



Energy Conservation and Demand Management Plan

Introduction

The Green Energy Act

The *Green Energy Act* was created to expand Ontario's renewable energy generation, encourage energy conservation and promote the creation of clean energy jobs. Energy conservation saves money for businesses and families as well as reducing demand on the electricity grid and reducing greenhouse gas emissions.

Ontario Regulation 397/11 of the *Green Energy Act* outlines requirements for public agencies such as municipalities, universities and colleges, schools and hospitals for reporting energy usage and the requirement for the organization to develop an Energy Conservation and Demand Management Plan (ECDM).

Public sector reporting requirements

On July 1, 2013, Fiscal Year (FY) 2011 (FY 2011 is September 1, 2011 to August 31, 2012) fuel and power consumption figures for all buildings were submitted to the Ministry of Energy. As a result of the combined efforts of the Ministry of Education, Agent Energy Advisors and various school boards, the Hastings and Prince Edward District School Board (HPEDSB) fulfilled the request for data from FY 2011 using information compiled on the Utility Consumption Database (UCD) and verified this data using internal data tracking spreadsheets.

Ontario Regulation 397/11 required school boards to submit Energy Consumption and Greenhouse Gas (GHG) Emissions Template for FY 2012 and the first ECDM plan by July 1, 2014. A guideline for developing ECDM plans was issued by the Ministry of Energy to assist public sector agencies with their planning and development of the ECDM. On an ongoing basis the previous year's energy usage needs to be submitted annually and the ECDM is to be updated every five years. The consumption data will be reported using the UCD and internal data.

The ECDM plan is an evolving document that must take into consideration a number of factors: current consumption, available funding for improvements, incentives from local utility companies (HydroOne, Union Gas, Veridian Energy), areas of greatest need, measures with the best payback, environmental factors, new buildings, system renewals, new technologies and reinvestment of savings towards further projects. HPEDSB will consider implementation opportunities in future operating and capital budgets and forecasts. This report includes a five-year plan for specific projects that will be evaluated annually on the factors above (see Table 1).

The ECDM plan highlights current and ongoing efforts being carried out by staff and students to aid in reduction of HPEDSB's energy footprint. Facility Services has dedicated time and funds over the past years to conserving and reducing energy consumption and managing our demand for energy. HPEDSB follows its Procedure 130: Environmentally Responsible Operations and Education, which highlights the board's ongoing commitment to preparing students with knowledge, skills and practices students need to be environmentally responsible by delivering



Energy Conservation and Demand Management Plan

effective environmental education and reducing use of natural resources through energy conservation. HPEDSB plans to reduce energy consumption by 5% by FY 2017 using FY 2012 as a baseline (see Table 2a). To achieve this goal, HPEDSB will focus on key areas to capture the greatest reduction in energy consumption and demand for our efforts.

Key areas of focus

1. Develop energy awareness and communication programs

Ongoing efforts are required to maintain communication and engagement plans related to energy and the environment with staff and students. This is a critical component to reducing our energy consumption and demand as it has the highest potential savings at the lowest cost output. This component will rely heavily on facility services working closely with the school staff to ensure success. Data needs to be available to engage and facilitate behavioral changes. It is anticipated that real-time energy consumption data will become available in some capacity as part of the new building automation system being implemented over the coming years.

2. Partnerships with local utilities

HPEDSB maintains good communication with Veridian, Hydro One and Union Gas regarding programs and available incentives. This is critical in ensuring funds are used effectively and provide the most energy conservation and demand management potential. Examples of this partnership include using such incentives for upgrades of energy efficient lighting and heating equipment.

3. Water management plan

Another important part of the plan is water management which involves evaluating consumption data, metering and planned improvements. This includes investigation of the condition of existing distribution networks, as well as consumption studies. With metering in place, it is possible to review significant water users for potential savings projects, generate water reduction targets and identify any required major investments for renewal.

4. Energy performance of existing and new buildings

New buildings are being designed keeping in mind reduction of energy consumption and demand targets using building concept considerations, including placement, orientation, building materials, utility systems and building finishes. School closures resulting in amalgamation into new buildings or to fill existing buildings, closure of portables and closure of unused space will continue as a result of demographic changes, in order to maintain and reduce energy consumption and demand across HPEDSB.

5. Building renewal planning

The replacement/renewal of mechanical, heating, ventilating and air conditioning (HVAC), and electrical systems is an ongoing process. We consider the provision of energy conservation design, such as installation of heat recovery systems, variable frequency



Energy Conservation and Demand Management Plan

devices (VFD's) and other measures as appropriate. The energy consumption and demand reduction possibilities are estimated in Appendix A.

6. Energy conservation measures

It is important to understand that these projects are achievable with current, widely deployed technology with added benefits of improving operational stability. Typical projects include:

a) Lighting retrofits

LED lighting is being used as opportunities arise, such as during major renovations, new buildings and during regular lamp maintenance of spent bulbs in hard to reach places. This lighting choice complements the high efficiency fluorescent lighting retrofit program that has been under way for several years.

b) Water conservation projects

Conservation efforts that are ongoing include metering, change to low flow devices (toilets, showers etc.), as well as possibilities for grey water reuse in new construction. There is also an ongoing program to install waterless urinals in schools.

c) Appliance replacements

Wherever possible, Energy Star equipment is being purchased to replace aging or damaged appliances. This applies for all schools in HPEDSB for replacement or provision of photocopiers, vending machines, computers, small appliances and kitchen equipment for food services.

d) Heat pumps and ground source energy

Heat pumps are extensively used throughout the school board. New schools are being designed using heat pump technology. Several schools use ground source energy for their heat pumps to provide efficient heating and cooling.

e) High efficiency boilers

Condensing and high efficiency boilers are being installed on an ongoing basis in both retrofit and new construction in order to provide efficient heating.

f) Building automations systems

All buildings have a building automation system to control heating, ventilation and air conditioning (HVAC), lighting and other building services. Planned upgrades to this system will ensure improved energy use and monitoring.

g) Other projects

Other projects will be developed by facility services staff with input from the energy audits, retro-commissioning and other investigations.



Energy Conservation and Demand Management Plan

Table 1. Energy Conservation Goals

Energy Saving Objectives	Results To Be Evaluated
1. Reduce water usage by 5% overall over the next five years.	Quantity of water consumed. Review water usage and identify opportunities to reduce consumption via mechanical upgrades and changes in occupant behavior.
2. Reduce energy consumption by 5% overall over the next five years.	Energy invoices and data from UCD. Evaluate periodically to identify energy saving opportunities to implement. Conduct periodic energy audits.
3. For new construction or major renovation projects, incorporate energy efficient building systems and other sustainable measures.	Review projects and their final design features to ensure they aid in meeting the 5% energy consumption reduction goal for the five years covered in this report.
4. For building system retrofits, optimize energy consumption by “rightsizing” building system equipment, selecting energy efficient equipment and ensuring adequate system performance through commissioning.	Review current systems to ensure number of retrofits aids in meeting the goal of 5% reduction of energy consumption over five years.
5. Encourage engagement in programs that develop energy saving ideas, best practices, and routines of students, staff and volunteers.	Evaluate knowledge and understanding of best practices to reduce energy consumption, take note of areas in need of improvement. Review education and conservation programs.
6. Work with utility companies and ensure applications for incentives for various energy projects are submitted.	Review project status, number of projects and whether project is eligible for incentive.



Energy Conservation and Demand Management Plan

Table 2a. Current Energy Consumption

Energy Consumption and Greenhouse Gas (GHG) Emissions Reporting Baseline Year FY 2012						
Hastings and Prince Edward District School Board Building Type	Energy Type and Amount Purchased and Consumed				Total	
	Electricity	Natural Gas	Fuel Oil 1 & 2	Propane	GHG Emissions (Kg)	Energy Intensity (ekWh/sqft)
	Quantity (kWh)	Quantity (Cubic Meter)	Quantity (Litre)	Quantity (Litre)		
All Elementary Schools	7,246,396	1,281,562	48,179	318,855	3,742,026	18.28
All Secondary Schools	6,933,018	1,067,282	-	298,815	3,144,147	16.96
All Administrative Buildings	558,418	42,042	-	-	133,117	19.52
Total 2012	14,737,832	2,390,886	48,179	617,669	7,019,289	17.68
Total/Target Reduction by 2017						16.80
Net Reduction						-5%



Energy Conservation and Demand Management Plan

Appendix A. Planned Expenditures and Expected Energy Savings

Conservation Goal

	FY2013
Total Building Area (includes portables) (m ²)	236,489
Total Building Area (includes portables) (ft ²)	2,545,633
Energy Consumption for the board (ekWh)	45,009,451

	2013-14		2014-15		2015-16		2016-17		2017-18		2013/14-2017/18
	Estimated Cost to Implement	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost to Implement	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost to Implement	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost to Implement	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost to Implement	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
Design, Construction and Retrofit Strategies Total	\$2,005,000	854,564	\$1,955,000	867,642	\$1,955,000	867,642	\$1,955,000	867,642	\$1,955,000	867,642	12,949,240
Operations and Maintenance Strategies Total	\$ 338,071	791,601	\$ 91,000	201,204	\$ 51,000	106,206	\$ 51,000	106,206	\$ 51,000	106,206	5,400,057
Occupant Behaviour Strategies Total	\$ 14,000	71,481	\$ 40,000	78,892	\$ 40,000	78,892	\$ 40,000	78,892	\$ 40,000	78,892	1,146,318
TOTAL	\$ 2,357,071	1,717,646	\$ 2,086,000	1,147,738	\$ 2,046,000	1,052,740	\$ 2,046,000	1,052,740	\$ 2,046,000	1,052,740	19,495,615
Percentage reduction		4		3		2		2		2	8.66
Conservation Goal (ekWh/m²)		7.26		4.85		4.45		4.45		4.45	82.44
Conservation Goal (ekWh/ft²)		0.674742034		0.450865278		0.413547251		0.413547251		0.413547251	7.658454785



Energy Conservation and Demand Management Plan

Design, Construction & Retrofit Strategies

Design, Construction and Retrofit Strategies	Quantity of Time Measure Will be in Place (years)	2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2013/14-2017/18 Estimated Accumulated Energy Savings (ekWh)
		Estimated Cost to Implement	Estimated Annual Savings (ekWh)	Estimated Cost to Implement	Estimated Annual Savings (ekWh)	Estimated Cost to Implement	Estimated Annual Savings (ekWh)	Estimated Cost to Implement	Estimated Annual Savings (ekWh)	Estimated Cost to Implement	Estimated Annual Savings (ekWh)	
Lighting												
High Efficiency Lighting Systems (T-8, T-5, CFL, LED ...)	15	\$ 10,000	9,877	\$ 10,000	9,877	\$ 10,000	9,877	\$ 10,000	9,877	\$ 10,000	9,877	148,155
Daylight Sensors	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Outdoor Lighting	15	\$ 10,000	9,877	\$ 10,000	9,877	\$ 10,000	9,877	\$ 10,000	9,877	\$ 10,000	9,877	148,155
Occupancy Sensors	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Daylight Harvesting	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
HVAC												
Efficient Boilers (near condensing)	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
High Efficiency Boilers (condensing)	15	\$ 120,000	311,658	\$ 120,000	311,658	\$ 120,000	311,658	\$ 120,000	311,658	\$ 120,000	311,658	4,674,870
High-efficiency boiler burners	10	\$ 50,000	259,715	\$ 50,000	259,715	\$ 50,000	259,715	\$ 50,000	259,715	\$ 50,000	259,715	3,895,725
Geothermal	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Heat recovery/enthalpy wheels	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Economizers	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Energy efficient HVAC systems	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Energy efficient Rooftop units	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
High Efficiency Domestic Hot Water	15	\$ 15,000	30,825	\$ 15,000	30,825	\$ 15,000	30,825	\$ 15,000	30,825	\$ 15,000	30,825	462,375
Efficient Chillers and Controls	25	\$ 50,000	3,704	\$ 50,000	3,704	\$ 50,000	3,704	\$ 50,000	3,704	\$ 50,000	3,704	55,560
High-efficiency motors	20	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
VFD	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Demand Ventilation	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Entrance Heater Controls	20	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Controls												
Building Automation Systems - New	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Building Automation Systems - Upgrade	10	\$ 25,000	19,791	\$ 100,000	79,165	\$ 100,000	79,165	\$ 100,000	79,165	\$ 100,000	79,165	890,605
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Building Envelope												
Glazing	30	\$ 100,000	23,260	\$ 100,000	23,260	\$ 100,000	23,260	\$ 100,000	23,260	\$ 100,000	23,260	348,900
Increased Wall Insulation	50	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
New Roof	25	\$ 1,500,000	139,561	\$ 1,500,000	139,561	\$ 1,500,000	139,561	\$ 1,500,000	139,561	\$ 1,500,000	139,561	2,093,415
New Windows	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Treatments	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Shading Devices	30	\$ 125,000	46,296	\$ -	-	\$ -	-	\$ -	-	\$ -	-	231,480
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Design, Construction and Retrofit Strategies Total		\$ 2,005,000	854,564	\$ 1,955,000	867,642	\$ 1,955,000	867,642	\$ 1,955,000	867,642	\$ 1,955,000	867,642	12,949,240



Energy Conservation and Demand Management Plan

Operations & Maintenance Strategies

Operations and Maintenance Strategies	Quantity of Time Measure Will be in Place (years)	2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2013/14-2017/18 Estimated Accumulated Energy Savings (ekWh)
		Estimated Cost to Implement	Estimated Annual Savings (ekWh)	Estimated Cost to Implement	Estimated Annual Savings (ekWh)	Estimated Cost to Implement	Estimated Annual Savings (ekWh)	Estimated Cost to Implement	Estimated Annual Savings (ekWh)	Estimated Cost to Implement	Estimated Annual Savings (ekWh)	
Policy and Planning												
New School design/construction guidelines and specifications	5	\$ 327,071	776,774	\$ 60,000	142,497	\$ 20,000	47,499	\$ 20,000	47,499	\$ 20,000	47,499	4,738,852
Day and Night Temperature Guidelines	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Night time blackout of sites - interior	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Night time blackout of sites - exterior	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Procures only Energy Star certified appliances	5	\$ 10,000	14,815	\$ 10,000	14,815	\$ 10,000	14,815	\$ 10,000	14,815	\$ 10,000	14,815	222,225
Daylight Harvesting (servicing)	3	\$ -	-	\$ 10,000	14,815	\$ 10,000	14,815	\$ 10,000	14,815	\$ 10,000	14,815	148,150
Demand Ventilation (servicing)	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other (describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Energy Audits												
Walk Through Audit	5	\$ 1,000	12	\$ 1,000	12	\$ 1,000	12	\$ 1,000	12	\$ 1,000	12	180
Engineering Audit	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other (describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Real Time Monitoring												
Real time energy data for operators to id	5	\$ -	-	\$ 10,000	29,065	\$ 10,000	29,065	\$ 10,000	29,065	\$ 10,000	29,065	290,650
Other (describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Operations and Maintenance Strategies Total		\$ 338,071	791,601	\$ 91,000	201,204	\$ 51,000	106,206	\$ 51,000	106,206	\$ 51,000	106,206	5,400,057



Energy Conservation and Demand Management Plan

Occupant Behaviour Strategies

Occupant Behavior Strategies	Quantity of Time Measure Will be in Place (years)	2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2013/14-2017/18 Estimated Accumulated Energy Savings (ekWh)
		Estimated Cost to Implement	Estimated Annual Savings (ekWh)	Estimated Cost to Implement	Estimated Annual Savings (ekWh)	Estimated Cost to Implement	Estimated Annual Savings (ekWh)	Estimated Cost to Implement	Estimated Annual Savings (ekWh)	Estimated Cost to Implement	Estimated Annual Savings (ekWh)	
Training and Education												
Building Operator Training	3	\$ 5,000	17,661	\$ 5,000	17,661	\$ 5,000	17,661	\$ 5,000	17,661	\$ 5,000	17,661	264,915
NRCan Benchmarking Program	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Building Automation Training (site specific)	3	\$ 5,000	52,983	\$ 5,000	52,983	\$ 5,000	52,983	\$ 5,000	52,983	\$ 5,000	52,983	794,745
Ongoing training and awareness programs for energy conservation	5	\$ 1,000	801	\$ 10,000	8,010	\$ 10,000	8,010	\$ 10,000	8,010	\$ 10,000	8,010	84,105
Provide detailed information on Building Operational costs	1	\$ 1,000	12	\$ 10,000	119	\$ 10,000	119	\$ 10,000	119	\$ 10,000	119	1,250
Provide detailed information on energy consumption (e.g. via the Utility Consumption Database or other database)	1	\$ 2,000	24	\$ 10,000	119	\$ 10,000	119	\$ 10,000	119	\$ 10,000	119	1,310
Participate in environmental programs, such as EcoSchools, Earthcare	1	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other tools (Define)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Occupant Behavior Strategies Total		\$ 14,000	71,481	\$ 40,000	78,892	\$ 40,000	78,892	\$ 40,000	78,892	\$ 40,000	78,892	1,146,325