

TOWN OF MANCHESTER, CONNECTICUT
ENERGY CONSERVATION INITIATIVES



Status Report

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CONTENTS

Introduction & Summary.....	2
Current Initiatives.....	3
Energy Efficiency and Conservation Block Grant.....	3
Other Facility Energy Efficiency Improvements.....	4
Renewable Energy Credits.....	4
Solar Energy.....	5
EPA Community Energy Challenge.....	5
Energy Efficient Machinery.....	5
Fuel Efficient Vehicles.....	6
Anti-Idling Policy.....	6
ISO-NE Program.....	6
Compact Fluorescent Streetlights.....	7
LED Traffic Signals.....	7
Reusable Grocery Bags.....	7
Preliminary Energy Audit Recommendations.....	8

INTRODUCTION & SUMMARY

In order to both stabilize and reduce its energy costs, and to take leadership in averting the effects of global warming and global fuel consumption, the Town of Manchester has considered a number of options towards a concentrated effort to identify and implement methods of reducing municipal energy consumption. This report serves as an update to the 2008 status report by providing a summary of energy conservation measures to date and the Town's progress in pursuing a number of ongoing efforts.

The following table summarizes the efficiency measures covered in this report, as well as their current implementation status.

CURRENT INITIATIVES	Status
Energy Efficiency and Conservation Block Grant (EECBG)	Received award in September 2009; currently working on procurement of facility energy efficiency improvements
Other Facility Improvements	Numerous recommendations identified in Preliminary Audit Report; funding of further measures to be considered after completion of EECBG-funded improvements
Renewable Energy Credits	Issued RFP and selected provider; currently purchasing REC's
Solar Energy	3kW panels installed through 20/10 program in October 2009; power purchasing agreement considered by Board of Directors in September 2008 but was ultimately not pursued
Community Energy Challenge	Enrolled, and data is being gathered using EPA web application.
Energy Efficient Machinery	Installed as current equipment needs replacement
Fuel Efficient Vehicles	Several 2009 hybrids purchased by Town
Anti-Idling Policy	Town policy implemented
ISO-NE Program	PD & New State Road Well are enrolled
Compact Fluorescent Streetlights	Pilot Program in Place; now being installed in new subdivisions and during replacement of older fixtures.
LED Traffic Signals	Widely Implemented
Reusable Grocery Bags	Purchased 2,000 for sale to residents; 365 have been sold as of the writing of this report

The latter half of this report details the recommendations provided in the Preliminary Audit Report submitted by Siemens in 2009. These recommendations will be considered following completion of the EECBG-funded facility improvements, and will be taken into consideration during the course of regular capital improvement projects in Town buildings.

CURRENT INITIATIVES

Energy Efficiency & Conservation Block Grant (EECBG)

Manchester participated in a program hosted by the Connecticut Conference of Municipalities, through which Siemens Building Technologies provided the Town with an energy audit of its major facilities to determine areas where energy cost savings can be realized through investment in new machinery or technologies. The audit was completed in January 2009 and the report was presented in April, 2010. Based on the recommendations of the report and the significant energy savings projected for a number of facility improvements, the Town decided it would complete some of the more cost-effective facility improvements using funding from the Energy Efficiency and Conservation Grant (EECBG), for which Manchester was allocated \$533,700 in federal Recovery Act funds.

In June of 2009, the Town of Manchester entered into a Letter of Intent with Siemens to conduct a detailed energy audit, focusing on basic facility envelope improvements across all Town buildings, as well as a comprehensive evaluation of Town Hall, the Lincoln Center, and the Police Department. Based on that report, the Town developed a proposal for the use of EECBG funds, which was approved in September, 2009. The Town of Manchester has since begun working on developing bid specifications and hopes to begin work in the fall of 2010.

The following table lists the projects currently slated to take place through EECBG funding. The listing of projects is subject to change based on the final cost of work and any logistical issues that may arise.

Building Envelope Improvements- includes caulking building joints that are allowing air to escape, sealing window frames, enhancing existing roof insulation, installing weatherstripping, closing any penetrations or openings that may be allowing heat loss, and so forth.

- Board of Education Central Office
- Botticello Public Works Facility
- Bowers Elementary School
- Community Y
- Fire Station #1
- Fire Station #2
- Fleet Facility
- Lincoln Center
- Lutz Children's Museum
- Mary Cheney Library
- Police Department
- Police Department Garage
- Probate Court
- Senior Center
- Town Hall
- Waddell Elementary School
- Weiss Center
- Whiton Library

Vending Machine Controls- vending machine occupancy controllers (VMOCs) will be installed for three cold beverage vending machines at the Police Department. These will operate similar to lighting occupancy sensors so that the machines are only operating when people are in the room, but also includes timing features in order to maintain contents at a refrigerated temperature.

Lighting and Lighting Controls- lighting improvements will be conducted at Town Hall, the Lincoln Center, and the Police Department. The improvements will include installation of super-saver ballasts and lamps, replacement of incandescent lamps with compact fluorescent bulbs (CFL), and installation of occupancy sensors that will turn lights off after 10 minutes of inactivity in a given room or area.

Demand Control Ventilation- the Police Department will be equipped with controls and carbon dioxide sensors which will limit or interrupt heating or cooling when an area of the building is unoccupied.

Other Facility Energy Efficiency Improvements

The energy audit report issued by Siemens includes a wide range of recommendations, which in totality exceed the amount of funding provided through the EECBG program. These additional improvements will be considered for implementation at a later date, pending the availability of funds or desirable financing opportunities. A detailed discussion of these recommendations is included in the latter section of this report.

Prior to conducting the energy efficiency audit, the Town of Manchester was already engaged in a number of energy-saving efforts.

The Town of Manchester replaced a large number of T12 lamps with T8's in 2004 during the CL&P energy audit, which also saw the installation of occupancy sensors in the Town's major facilities. A few of the smaller Town buildings still have some T12 lamps in place, but these are being continuously replaced with T8's as ballasts wear out. All old T-12's are sent to a bulb recycling facility.

Additionally, the regular capital improvement plan includes a number of measures that improve energy efficiency in facilities, including routine window replacements, re-roofing projects, HVAC upgrades, and any energy efficiency and envelope improvements conducted during the course of building renovation projects.

Renewable Energy Credits

As participants in the State's 20/10 program, the Town has arranged to purchase 20% of its electricity (approximately 4,230 MWh per year) through the form of renewable energy credits (REC's). Under this arrangement, the Town continues to receive its electricity from conventional means through Trans-Canada, but by purchasing the REC's at the cost differential between conventional and wind energy, the Town subsidizes renewable energy production in locations where it is available, thereby reducing the overall carbon footprint of human energy production.

The Town of Manchester currently contracts with Constellation New Energy for the purchase of approximately 4,300MWh of renewable energy credits in the fiscal year beginning July 1, 2010, at a cost of \$6.38 per MWh.

Solar Energy

20/10 Program: Through the Town's participation in the 20/10 program, the Town is entitled to receive 3kW of solar panels at no cost from the Connecticut Clean Energy Fund (CCEF). A consultant contracted through CCEF inspected four sites proposed by the Town to assess their suitability for the project, and the Manchester High School was chosen for the installation of 3kW of photovoltaic panels. The panels were installed in October, 2009, and a ribbon-cutting ceremony was conducted to commemorate the event. As of August 17, 2010, the panels have generated 3,395 kWh of electricity since it started data-logging in January, which should equate to approximately 5,820 kWh per year.

Solar RFP: On July 31st 2008, the Town received and reviewed proposals for the provision of solar panels under a power purchasing agreement (PPA). Two proposals were received, and only one was deemed to be responsive. The proposal would involve entering into a 20-year PPA, with a buyout option in year six, whereby the Town would pay 12 cents per kilowatt-hour, escalated at 3% per year, for 200kW of solar panels. The results of the RFP were discussed at the Alternative Energy Subcommittee meeting on September 4, 2008, and several concerns were raised, particularly regarding the 20-year duration of the agreement. No action was taken, and the proposals expired on October 29, 2008.

Other Considerations: Ideally, Building-Integrated Photovoltaics (BIPV's) could be incorporated into new construction, which has the added advantage of reducing material costs because the cells would double as building envelope components. There may also be some smaller auxiliary uses that could be explored.

EPA Community Energy Challenge

In August, 2008, the Town of Manchester enrolled in the EPA Community Energy Challenge, through which the Town pledges to set a 10% energy consumption reduction goal within a feasible timeframe. As a member, the EPA provides the Town with a vast variety of online resources for energy tracking, benchmarking, identifying programs and incentives, ideas for energy conservation, and so forth.

The Town of Manchester has started to record energy data for select facilities using the EPA Energy Star Portfolio Manager web tool, which will provide useful information regarding facility efficiency and the effectiveness of energy conservation measures. The first major improvements in facility energy consumption are expected following the completion of the EECBG-funded facility improvement projects.

Energy Efficient Machinery

As energy efficiency technologies advance, appliances and machinery are consistently improving in terms of the amount of energy they use. Several standards, particularly Energy Star, are employed to indicate to what degree different products meet the most current energy standards.

As machines and appliances are replaced, higher levels of energy efficiency are almost always realized. Energy efficiency is generally accounted for when large purchases are being considered. The Town may improve its degree of energy-efficient purchasing by establishing a policy that prescribes energy

efficiency standards or requires energy efficiency to be accounted for in bid specifications and equipment replacements.

New boilers have been installed at Town Hall and the Weiss Center at the time of this writing. New boilers at Globe Hollow Water Treatment Plant were installed last year. The Bennet School boiler was recently replaced as part of their renovation project, generating significant cost savings. Most of the Town large boilers are less than 12 years old and are 80%-84% efficient; older boilers are replaced with more efficient ones at the end of their life cycle.

CL&P also offers incentives through its Energy Efficiency Opportunities Program for high-efficiency machinery, including HVAC, water source heat pumps, and motors, which the Town has consistently taken advantage of.

Fuel Efficient Vehicles

The Town of Manchester has made it a practice to consider hybrid vehicles and other fuel-efficient options for all vehicle purchases made by Town departments. Currently the Town fleet includes three hybrid 2009 Honda Civics in the Public Works Administration department, three hybrid 2009 Ford Escapes in the Building Inspection department, and a hybrid 2009 Ford Escape in the Building Maintenance department.

Anti-Idling Policy

The General Manager, in conjunction with the Police and Fire Departments, Water and Sewer Departments, and the Department of Public Works, recently enacted an Anti-Idling Policy, effective October 20, 2008. This policy prohibits vehicle operators from leaving vehicles and machines running when not in use in excess of three minutes (with specific exceptions). This policy aims to reduce the air pollution from vehicle and equipment exhausts, create a healthier environment, promote energy (fossil fuel) conservation, reduce noise pollution and reduce wear and service needs on Town vehicles and equipment. Each department has a more detailed policy for their operations which must comply with the Town's "umbrella" policy. These policies are available upon request.

ISO-NE Program

Currently the Town of Manchester participates in the ISO-NE's Demand Response Program. This program provides the Town with annual monetary incentives for agreeing to run on generators and remove themselves from the power grid upon request, in situations where a reduction in total grid demand is necessary. Currently the Police Department and the New State Road Well participate. As new generators are installed at Town facilities, the potential for inclusion into the ISO-NE program will be considered, pending continuation of this program.

Compact Fluorescent (CFL) Streetlights

In 2007, over a dozen CFL's were installed in the Parker Village region of Manchester. The Town's experience thus far has shown that the lights are comparable to maintain and are more aesthetically-pleasing than their traditional counterparts, and would be appropriate for residential use on high-set fixtures due to their relatively narrow emission range.

Currently, CFL's are being utilized as replacements for the decorative cedar pole fixtures that were installed in the 1970s in several areas of town. CFL's are also used for new developments, although there has not been a great deal of subdivision development activity over the last few years.

LED Traffic Signals

Unlike the incandescent-based lamps, which use a single large bulb, the LED-based lamps consist of an array of LED elements, arranged in various patterns. When viewed from a distance, the array appears as a continuous light source.

LED-based lamps (or 'lenses') have numerous advantages over incandescent lamps; among them are:

- Much greater energy efficiency (can be solar-powered).
- Much longer lifetime between replacement, measured in years rather than months.
- Brighter illumination with better contrast even in direct sunlight.

The Town of Manchester implemented this technology in 2002 and has replaced all traffic signals with LED displays, and incandescent pedestrian walk lights are being replaced with LED's on an ongoing basis. The Department of Public Works has recently entered into a deal with the CT Department of Transportation to purchase LED's for the Town's crossing signals. Experience has shown that the energy savings from LED walk signals compensate for the replacement cost in as little as 8 months.

Reusable Grocery Bags

In September 2008 the Alternative Energy Subcommittee approved the purchase of 2,000 reusable grocery bags, made of recycled materials, at a cost of \$2.00 each. The bags can be used in place of plastic and paper bags, which contribute to solid waste production in the United States. Since the bags were received, 365 of them have been sold to date.

PRELIMINARY ENERGY AUDIT RECOMMENDATIONS

These recommendations are taken from the Preliminary Audit Report submitted by Siemens Building Technologies, Inc. and do not necessarily reflect the opinions and recommendations of Town staff.

Lighting Retrofits:

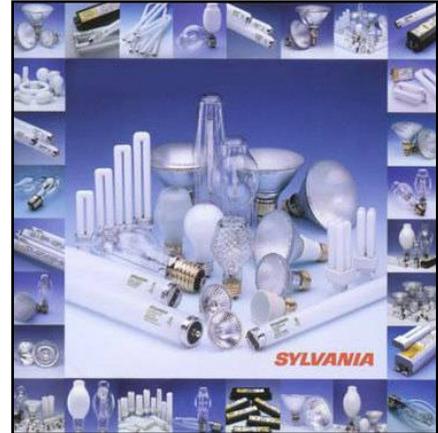
The Energy Audit recommends replacing any existing T-12 fluorescent lamp fixtures with efficient T-8 high lumen output fluorescent lamp fixtures and high efficiency electronic ballasts.

The Town may also investigate the possibility of replacing the existing four lamp T-8 fluorescent fixtures with two lamp T-8 fixtures that have reflectors installed on them.

In facilities with higher operating hours the report recommends investigating the possibility of retrofitting the existing T-8 fluorescent fixtures with Super T-8 fluorescent fixtures.

Additionally, any existing metal halide lamps could be replaced with T-5 fluorescent lamp fixtures and high efficiency electronic ballasts that will consume much less power while matching or exceeding the existing light levels.

The Town of Manchester replaced a large number of T12 lamps with T8's in 2004 during the CL&P energy audit, which also saw the installation of occupancy sensors in the Town's major facilities. A few of the smaller Town buildings still have some T12 lamps in place, but these are being continuously replaced with T8's as ballasts wear out. All old T-12's are sent to a bulb recycling facility. Further lighting retrofits will be conducted at the Police Department, Town Hall, and the Lincoln Center as part of the Energy Efficiency & Community Development Block Grant (EECBG).



Occupancy Sensors:

The majority of the areas in most of the facilities have sensors already installed. There are however, a few areas in all of the facilities where there are still opportunities for sensors to be installed. This includes the hallways, garage areas, offices and other miscellaneous areas.

Data loggers can be installed throughout a sampling of areas during a detailed audit to clearly quantify the potential for savings.

The Town's major facilities were fitted with occupancy sensors by CL&P in 2004. Some of the smaller facilities were not fitted with occupancy sensors because the potential savings were too small to justify the cost of installation. Nonetheless, many of these remaining facilities have been retrofitted with occupancy sensors since then, and installation is ongoing as opportunities present themselves. Additional occupancy sensors will be installed at the Police Department, Town Hall, and the Lincoln Center, which will also be funded by the Energy Efficiency & Community Development Block Grant (EECBG).



Energy Management System (EMS) Installation/Optimization

In order to reduce energy consumption and improve occupancy comfort at the facilities, the audit report recommends installing new Direct Digital Controls or optimizing the existing EMS, which electronically manage heating and cooling within facilities.

The following are some of the proposed control sequences which will be used to save energy and reduce operating costs:

Night Setback:

By implementing this EMS strategy, the energy required for heating or cooling during unoccupied hours is reduced by lowering the heating space temperature set point or raising the cooling space temperature set point. For example, the space temperature can be reduced from the normal winter inside design temperature (70°F -72°F) to a lower space temperature (55°F - 60°F) during the unoccupied periods.

The major town buildings have automated temperature controls that allow for remote access. All spaces are set for evening and weekend temperature setbacks. Installation was completed in 2008 at the Public Works facility. Difficulties often arise in older buildings where there are “hot spots” and “cold spots” due to building design and envelope issues.

Scheduled Start/Stop:

The scheduled start/stop program consists of starting and stopping equipment based on the time of day and day of week. Scheduled start/stop is the simplest of all EMS functions to implement. This program provides the best potential for energy conservation by turning off equipment or systems during unoccupied hours.

Town Hall, Lincoln Center and Weiss Center have timed on/off systems.

Optimum Start/Stop control of HVAC System Equipment:

The scheduled start/stop program previously described is refined by automatically adjusting the equipment operating schedule in accordance with space temperatures and outside air temperature. In the scheduled start/stop program, HVAC systems are started prior to occupancy to cool down or heat up the space on a fixed schedule independent of outside air temperature and space conditions.

The optimum start/stop program automatically starts and stops the system on a sliding schedule. The program will adjust start/stop time by taking into account the thermal inertia of the structure, the capacity of the HVAC system to either increase or reduce space temperatures, outside air temperature conditions, and current space temperatures, using prediction techniques.

These techniques determine the latest time for starting HVAC equipment to satisfy the space environmental requirements at the beginning of the occupied cycle, and determine the earliest time for stopping equipment at the end of the work day.



Demand Control Ventilation

Heating and cooling energy will be saved if ventilation air (i.e. outside air) is reduced during the occupied period. The quantity of ventilation in a demand control ventilation system is based on maintaining a tracer gas, carbon dioxide (CO₂) as an indicator of indoor air quality. Sensors would be installed to measure the building air CO₂ concentration. During unoccupied periods the outside air dampers are closed.

New EMS systems allow facilities to monitor the energy consuming equipment in the building remotely in real-time, track the facility energy performance, and remotely adjust set points and schedules to optimize the facility operation.

Demand control ventilation sensors and programming will be applied at the Police Department as part of the Energy Efficiency & Community Development Block Grant (EECBG).

High Efficiency Boilers



Boilers that are more than 25 years old present a maintenance liability due to their age and do not take advantage of design improvements in recent years that improve boiler efficiency and performance. Boiler inefficiencies include poor combustion efficiency, old and inefficient heat transfer design and excessive jacket heat losses due to a lack of insulation and increased surface area over contemporary boilers.

The audit report recommends the replacement of old inefficient boilers with new boilers that have improved combustion efficiencies and thermal efficiencies.

New high-efficiency boilers incorporate several features to increase their Annual Fuel Utilization Efficiency (AFUE). The AFUE rating indicates what percentage of the energy in the fuel is converted into usable heat. A new, high-efficiency boiler has an AFUE rating of 87% or greater while older boilers typically have AFUE ratings from 70% to 75%. Power burners, electronic spark ignition and pulse combustion are all more efficient methods of burning the fuel. A new high-efficiency boiler incorporates these improvements.

New boilers have recently been installed at Town Hall and the Weiss Center. New boilers at Globe Hollow Water Treatment Plant were installed in 2007. The Bennet School boiler was recently replaced as part of their renovation project, generating significant cost savings. Most of the Town large boilers are less than 12 years old and are 80%-84% efficient; older boilers are replaced with more efficient ones at the end of their life cycle.

CL&P also offers incentives through its Energy Efficiency Opportunities Program for high-efficiency machinery, including HVAC, water source heat pumps, and motors, which the Town has consistently taken advantage of.

Premium Efficiency Motors and Variable Frequency Drives

Energy savings can be obtained by replacing the standard efficiency motors with energy efficient motors in the existing HVAC units, exhaust fans and water pumps with premium efficiency motors. This is especially true wherever motors are three horsepower (HP) or larger, and operate for a majority of the year. Energy-efficient electric motors reduce energy losses through improved design, better materials, and improved manufacturing techniques. With proper installation, energy-efficient motors run cooler and consequently have higher service factors, and longer bearing and insulation life.

In addition the town may install Variable Frequency Drives (VFD's) on motors driving fans and pumping systems that are not required to be at 100% load most of the time. A VFD will reduce the operating speed of the motor to effectively match the output of the fan or pump to the systems requirements. The flow rate of the fan or pumping system is also reduced with the reduction in motor speed. The VFD will either be individually programmed to maintain system operating parameters with feedback from system monitoring sensors or can be modified via an energy management system (EMS) that will provide the necessary feedback to the VFD through monitoring sensors.



Most newer HVAC units utilize this technology, and Bennet, Manchester High, and Illing have all had recent HVAC replacements. CL&P offers up to \$9,290 for retrofitting through its Energy Efficiency Opportunities Program.

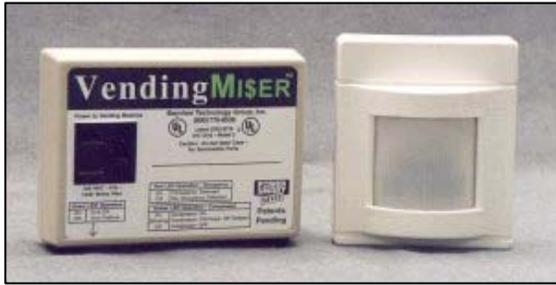
Building Envelope Improvements

Air leakage has been shown to represent the single largest source of heat loss or gain through the building envelopes of nearly all types of buildings. Beyond representing potential for energy savings, uncontrolled air leakage can affect the thermal comfort of occupants, air quality through ingress of contaminants from outside and the imbalance of mechanical systems. The structural integrity of the building envelope can also be compromised through moisture migration. Control of air leakage involves the sealing of gaps, cracks and holes, using appropriate materials and systems, to create, if possible, a continuous plane of air-tightness to completely encompass the building envelope.

A thorough analysis of the facility exteriors was performed during the detailed energy audit to determine the precise scope of work, of which a number of buildings are being funded through the EECBG grant.



Vending Machine Controls



In order to minimize the unnecessary operation of electrical devices, the audit report recommends installing plug load controllers on all vending machines located throughout the facilities. A typical cold drink machine will consume nearly 4,000 kWh annually, resulting in a utility cost of more than \$600 per machine per year.

On refrigerated cold drink machines, controls would be installed that utilize a passive infrared (PIR) sensor and completely powers down a vending machine when the area surrounding it is unoccupied. Once powered down, the unit will monitor the room's temperature and use this information to automatically re-power the vending machine at one- to three-hour intervals, independent of occupancy, to ensure that the vended product stays cold.

The control device also monitors electrical current used by the vending machine. This ensures that the unit will never power down a vending machine while the compressor is running, so a high head pressure start never occurs. In addition, the current sensor ensures that every time the vending machine is powered up, the cooling cycle is run to completion before again powering down the vending machine.

The plug load controllers are easily installed and virtually transparent to visitors and staff. Unnecessary run hours and, therefore, energy consumption will be reduced with no interruption of normal facility activities.

Vending machine controls will be installed at the Police Department as part of the EECBG program.

Pipe Insulation

Although heat loss from a boiler's distribution system can vary significantly depending on system design, materials, and operating conditions, proper pipe insulation can conserve large amount of energy. Insulation can help on almost all piping for distribution systems, including primary and branch lines, condensate return lines, and even pipes that carry heated fuel oil. In hot water systems, insulation will prevent heat losses and reduce recirculating pump power requirements.

A more in depth study of the uninsulated sections of piping would be required to identify specific areas where pipe insulation may be beneficial in town buildings.

Steam System Improvements

Steam Traps:

A dedicated steam trap maintenance project every year or every two years is recommended by the audit report. Properly selected and maintained steam traps provide a clean gateway for condensate and noncondensable gases and allow a steam system to work at its maximum potential. If steam contains moisture, it loses some of its ability to transfer heat. Furthermore, if a trap fails because of lack of proper maintenance or even if the trap is not properly selected, costly dollars will be spent for unnecessary energy consumption.



Among the ways that a trap fails is by allowing steam to escape, even small leaks can be very expensive.

Repair Steam Leaks:

Most facility systems contain at least a few areas where steam and/or condensate is leaking, resulting in wasted energy. Steam leaks can occur in several locations that would typically include high pressure steam flanges, packing leaks in high and medium pressure valves, holes in return lines, receiver pumps leaking, receiver tanks leaking through their fittings, etc. Steam leaks cause: (1) steam to be lost to the atmosphere and not delivered to the location it is needed (2) additional make-up water consumption to replace the lost steam and (3) more steam required to heat the facility and equipment.

Install Thermostatic Radiator Control Valves:

Many of the radiators and fin tube convectors in some of the facilities still have manual control valves. Given the age of the valves, many of these valves are beyond their useful life. In some cases the occupants do not understand or know how to adjust them. As a result, there are several areas that are overheated resulting in uncomfortable conditions and excessive waste of heat.

The audit report recommends the installation of reliable thermostatic radiator valves to improve the control of the heating system and reduce the need to open windows to control temperature in the buildings. This will not only reduce energy, but also improve the comfort of the occupants as well.

Recommissioning of HVAC Equipment

HVAC equipment does not operate as originally intended over a period of time. Damper actuators are normally found disconnected, valves are found without actuators thus eliminating any means of proper space control and filters are found with a thick film of dust on them prohibiting proper air flow to the space. These are elements that have an impact on the energy consumption and performance of existing HVAC equipment as well as their life expectancy.

In order to ensure proper operation of the existing systems, the audit report recommends recommissioning the existing HVAC system. Recommissioning is critical for verifying that the systems continue to function at their peak efficiency and effectiveness throughout their lives. In addition, it recognizes the importance of documenting inevitable building changes and their effect on the systems serving the building. Recommissioning will prevent the building from spiraling out of control and triggering the need to start over again with a new retro-commissioning process.

The benefits of recommissioning include:

- Continued energy savings associated with properly operating systems
- Continued safe operation of critical spaces such as laboratories
- Continued environmental control criteria adherence for critical spaces
- Documented proper ventilation system operation to help avoid complaints and litigation
- Extended life expectancy of equipment through the periodic verification of proper operating parameters

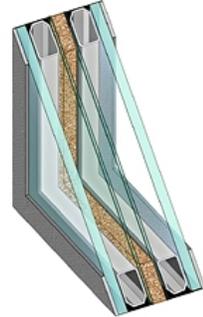
To date, other than air balancing, complete building recommissioning is not required at Town facilities. Lincoln Center should be considered for air balancing recommissioning. Establishing a practice of commissioning new construction projects should also be considered.

There would need to be a determination as to whether commissioning costs would be reimbursable under Connecticut school construction financing guidelines; however, the State Department of Education's

Ineligible and Limited Eligible Cost Worksheet did not list commissioning as an ineligible or limited-eligible expense, so it is unlikely that commissioning costs would be exempted from reimbursement.

Energy Efficient Windows

The existing window system in some of the buildings is part of the original building(s) construction. Many of the window frames have gaps, which allow air to infiltrate through them. The existing glazing is inefficient and allows a substantial amount of heat to transfer out through the glass during the winter months, and into the space during summer months. Moreover, this glazing system allows much of the sun's radiant heat to penetrate, making building occupants uncomfortable in perimeter areas.



The report proposes to replace the existing single-pane window system with a new energy efficient system. The recommended new window system would be comprised of new double-pane, low emissivity (“low-e”), high-performance glass with aluminum trim.

Implementation of this measure will reduce heat losses in the winter and heat gains in the summer, as well as reducing infiltration losses, thereby producing energy savings all year long. The occupants will benefit from improved comfort, especially when seated near windows. In addition, the new window system will greatly improve the aesthetic appearance of the building. The new windows would also close more completely, adding to the safety and security of the building.

The Town takes the opportunity during new construction and renovations to install thermally-glazed windows, which are designed to minimize thermal conductivity. New thermal windows have most recently been installed at the Whiton and Mary Cheney Libraries, Bennet 6th Grade Academy, Manchester High School, the Fire Museum, and the Probate Court facility. Replacing windows strictly for energy efficiency gains prior to the completion of a window set's useful life is not advisable given the high cost and long payback period (approximately 20 years) associated with energy efficient window replacements.