under the police building. Installing the proper kind and amount of insulation under the building will help with the cold during winter. Well-placed insulation will pay for itself in a very short time with energy savings. As the underside of the police building is well exposed on the hillside, consideration should be taken into account possible wildlife, storm driven water and access to plumbing and wiring.
- The police building has a very large water heater installed in an office area. It was stated that the building never runs out of hot water. When it was checked it was noted that the cold water line into the water heater was warm from residual heat. This indicates heated water may sit for a long time. Hot water is one of the top energy users in a building.
 - A smaller water heater would be more cost effective to run with such low building demand, but it is not likely to be economical until the larger unit breaks down.
 - Adding a water heater insulation blanket around the existing water heater could save noticeable energy costs. The blanket would only take up a few inches around the water heater, which is not likely to interfere with office space.
 - The existing water heater should be drained periodically to remove the sediment off the heating coils inside the tank making them more energy efficient.
- The police building HVAC system has a dehumidifier. It is not clear if the dehumidifier is needed for proper operation of the electronic and communications equipment. Turning off the dehumidifier on days when weather conditions are at an acceptable comfort range could save noticeable electric bill costs.

3.3 Water Savings

- Much of the same landscaping water savings ideas for the town hall apply to the police building, as the buildings are next door to each other. Consideration may be made for using the property stormwater basin to save and reuse water, as it is located next to the police building. Reusing stormwater may be a cost-effective way of saving water for vehicle washing.
- Vehicle washing was stated as an important issue for the town, especially for having clean police cars. Washing vehicles on the grass or sand can help prevent the town from violating state regulations on wastewater runoff. Allowing washing wastewater to enter a storm drain or leaving the property would constitute a water quality violation from the state.
- The owner of the soda vending machine by the back door of the police building should be asked if this machine uses one-time-through cooling water to refrigerate the cans. If so, it would be like leaving a water faucet on 24/7 and should be replaced to reduce the town's water bill. As the machine is kept outside it would be feasible to use an air-cooled system.

3.4 Electrical Appliances and Machines

- The refrigerator in the police building may need better ventilation to dissipate the heat for the coils behind the machine, making it more energy efficient. Cleaning the coils periodically will extend the useful life of the refrigerator and save energy costs.

- The electric bills for the police building are based on a set rate schedule from the utility company. Please see the information on cost savings with utility bills for the town hall.
- Electric meters can malfunction. Please see information on monitoring bills and meters for the town hall.
- Look for circuit overloads that can shorten the life of office machines and communication equipment. Plugging in too many office machines in the same circuit of outlets can load the circuit so much it creates a “brownout” of the office machines. It affects performance and reduces machine life.
- Regularly turning off computers and other office machines at end of a shift reduces electrical demands and cuts costs. It is not known if this may already be done at the police station for security reasons. Just turning off a single computer monitor at end of a shift can save as much as \$30 a year on an electric bill. Computer monitors built over the last several years are designed to be turned off daily.
- Most office machines will have a steady flow of electricity while waiting to be used, especially copiers and printers that keep their heating elements on even during sleep mode. How much the police building offices use various office machines should be determined and, if feasible, considerations should be made to turn on machines only when needed.
- Energy Star-rated and other energy efficient machines should be used (or purchased) whenever possible. It could mean hundreds of dollars in operating cost savings for each machine. This includes appliances used in the police building kitchen.
- It is understood the town has an emergency generator, or an emergency generator is obtained when needed by the town. Electrically run equipment with varying loads like a refrigerator and air handling equipment for the town hall heat pumps can be damaged, or have their useful life shortened, by the improper loading of a generator. It is not known if the police station has an emergency generator-loading plan in place to minimize equipment damage from a fluctuating electrical loading of a generator.
- The vending machine outside the back door of the police station appears to be in a spot where it is in heat of the sun during the day. The refrigeration system of the machine must use even greater amounts of electricity to keep the soda cans cold in the hot sun. Keeping the vending machine out of the sun would save the town a noticeable amount of extra electricity costs.

3.5 Landscaping

- Using the stormwater basin next to the police building may be effective in storing water to supplement pumping costs from the well and/or lowering the water bill for landscaping.
- Other landscaping issues for the town hall will also apply for the police department building. Composting non-meat garbage has even more potential for the police department than the town hall, as more meals and coffee grounds are likely to occur for a round-the-clock operation.

3.5 Recycling

- The same recycling issues for the town hall apply to the office recycling issues of the police building.

- A proposal was made to create incentives for recycling by allowing police and staff to use proceeds from recycling for personal job related items. This especially true for aluminum can recycling from the vending machine. While recycled paper may not have very many buyers, aluminum cans sell for several cents a pound.

4.0 The Community Center Building

Several energy and waste items that apply to the town hall also apply to energy savings and waste reduction for the community center building. Please review the list of items for the town hall for the community center building.

The community center building is a two-story, mostly wood frame building with large a meeting room, several offices and small meeting rooms. It has two heat pumps, each with its own thermostat. The large meeting room has a speaker system and equipment to record meetings. The building was constructed in recent years as a pilot for storm resistant structures on the coast and is currently being monitored electronically by different university study programs. The study involves many sensors around the building and some windows with electronic equipment to measure, record and transmit information.

4.1 Lighting

- Most if not all the lighting items to save energy costs for the town hall will save costs for the community center building.
- During the site visit, it was noticed that most of the lighting in the community center building were turned off when not being used. It is not known if the staff checks the building regularly to make sure previous users turned off lights.
- The town may want to confirm what kind of exit signs being used in the buildings. Exit signs are required to be lighted 24 hours a day. Old incandescent bulb exit signs can cost from \$80 to \$200 a year to operate. Exit signs using light emitting diodes can operate for just \$3 or \$4 a year. Replacing old exit signs with more energy efficient signs, like LEDs, have been known to pay for themselves in a matter of months.
- Several lighting fixtures in the community center have incandescent light bulbs. Changing to compact fluorescent bulbs or even the new LED bulb packs in these fixtures will save enough electricity costs to pay for the bulbs long before they burn out.

4.2 HVAC

- Most of the HVAC items to save energy costs for the town hall will save costs for the community center building. Note the site visit team did not inspect the heat pumps.
- It was stated during the site visit that the doors and windows noticeably leak air. Weather sealing and window stripping will save enough energy costs to have a very short payback period.
- The HVAC systems in the closets of the large meeting room appeared to be well on their way to rust damage, presumably from condensate. Extra ventilation and/or some drainage to collect condensate should help to prolonging the life of these units.
- The large meeting room practice of turning off the HVAC systems after meetings and other uses is commendable and is saving energy costs.

4.3 Water Savings

- As the community center is on the same property as the town hall and police building, most of the same items on water savings should apply to water savings for the community center. Please review the water savings lists for both the town hall and the police station for water savings.
- The community center does not seem to be used as much as the other two buildings in the town government complex, town staff should check the building more often for water leaks or faucets left running.

4.4 Electrical Appliances and Machines

- The community center has fewer electrical appliances and machines than the town hall and police building; however, most of the same electrical and machine savings should apply. Please review the electrical appliance and machine savings lists for both the town hall and the police station for cost savings.
- The universities with sensors and electrical equipment should be questioned as to how much their equipment is impacting the electric bill for the community center, to get an idea how much is the universities' equipment costing and how much is purely building use. Is there any agreement with the universities that requires them to inform you of any energy usage experiments they may want to do in the building?

4.5 Landscaping

- The community center building appears to have very little landscaping being surrounded on two sides by parking lot. Some of the same landscaping lists of the town hall and the police building should also apply to the Pitts Center.
- The side door of the community center nearest the town hall appears to be landscaped so that any driving wind or rain could flood the door. It was not brought up during the site visit, but the town may want to check on this possibility.

4.6 Recycling

- The same recycling issues for the town hall apply to the office recycling issues of the police building.
- Recycling bins should be provided in order to encourage participation. During the site visit recycling containers were not evident. While public meetings may not be known for quantities of recycling, it is understood that there are other meetings and work groups that take place in the community center. As an incentive idea for public education, a proposal made allowing police and staff to use proceeds from recycling for personal equipment would likely be embraced by any public users of the community center.

5.0 The Public Works Building.

The public works building is a cement slab, metal, 4-bay garage building, with a large garage rollup door at each bay. It stores small equipment for utilities, traffic control, landscaping and painting, and has some limited repair facilities. It has a large, privacy/security, fenced asphalt yard with storage garbage collection containers and other town materials. Outside the front fence is a public recycling center.

5.1 Lighting

- Lighting in the garage is primarily eight ft. long fluorescent tube fixtures controlled by individual switches for each bay. If any fixture burns out it is recommended the town look at energy efficient replacement fixtures, such as T5 high bays. A plan should be in place to replace any burned out fixture with a more energy efficient fixture. Public works staff may need to replace an 8-foot fixture quickly and the opportunity would be lost to save a few hundred dollars a year in lighting costs.

- Outside lighting for the public works area was not examined. LED area/street lights are more energy efficient and last longer than expensive street light high intensity bulbs. These are good candidates for any replacements for the present area lights in the public works yard.
- The town may want to confirm what kind of exit signs being used in the buildings. Exit signs are required to be lighted 24 hours a day. Old incandescent bulb exit signs can cost from \$80 to \$200 a year to operate. Exit signs using light emitting diodes can operate for just \$3 or \$4 a year. Replacing old exit signs with more energy efficient signs, like LEDs, have been known to pay for themselves in a matter of months.

5.2 HVAC

- Expected natural gas cost increases may dampen the town plan to convert the public works building HVAC from propane to natural gas. The town may want to make a cost comparison with projected natural gas and propane costs to see if these options are still cost effective.
- Extra insulation and weather stripping would be easy to add to the public works buildings open wall interior.
- Heating only the office section of the public works building when needed would also save on heating costs. It may be feasible that an electric space heater in the office is cheaper than natural gas heating because of the limited time the office is occupied. However, there is a great danger that heating costs would be wasted if a space heater were accidentally left on unattended.
- Only heating a bay when work has to be performed is also a stable practice to save heating costs. Any temporary space heater would be a potential danger with all the flammable liquids and materials stored in the bays.

5.3 Water Savings

- The public works building is well situated to capture rainwater and use it for landscaping. Plenty of rain barrels and tanks are available and the gravity feed from a ground level tank would work well for the surrounding landscaping. Perhaps a local school would take this on as a project.
- Public works equipment must be washed for proper maintainance. It was not asked during the site visit if this washing takes place at the public works building. Allowing vehical or equipment washwater to leave the property would be a state water quality violation. If the washwater were captured or directed for some other reuse on the property it would be acceptable. This could include landscaping after the water settled in a tank or if plant-tolerant soaps were used.

5.4 Electrical Appliances and Machines

- The electric bills for the public works building are based on a set rate schedule from the utility company. Please see the information on cost savings with utility bills for the town hall.
- Electric meters can malfunction. Please see information on monitoring bills and meters for the town hall.
- Look for circuit overloads that can shorten the life of office machines and communication equipment. Plugging in too many office machines in the same circuit of outlets can load the circuit so much it creates a “brownout” of the office machines. It affects performance and machine life. There is equipment at the public works building that can cause such damage if too much of it is plugged into the same circuit as the office equipment.

- Regularly turning off computers and other office machines at end of a shift can save thousands of dollars a year. It is not known if this may already be done at the public works building. Just turning off a single computer monitor at end of a shift can save as much as \$30 a year on the electric bill. The public works building computer is used a lot less than town hall computers. Computer monitors built over the last several years are designed to be turned off daily.
- Most office machines will have a steady flow of electricity while waiting to be used, especially copiers and printers that keep their heating elements on even during sleep mode. How much the public works building office use various office machines should be determined and, if feasible, considerations should be made to turn on machines only when needed.
- Energy Star-rated and other energy efficient machines should be used (or purchased) whenever possible. It could mean hundreds of dollars in operating cost savings for each machine.

5.6 Landscaping

- The public works building has a soaker hose type landscaping watering system made from old garden hoses. This is very commendable and effective. The town may wish to use a timer on this system to prevent any over watering caused by situations such as the public staff being called to handle an emergency incident.
- The fence for the public works building is at the property line for several residences, other buildings, a road leading to a school and the public-accessed recycling center. Invasive plant species and nuisance plants from other properties could interfere with the landscaping plans of the public works building. Plants unfriendly to people such as poison ivy or plants with berries poisonous to children growing on the public works property could leave the town liable.

5.7 Recycling

- It is understood the public works building takes full advantage of the recycling center outside its gate. There appears to be a sizable space at the public works building to expand recycling to include cans and bottles from local businesses. Using the proceeds from recyclables that have a good market value could generate revenue for town equipment or personal equipment for town police and/or staff. **The State Legislature recently passed a bill (HB 1815) that will require all businesses with an ABC permit to recycle by 2008.**
- The reuse of old fire hoses and other equipment by the public works staff is commendable and should be encouraged where possible.
- Large cardboard boxes and appropriate paper products from the town hall, police building, and the community center could be used by the public works building staff for various things like: protective storage of loose items in the public works building, mats under equipment to catch fluid leaks, shredding to mulch landscaping around town and weed and vine suppression at the public works building.
- Look for ways to reuse/remelt asphalt waste for paving and potholes in the town's parking lots.
- The public works building staff would be perfect to coordinate with the town hall, police building, the community center and the public works building to reuse or recycle items. They would help recycle items one building no longer wants but could be used in one of the other buildings.

6.0 Town Vehicle Savings

It is understood the town has several police cars, including a few SUVs and a couple of large public works trucks. It was not learned during the site visit what, if any, road working equipment the town is maintaining. The list of items below generally cover different things that can save fuel and other vehicle cost.

- As a rule of thumb, you can assume that each five mph you drive over 60 mph is like paying an additional \$0.21 per gallon for gas. Note: Cost savings are based on an assumed fuel price of \$3.07/gallon.
- Avoid keeping unnecessary items in your vehicle, especially heavy ones. An extra 100 pounds in your vehicle could reduce your MPG by up to two percent. The reduction is based on the percentage of extra weight relative to the vehicle's weight and affects smaller vehicles more than larger ones. Note: Cost savings are based on an assumed fuel price of \$3.07/gallon.
- Idling gets 0 miles per gallon. Cars with larger engines typically waste more gas at idle than do cars with smaller engines. Note: Cost savings are based on an assumed fuel price of \$3.07/gallon.
- Replacing a clogged air filter can improve your car's gas mileage by as much as 10 percent. Your car's air filter keeps impurities from damaging the inside of your engine. Not only will replacing a dirty air filter save gas, it will protect your engine. Note: Cost savings are based on an assumed fuel price of \$3.07/gallon.
- You can improve your gas mileage by around 3.3 percent by keeping your tires inflated to the proper pressure. Under-inflated tires can lower gas mileage by 0.4 percent for every one psi drop in pressure of all four tires. Properly inflated tires are safer and last longer. Note: Cost savings are based on an assumed fuel price of \$3.07/gallon.
- You can improve your gas mileage by one to two percent by using the manufacturer's recommended grade of motor oil. For example, using 10W-30 motor oil in an engine designed to use 5W-30 can lower your gas mileage by one to two percent. Using 5W-30 in an engine designed for 5W-20 can lower your gas mileage by between one and one and a half percent. Also, look for motor oil that says "Energy Conserving" on the API performance symbol to be sure it contains friction-reducing additives.
- Fixing a car that is noticeably out of tune or has failed an emissions test can improve its gas mileage by an average of four percent, though results vary based on the type and quality of the repair.
- Fixing a serious maintenance problem, such as a faulty oxygen sensor, can improve your mileage by as much as 40 percent.
- The difference between a car that gets 20 MPG and one that gets 30 MPG amounts to \$550 per year (assuming 15,000 miles of driving annually and a fuel cost of \$2.20).
- The town could reuse motor oil after filtering and refurbishing. On a small scale it may be economical to filter and/or refurbish used oil. The economics of this would have to be looked at, as the equipment is easily homebuilt and used. The state of North Carolina's motor fleet once reused its own motor oil with a state-government-built re-refining system.

7.0 Landscaping in the Town's Traffic Islands

Landscaping ideas and water conservation in the town traffic medians would essentially be the same as landscaping in the town hall but on a smaller scale. Below are some of those cost saving ideas.

- Some nearby buildings or stormwater catch basins will capture rainwater which can be used for traffic island landscaping and dust control.
- Select only drought-tolerant plants for the landscaping. Expensive plants are even more costly if they have to be constantly watered during hot weather. Select plants that can stand heavy watering periods for those rainy days vehicle tires keep splashing the plants.

- Train plants to root deeply by not over watering.
- On hot days in bright sun as much as half the water never reaches the plant, if watering takes place during the heat of the day. Water only according to plant needs and during the cooler part of the day, such as early morning or at night.
- Consider using community service, volunteer students or landscaping clubs to maintain landscaping. Student projects in landscaping could be used to educate the public on water conservation and landscaping. Teachers with horticulture expertise could supervise the projects.
- Composting landscaping waste can save the transportation costs and landfill fees. A well-designed composting station can turn most food waste and landscape cuttings into usable landscaping soils in less than three weeks.
- Allow local area schools to grow seedlings as class projects for the town to use in the traffic islands. It can save costs and be good public relations.

8.0 DPPEA Services

8.1 Pollution Prevention Training

Employee training is an integral aspect of any waste reduction program. Waste reduction/pollution prevention training that focuses on employee awareness and stresses continuous process improvement can lead to improved environmental programs and cost savings. DPPEA provides various training services. These include:

Management Awareness Training - Training on the importance of waste reduction from an economic and environmental standpoint and how to implement a waste reduction program

Train-The-Trainer Training - Process specific or facility-specific training for waste reduction teams on waste reduction options for the facility. Training includes:

- Facilitated brainstorming session to identify and rank options;
- Fundamental material balances and waste identification;
- Discussion of potential barriers to implementation; and
- Implementation plans development.