



CCSU Sustainability Initiatives

November 2011

Sustainability measures including energy efficiency help fulfill the CCSU mission tenets of **maximizing available resources** and **providing safe and respectful learning environments**. The following is a list of some of the steps we have taken so far:

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- Project Planning:** Sustainability is always a significant consideration when planning projects.
- The entrance and main office renovation at Hiawatha in 2011 included a vestibule with air lock to prevent heat loss.
 - The sidewalk was replaced at Westford in 2011. The sidewalk pitches away from the building to prevent water damage to the building.
 - Renovations on Park Street School in 2009 saved a significant amount on our natural gas bill. In the winter after the renovation, we spent approximately 75% less than the previous winter.
 - EJSJ received nearly \$3K in Efficiency Vermont grants for various projects at ADL and Fleming in 2008 which saved 26,000 KWH.
 - Wise energy decisions during the OneCampus project yielded nearly \$77,000 from Efficiency Vermont to offset our costs. The estimated energy savings was nearly 550,000 KWH/year.
 - Center for Technology, Essex (CTE) renovated the building at 51 Park Street after taking ownership in 2001. The renovation made the building more energy efficient through the installation of a new roof, windows, insulation, and heating, ventilation, and air conditioning. This building is now owned by the U#46 District and houses the CCSU Central Office – CCSU now pays rent to a member district versus a private company.



Energy Efficiency: More can always be done, but we continually look for opportunities and are in very good shape.

Natural Gas Usage

The three-year average natural gas usage from FY'08-10 was 226,017 CCF in the Educational Center and 156,213 CCF in Essex Junction School District (EJSJ). These amounts dropped to 224,106 CCF and 150,811 CCF respectively from FY'09-11.

Electricity Usage

The three-year average electricity usage from FY'08-10 was 3,218,329 KWH in the Educational Center and 1,157,371 KWH in EJSJ. These amounts dropped to 3,112,967 KWH and 1,104,105 KWH respectively from FY'09-11. Westford's peak usage has dropped 11,500 KWH from FY'07 to FY'11.

Independent Assessments

- A community member recommended we contact two energy efficiency companies during the winter of 2008-09 to assess the Educational Center. In addition to assessing the Educational Center, we asked the companies to review our overall HVAC system for U#46 and EJSJ. The mission of the first company was to reduce the carbon footprint of buildings and they focused on the Educational Center's building environment. This company had no recommendations after their initial visit. The second company was focused on HVAC and electrical. After two visits and several follow-up discussions, the company sent an e-mail stating, "It's great to see someone who has a handle on energy use. This is the best school that we've seen by a mile. Keep up the excellent work!" They went on to say that they didn't feel they could "appreciably impact [our] energy use."

Heating, Ventilation and Air Conditioning (HVAC)

- Variable speed drives were installed on four air handlers in the Educational Center gymnasium and auditorium in 2010 with an estimated savings of more than \$5K/year. Efficiency Vermont offered a cash incentive of \$2K toward the cost of these improvements.
- Carbon Dioxide (CO2) sensors were installed in the Summit and Fleming auditorium/gymnasium during the summer of 2011. Air handlers will only operate as needed for CO2 ventilation and temperature control. CO2 sensors are also in place in the Educational Center gym and auditorium.
- Heaters in various CTE areas were upgraded in 2011 which allow for separate operation depending on need versus all of the heaters coming on together.
- Burners were replaced in 2011 at ADL, Summit, and Hiawatha. The old burners were over 25 years old and old technology. The new burners have electronic control for flame and gas flow and modulate the flame depending on the heating demand.
- All unit ventilators in the Educational Center were replaced in 2007 and no school has in-classroom unit ventilators/heaters older than 1995 – newer units are more energy efficient.
- In 1998, a Munters Dehumidifier was installed in the rink saving \$9-11K per year on electricity and natural gas. VT Gas and Green Mountain Power were instrumental in the project and the investment breakeven was only 3.4 years.
- Essex Junction Recreation and Parks (EJRP) and every school located in Essex Junction is connected to a central Direct Digital Control (DDC) system with matching thermostats for every room, boiler, unit ventilator, air handler, base board radiator, AC unit, heat pump or refrigeration unit. Boilers are alarmed for low water or flame failure. When there is any type of failure from pre-set perimeters, a technician is called 24/7/365 and the situation is corrected within an hour. The system is web-based, so it can be checked and adjusted from anywhere in the world. Heating and ventilation is tracked 24/7 with alarms in place if settings are changed from a pre-set schedule. All buildings are on a master schedule and go on night set-back for heating and AC.
- The skating rink/rink addition has a heat recovery system that recovers the heat from the rink refrigeration plant to preheat water for the boilers and domestic hot water.
- All boilers have energy efficient burners.
- Pumps and motors have variable speed drives.
- Air quality is sampled/tested in our schools to make sure the mixture is correct.
- Filters are changed at least twice per year. Concurrently, all units are serviced from belts to motors to greasing and anything else discovered during routine maintenance.

Capacitor Banks

- The Educational Center and rink have capacitor banks to correct our power factor driven by numerous motors. This eliminates the power factor penalty on our bill by keeping the amperage and voltage in synch on the alternating current cycle and making it usable power. Without the banks, some power would become unusable, but would still be charged.

Lighting

- Multi-switching is utilized for gym lights at the Educational Center, Rink, ADL, and Fleming (T5 High Output 55 watt fixtures). Multi-switching is also utilized at Westford.
- T12 lamps (40 watt) have been replaced with T8 lamps (28 watt) at all schools.
- Motion sensor activated lights are installed in all classroom, closets and offices at Westford. Similar lights are being tested in the rink at several locations (such as hallways and bathrooms). If successful, we will expand to other locations.
- Efficiency Vermont has supported many projects in U#46, EJSD and Westford since 2001 and estimates our savings at 771,000 KWH/year or approximately \$200,000 through FY09.

- Provided approximately \$13.0K of the \$15.6K required to install 68 30 watt lights in place of existing parking lot lights ranging from 150 to 400 watts. The lights were replaced in the fall/ winter of 2011 at the Educational Center, Central Office, Park St School, Fleming, Hiawatha, Summit, and EJRP. The net cost was about \$2.6K, but the annual savings is estimated at \$2.5K.

- Purchased 8,500 T8 lamps (bulbs) for the Educational Center in the summer of 2011 saving the district over \$23K. We replace lamps in the Educational Center every three years since that is about the life span of lamps. Wholesale replacement is less time-consuming than replacing individual lamps as they burn out. In addition, lamps use more electricity as they age. The replacement cycle also ensures that we have the most energy-efficient lamps available.

- Accomplished a lighting audit at the Educational Center and all EJSD schools during the February 2009 vacation. In May 2009, they funded projects valued at \$178K in EJSD schools and \$23.4K in the Educational Center. In EJSD schools, almost all of lighting was replaced and the first year savings was calculated at \$25.9K. In the Educational Center, there was less that could be done due to our ongoing efforts. However, lighting was replaced in a few classrooms, offices, locker rooms, bathrooms and storage areas and motion sensors were placed in some hallways. The first year savings in the Educational Center is estimated at \$3K.

- Provided a cash incentive of more than \$6K for efficiency improvements at the Educational Center's Ag Building, with estimated yearly savings estimated at nearly \$2K and more than 15,000 KWH. This project was also completed in the summer of 2009.

- Provided a cash incentive of \$12K for lighting projects at Westford in 2009.

- Performed an assessment at EJRP in 2009 and provided funding for new

fixtures.

Windows

- Nearly all windows are energy efficient thermal glass. In April 2009, we replaced about 20 small single pane windows at ADL at a cost of \$4.1K. Westford still has some single-pane windows that need to be replaced.

- In January 2002, we had a Heat Loss Scan of windows at the Educational Center. The results led to some changes such as re-glazing certain windows. Some windows didn't perform as well as we would have liked, but the estimated breakeven point on the investment was 15-20 years. We are updating cost estimates in the event grants become available.

Hot Water

- A new energy efficient instantaneous hot water heater was installed at the Educational Center in 2010 when a 3,500 hot water tank failed. The new system is estimated to be 60-70% more efficient.

Appliances

- New energy efficient dishwashers were installed in 2011 at the Educational Center and ADL when the existing dishwashers began to fail. Payback at the Educational Center was estimated at less than 3.5 years due to less natural gas use in heating the water and less water usage (1.4 gallons per load versus 3.4). Payback at ADL was estimated at 2.5 years due to less natural gas use in heating the water, switching from a high temperature machine to low temperature, eliminating an electric hot water booster (\$524 savings per year), and a 50% reduction in water usage per load. VT Gas contributed \$760 toward the Educational Center machine.


- Kitchen renovations at Summit Street and Hiawatha in 2009 and 2010 included installation of energy efficient appliances.

- An energy efficient dishwasher was purchased at Westford in 2001 and two refrigerators were removed from the staff room and replaced with a single, energy efficient unit.

Information Technology

- Desktops, Notebooks, Servers and Workstations are purchased with the Energy Star® rating. Our computers have highly efficient power supplies and other hardware specific features that, based on EPA estimates, could annually: (1) save up to 130 kWh of electricity per machine; and (2) prevent up to 200 lbs of green house gas emissions per machine.

- All but a handful of specific, special use desktops are set to automatically shut off at the end of the day.



Alternative Energy: The solar array doesn't generate much savings and there hasn't been an opportunity to seriously explore wind energy alternatives.

Solar

- The Educational Center was awarded a \$50K "Solar in Schools" grant in 2010 to fund additional photovoltaic (PV) panels. In addition, we received \$24.7K from the Vermont Small Scale Renewable Energy Incentive Program. As a result of receiving these funds, during the summer of 2010, we were able to install an additional 12.65kW worth of PV panels which are compatible with original array purchased in 2009. Information related to the performance of the array can be viewed at the following link:

<https://services.wattmetrics.com/dashboard.aspx?siteId=63#/dashboard>

- The 2009 Senior Class purchased a 1kW, 6-panel photovoltaic array for the Educational Center as their senior class gift. The array is a grid-tied metered photovoltaic system. Six Sharp panels, each with Enphase Micro-inverter, were installed on a ballasted, non-penetrating roof mount. It is estimated that this array will produce an average of 88kWH per month.

Wind

- Monitoring for grant opportunities.

Wood Chips

- Westford was one of the first schools to install a woodchip boiler in 1993. Even though it's one of the oldest boilers in the State, it ranks among the best for efficiency.

Dual Fuel

- The Educational Center, rink, ADL, and Westford have alternate fuel sources - Westford can either burn wood chips or oil while the other facilities can either burn natural gas or oil. The Educational Center is an interruptible customer with Vermont (VT) Gas.



Water & Drainage:

- An infiltration chamber was added to the storm water system at Fleming in the summer of 2011 to minimize the risk of ground water flooding the building during heavy rain.


- Bathroom renovations such as those at the Educational Center in 2010 and 2011 included installation of motion-sensor toilets and sinks. Motion-sensor sinks also exist at EJRP.

- Two catch basins and culverts were replaced at Westford in 2010 to improve drainage and minimize flooding and standing water.

- A rain garden was installed by volunteers (including students) at the Educational Center in 2009. The intent is to filter water draining off the parking lots prior to entering the brook.

- Significant drainage projects occurred at ADL and Summit Street in 2008 to minimize risks of future water damage through foundation walls.

- Westford utilizes automatic shut-off faucets and toilets are one-gallon flush.



Recycling & Compost Collection: Compost collection is new to the Educational Center in 2011-12 and will need to be monitored and assessed.

- Every CCSU school facility has actively recycled since 2001 – some as early as 1999. EJRP installed recycling bins throughout the park in 2007.
- The Educational Center began compost collection during the 2011-12 school year. The other schools have collected compost since 2008.



Emergency Power:

- The Educational Center and rink have emergency back-up power for lighting and heating. ADL has the ability to have a generator installed from a 2002 rewire of the building.



Purchasing: While central purchasing is not currently feasible, we may be able to do more along the lines of identifying “good deals.”

- One person is now accomplishing most purchases for the high school learning communities. This person can search for best prices and bulk purchases.
- Finance policies and procedures exist for purchasing and bidding requirements.
- Property Service and Food Service belong to purchasing consortiums to minimize the cost for custodial supplies and food products.
- Property Service maintains Material Safety Data Sheets (MSDS) for chemicals and products on school grounds that are considered hazardous by the OSHA definition.