



**HAMILTON-WENTWORTH**  
DISTRICT SCHOOL BOARD



## Conservation and Demand Management Plan 2014 - 2019

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School Energy Intensity and GHG Emissions

## 1) Introduction

Under the Green Energy Act 2009, (Ontario Regulation 397/11) public agencies as municipalities, municipal service boards, school boards, universities, colleges and hospitals are required to report on their energy consumption and greenhouse gas (GHG) emissions beginning in 2013 and to develop and implement energy Conservation and Demand (CDM) plans starting July 1, 2014.

The Hamilton-Wentworth District School Board is 100% funded by the Ministry of Education. In developing our Five Year Energy Conservation and Demand Plan it is assumed that the current level of funding will continue at the same or higher dollar values.

The Hamilton-Wentworth District School Board currently has approximately 116 elementary and secondary schools, with a total enrolment of 47,724 students. The chart below reflects the age and square footage of buildings in the HWDSB portfolio. Currently there are 82 buildings constructed prior to 1970.

<b>Board Profile Asset Profile Hamilton-Wentworth District School Board</b>	<b>Total Number of Buildings</b>	<b>Total Building Area (includes portables) (m<sup>2</sup>)</b>
<b>Constructed Prior 1946</b>	7	
<b>Constructed 1946-1969</b>	75	394,062
<b>Constructed 1970-1979</b>	5	19,762
<b>Constructed 1980-1989</b>	5	18,624
<b>Constructed 1990-1999</b>	6	56,589
<b>Constructed 2000+</b>	17	100,113

Fig.1- Number of Buildings versus age range

The Hamilton- Wentworth District School Board endeavours, as it has in the past, to continue our commitment of reducing both its energy consumption and resulting associated generated green house gases. We have a responsibility to reduce or eliminate unnecessary consumption as part of the community and moral responsibility to our students whom will inherit the planet.

The Hamilton-Wentworth District School Board currently uses and continually upgrades to a large variety of energy efficient Heating and Ventilation & Air Conditioning (HVAC) equipment. These include items such as fully-condensing boilers; advanced technology air handling equipment as Heat Recovery Units & Energy Recovery Units; Roof Top Air Handlers with Economizers; Heat Pumps, and High Tech Chillers; and Variable Frequency Drives on pump and fan motors.

The school board has 108 sites with varying penetration levels of computerized Building Automation Systems (BAS). The BAS controls and monitors operation of a variety of items including HVAC and lighting. While providing proper Indoor Air Quality (IAQ) for our occupants, the BAS allows more flexible operation and scheduling of equipment.

Both exterior and interior lighting have seen many upgrades to more efficient means while maintaining an excellent learning environment for our Staff and Students. In addition a wide variety of lighting controls are used to reduce unnecessary electrical consumption. Such controls are motion detectors, daylight harvesting and BAS.

The HWDSB ensures the selection of building products used for both new construction or renovations are of a high standard as they relate to “R” insulation value. Examples of these are window glazing, wall & roof insulation, pipe insulation, and insulated exterior doors.

The HWDSB also endeavours to promote environmental stewardship amongst our schools by participation in the Ministry of Education’s Eco-School Program. The program for grades 1-12 students is intended to develop ecological literacy while engaging them in practices to become environmentally responsible citizens.

The HWDSB currently has one secondary school with roof top solar panels generating power back to the local distribution company hydro grid. Also, 19 applications for additional sites are awaiting approval by the Ontario Power Authority.

Currently the HWDSB is trialing a program of displaying energy usage on a monitor in a school lobby. The monitor, referred to as a “Dashboard”, is set up to display real time energy consumption, historical use and school eco messages. Elsewhere, this has been proven to be very engaging for students as they can become interactive with building energy use.

## 2) Energy Consumption and Greenhouse Gas Emissions

The following is the energy consumption data for the HWDSB from September 1, 2012 to August 31, 2013.

Total Electricity (kWh)	49,839,540.00
Total Natural Gas (m <sup>3</sup> )	8,783,727.91
Total Thermal Energy (Giga Joules)	8769.6
Energy Intensity for the board (ekWh/ft <sup>2</sup> )	19.27
Greenhouse Gas Emissions (kgCO <sub>2</sub> )	24,988,294.00

Fig.-2 The above is the baseline year for which the HWDSB 5 year energy and consumption plan will be benchmarked.

## 3) Energy Conservation Goals and Objectives

The Hamilton-Wentworth District School Board has set a quantitative conservation goal of a 12% reduction in energy used per square foot or ekWh/ft<sup>2</sup> over the five year implementation period. Ongoing reductions for the 5 year energy and consumption plan will be calculated utilizing as baseline, the 2012/2013 fiscal year, of a 19.27 ekWh/ft<sup>2</sup>. The 5 year energy intensity target would be 16.96 ekWh/ft<sup>2</sup>. Please see Appendix-A.

Year	2012/2013 (ekWh/ft <sup>2</sup> ) (Baseline Year)	2014/2015 (ekWh/ft <sup>2</sup> )	2015/2016 (ekWh/ft <sup>2</sup> )	2016/2017 (ekWh/ft <sup>2</sup> )	2017/2018 (ekWh/ft <sup>2</sup> )	2018/2019 (ekWh/ft <sup>2</sup> )	Quantitative Goal
Conservation Target Reduction in (%)		3	3	2	2	2	12
Energy Intensity Target	19.27	18.69	18.12	17.73	17.34	16.96	2.31

Fig. 3 - Yearly ekWh targets versus baseline

## Qualitative Goals

The HWDSB would like to increase awareness and participation in energy conservation, environmental issues, and its importance to sustainability amongst our Students, Staff and the Community we serve.

HWDSB is currently a reporting partner plans to continue to be an active participant of the organization “Sustainable Hamilton”.

### 4) Conservation and Demand Measures

A combination of measures will assist the HWDSB in reaching the reduction target in energy use. As shown below in Fig. 4 these include such areas as construction, operations, and occupant behaviour. Each of these measures has an expanded focus as shown in Appendix “B”.

Conservation Goal												
		FY2013										
Total Building Area (includes portables) (m <sup>2</sup> )		713,939										
Total Building Area (includes portables) (ft <sup>2</sup> )		7,684,839										
Energy Consumption for the board (ekWh)		140,487,616										
		2014-15		2015-16		2016-17		2017-18		2018-19		2014-19
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
Design, Construction and Retrofit Strategies	\$	1,797,000	1,794,532	\$ 576,000	732,985	\$ 165,000	167,901	\$ 470,000	751,652	\$ 745,000	1,204,999	15,116,607
Operations and Maintenance Strategies Total	\$	46,000	92,279	\$ 45,000	88,557	\$ 20,000	29,184	\$ 20,000	58,130	\$ 20,000	58,130	1,077,568
Occupant Behaviour Strategies Total	\$	8,000	20,209	\$ 22,500	32,690	\$ 22,000	27,392	\$ 23,000	37,988	\$ 24,000	48,585	438,541
<b>TOTAL</b>	<b>\$</b>	<b>1,851,000</b>	<b>1,907,020</b>	<b>\$ 643,500</b>	<b>854,232</b>	<b>\$ 207,000</b>	<b>224,477</b>	<b>\$ 513,000</b>	<b>847,771</b>	<b>\$ 789,000</b>	<b>1,311,714</b>	<b>16,632,717</b>
Percentage reduction			1		1		0		1		1	2.367855191
Conservation Goal (ekWh/m <sup>2</sup> )			2.67		1.20		0.31		1.19		1.84	23.30
Conservation Goal (ekWh/ft <sup>2</sup> )			0.248153546		0.1111581		0.029210362		0.1103173		0.17069	2.164354474

Fig. 4 Calculated Goal

In addition to the above planned work to lower levels of energy consumption, the HWDSB Facilities Management Team will be targeting the 15 schools with the highest energy intensity levels (ekWh). These will be identified based on our Utility Consumption Database (UCD) and Ministry of Energy annual reporting (Appendix “C”). Step one will be an ASHRAE Level One audit to determine a strategy for reducing consumption at each of the sites. Outcomes from these reports could provide a variety of recommendations, from equipment replacement, increased insulation levels, suggested changes to occupant behaviours, or perhaps a re-commissioning of the entire HVAC & BAS system within site.

Further reductions in HWDSB GHGs will come as result of a reduction in surplus space from currently approved and any future potential school consolidations or closures. As schools are closed, operation and energy funding for those sites will be reinvested in remaining sites.

5) Renewable Energy

The HWDSB currently has one rooftop solar panel system at our Waterdown District High School. The power generated is put back into the grid of the Local Utility Company (LDC). Since the generation of this power does not create Green House Gases (GHG) there is an avoidance of producing environmental harmful emissions.

<b>Renewable Energy</b>	<b>Location</b>	<b>Number of systems in asset portfolio</b>	<b>Total size (kW)</b>	<b>Actual Generation (Sept 1, 2012 to Aug 31, 2013)</b>
<b>Solar photovoltaic</b>	<b>Waterdown District High School</b>	1	72 (AC)	98377

HWDSB currently has 19 Fit 3.0 applications being reviewed by the Ontario Power Authority. If applications are successful, the power generated would further offset our GHG production.

## 6) Letter of Plan Endorsement



**Daniel Del Bianco**  
Senior Facilities Officer  
TEL: 905.527.5092 EXT: 2362  
FAX: 905.521.2517

June 30, 2014

The Hamilton-Wentworth District School is committed to reducing energy consumption at all of our schools and administrative buildings. The development of the attached *Energy Conservation and Demand Plan* reflects the current state of our energy management program as well as our goals and objectives over the next five years.

Sincerely,

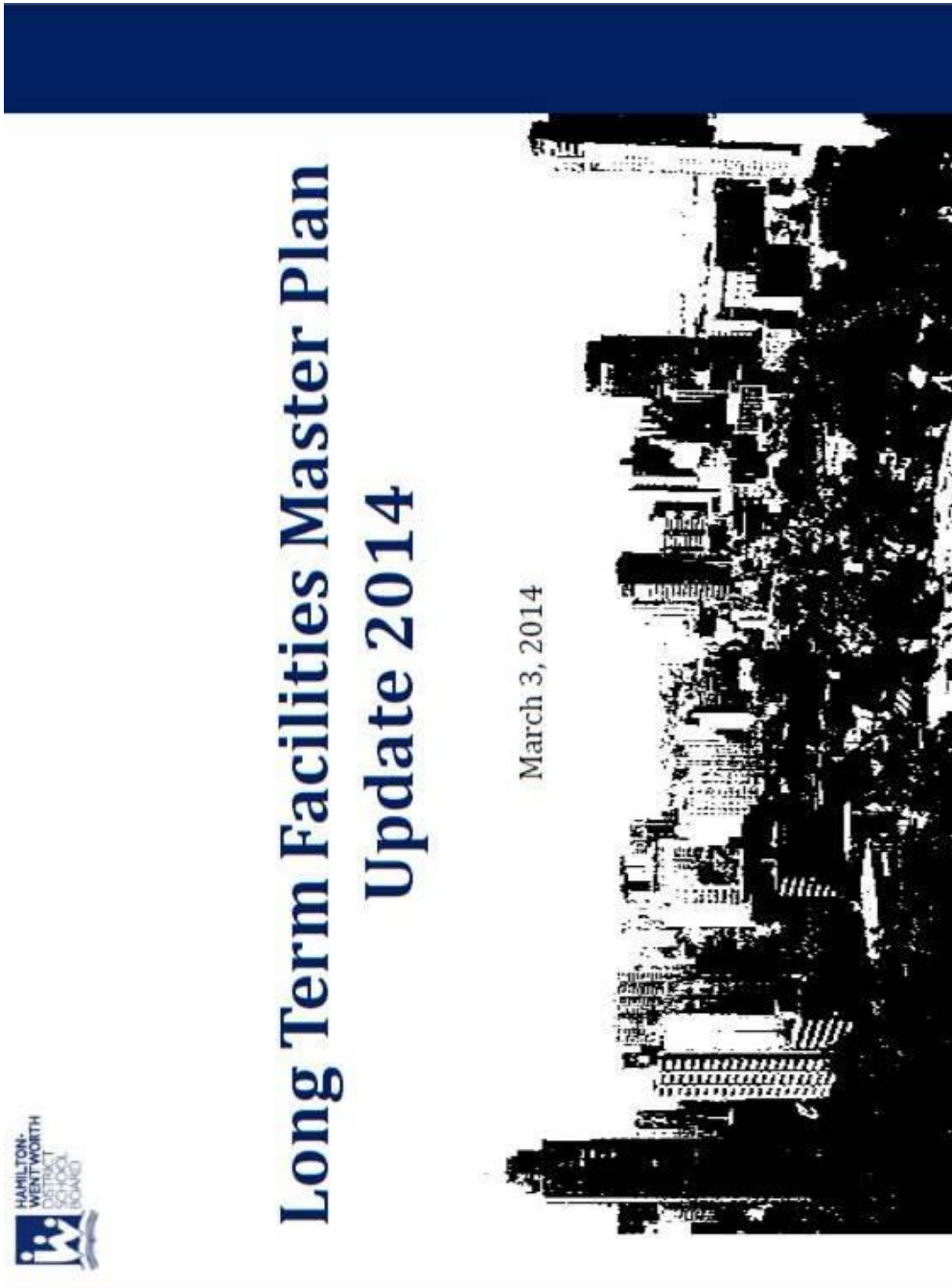
A handwritten signature in blue ink, appearing to read "Daniel Del Bianco". The signature is fluid and extends horizontally across the page.

Daniel Del Bianco, BA, MSA  
Senior Facilities Officer

120 KING STREET WEST, SUITE 1120, HAMILTON, ON L8P 4V2 TEL: 905.527.5092 [www.hwdsb.on.ca](http://www.hwdsb.on.ca)

ALL STUDENTS ACHIEVING THEIR FULL POTENTIAL





### Energy Maintenance Plan (NEW for 2014):

- We currently have an Average Energy Intensity usage of 19.27 ekwh (*Energy Kilowatt Hours*)
- We would like to reduce this value to 17.0 ekwh or better over the next 5-years
  - this would be equal to a 12% reduction of utility consumption



## LTFMP – Energy Conservation Plan

### Energy Maintenance Plan (NEW for 2014):

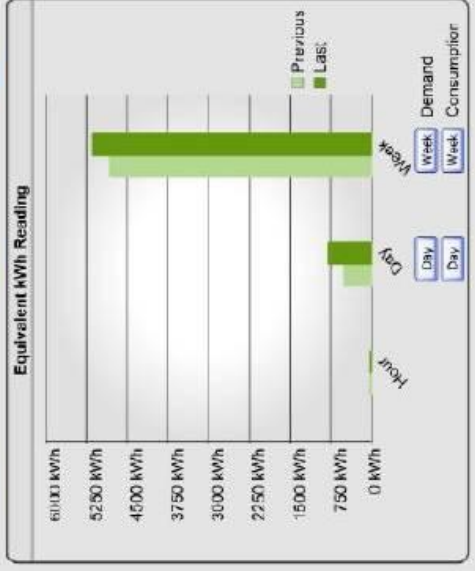
- How to achieve or goal:
  - Increasing the number of schools with complete Building Automation System (BAS)
  - Efficient rental scheduling over the summer months
  - The installation of LED lighting and upgraded HVAC equipment in school construction or renovations
  - The implementation of daylight harvesting technology
  - Solar panels
- Develop a energy awareness strategy at the school level (pilot project)

# LTFMP – Energy Conservation Plan



Sample Elementary School  
Dashboard

OAT: 17.6 °C



Unit	Value
Hour	0.3
Day	-36.6
Week	-42.7

**GREEN TIPS**  
Challenge Data Input



Electricity	\$0.15 /kWh
Water	\$0.75 /m³
Gas	\$0.75 /m³
Garbage	\$1.00 /Bag



## Potential Funding Sources

### Funding Sources:

- Proceeds of Disposition (PODS) (see handout)
- Full Day Kindergarten Reserves (one time funding)
- Capital Priorities Submissions (annual submissions/business cases)
- Operational Savings
- School Renewal Grants (annual funding)
- Top-up Funding
- Education Development Charges (EDC)



### Next Steps:

- **Capital Priorities Submission (2013)**
  - Identified 8 capital priorities
  - Approved by the Board in October 2013
  - Funding announcement anticipated for March 2014
  - Secondary school revitalization strategy (April 2014)
- **School Renewal Grants/Capital Plan Update (April 2014)**
  - At the March 26, 2012 Board meeting Trustees approved new Capital Projects Criteria to determine priority and approval of projects
  - Criteria include: Health & Safety, Regulatory Compliance, Risk of Failure, Urgent or High Needs, and New Program Initiatives
  - 2014 Capital Projects list will be submitted to the board in April

Design, Construction and Retrofit Strategies												
Lighting	Quantity of Time that Measure will be in place (years)	2014-15		2015-16		2016-17		2017-18		2018-19		2014/15-2018/19
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
High Efficiency Lighting Systems (T-8, T-5, CFL, LED ...)	15	\$ 250,000	246,934	\$ 150,000	148,148	\$ 150,000	148,148	\$ 150,000	148,148	\$ 150,000	148,148	2,716,069
Daylight Sensors	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Outdoor Lighting	15	\$ -	-	\$ 1,000	988	\$ 5,000	4,938	\$ 5,000	4,938	\$ 5,000	4,938	35,580
Occupancy Sensors	10	\$ 5,000	7,407	\$ 10,000	14,815	\$ 10,000	14,815	\$ 10,000	14,815	\$ 10,000	14,815	148,148
Daylight Harvesting	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ 10,000	14,815	14,815
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
HVAC	Quantity of Time that Measure will be in place	2014-15		2015-16		2016-17		2017-18		2018-19		2014/15-2018/19
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
Efficient Boilers (near condensing)	30	\$ 100,000	173,343	\$ -	-	\$ -	-	\$ -	-	\$ -	-	865,717
High Efficiency Boilers (condensing)	15	\$ 200,000	519,430	\$ 200,000	519,430	\$ -	-	\$ 200,000	519,430	\$ 300,000	779,545	6,492,874
High-efficiency boiler burners	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Geothermal	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Heat recovery/enthalpy wheels	30	\$ 40,000	93,041	\$ -	-	\$ -	-	\$ 20,000	46,520	\$ 50,000	116,301	674,544
Economizers	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Energy efficient HVAC systems	30	\$ 500,000	79,165	\$ -	-	\$ -	-	\$ -	-	\$ -	-	395,624
Energy efficient Rooftop units	15	\$ 50,000	19,791	\$ -	-	\$ -	-	\$ -	-	\$ -	-	98,956
High Efficiency Domestic Hot Water	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Efficient Chillers and Controls	25	\$ -	-	\$ -	-	\$ -	-	\$ 80,000	5,926	\$ 180,000	11,852	23,704
High-efficiency motors	20	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
VFD	15	\$ 40,000	72,889	\$ 5,000	9,124	\$ -	-	\$ -	-	\$ 50,000	92,296	492,673
Demand Ventilation	10	\$ 60,000	142,497	\$ -	-	\$ -	-	\$ -	-	\$ -	-	712,493
Entrance Heater Controls	20	\$ 2,000	4,750	\$ -	-	\$ -	-	\$ 5,000	11,679	\$ 10,000	23,749	72,248
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Controls	Quantity of Time that Measure will be in place	2014-15		2015-16		2016-17		2017-18		2018-19		2014/15-2018/19
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
Building Automation Systems - New	10	\$ 300,000	237,494	\$ -	-	\$ -	-	\$ -	-	\$ -	-	1,187,472
Building Automation Systems - Upgrade	10	\$ 250,000	197,952	\$ 10,000	7,916	\$ -	-	\$ -	-	\$ -	-	1,023,226
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Building Envelope	Quantity of Time that Measure will be in place	2014-15		2015-16		2016-17		2017-18		2018-19		2014/15-2018/19
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
Glazing	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Increased Wall Insulation	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
New Roof	25	\$ -	-	\$ 100,000	9,304	\$ -	-	\$ -	-	\$ -	-	37,216
New Windows	30	\$ -	-	\$ 100,000	23,260	\$ -	-	\$ -	-	\$ -	-	95,041
Treatments	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Shading Devices	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
<b>Design, Construction and Retrofit Strategies Total</b>		<b>\$ 1,797,000</b>	<b>1,794,532</b>	<b>\$ 576,000</b>	<b>732,985</b>	<b>\$ 165,000</b>	<b>147,903</b>	<b>\$ 470,000</b>	<b>751,652</b>	<b>\$ 745,000</b>	<b>1,204,999</b>	<b>15,116,607</b>



Operations and Maintenance Strategies												
Policy and Planning	Quantity of Time that Measure will be in place (years)	2014-15		2015-16		2016-17		2017-18		2018-19		2014/15-2018/19
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
New school design/construction guidelines and	5	\$ 25,000	59,374	\$ 25,000	59,374	\$ -	-	\$ -	-	\$ -	-	534,362
Day and Night Temperature Guidelines for all Schools	10	\$ 1,000	3,722	\$ -	-	\$ -	-	\$ -	-	\$ -	-	18,608
Night time blackout of sites	Interior	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
	Exterior	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Procures only Energy Star certified appliances	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Daylight Harvesting (servicing)	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Demand Ventilation (servicing)	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Energy Audits	Quantity of Time that Measure will be in place	2014-15		2015-16		2016-17		2017-18		2018-19		2014/15-2018/19
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
Walk Through Audit	5	\$ 10,000	119	\$ 10,000	119	\$ 10,000	119	\$ -	-	\$ -	-	1,425
Engineering Audit	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Real Time Monitoring	Quantity of Time that Measure will be in place	2014-15		2015-16		2016-17		2017-18		2018-19		2014/15-2018/19
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
Real-time energy data for operators to identify and diagnose building issues	5	\$ 10,000	29,065	\$ 10,000	29,065	\$ 10,000	29,065	\$ 20,000	58,130	\$ 20,000	58,130	523,172
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
<b>Operations and Maintenance Strategies Total</b>		<b>\$ 46,000</b>	<b>92,279</b>	<b>\$ 45,000</b>	<b>88,557</b>	<b>\$ 20,000</b>	<b>29,184</b>	<b>\$ 20,000</b>	<b>58,130</b>	<b>\$ 20,000</b>	<b>58,130</b>	<b>1,077,568</b>



Occupant Behaviour Strategies												
Training and Education	Quantity of Time that Measure will be in place (years)	2014-15		2015-16		2016-17		2017-18		2018-19		2014/15-2018/19
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
Building Operator Training	3	\$ -	-	\$ 5,000	17,661	\$ 5,000	17,661	\$ 5,000	17,661	\$ 5,000	17,661	176,610
NRCan Benchmarking Program	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Building Automation Training (site specific)	3	\$ 1,000	10,597	\$ 500	5,298	\$ -	-	\$ 1,000	10,597	\$ 2,000	21,193	116,562
Ongoing training and awareness programs for energy conservation	5	\$ 2,000	1,602	\$ 2,000	1,602	\$ 2,000	1,602	\$ 2,000	1,602	\$ 2,000	1,602	24,030
Provide detailed information on Building Operational costs	1	\$ -	-	\$ 5,000	59	\$ 5,000	59	\$ 5,000	59	\$ 5,000	59	594
Provide detailed information on energy consumption (e.g. via the Utility Consumption Database or other database)	1	\$ -	-	\$ 5,000	59	\$ 5,000	59	\$ 5,000	59	\$ 5,000	59	594
Participate in environmental programs, such as EcoSchools,	1	\$ 5,000	8,010	\$ 5,000	8,010	\$ 5,000	8,010	\$ 5,000	8,010	\$ 5,000	8,010	120,151
Other tools (Define)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
<b>Occupant Behaviour Strategies Total</b>		<b>\$ 8,000</b>	<b>20,209</b>	<b>\$ 22,500</b>	<b>32,690</b>	<b>\$ 22,000</b>	<b>27,392</b>	<b>\$ 23,000</b>	<b>37,988</b>	<b>\$ 24,000</b>	<b>48,585</b>	<b>438,541</b>





Appendix “C”

<b>Hamilton-Wentworth District School Board Energy Intensity and Green House Gas Emissions</b>	<b>Energy Intensity* (ekWh/sqft)</b>	<b>GHG Emissions* (Kg)</b>
A. M. Cunningham	15.0	118703.3
Adelaide Hoodless & Alter Ed	12.6	113657.2
Allan A. Greenleaf School	15.5	138868.4
Ancaster H & VS	22.9	668628.7
Ancaster Meadow	12.3	98260.9
Ancaster Sr PS	18.3	160578.8
Balaclava PS	15.9	100589.6
Barton	22.0	461352.0
Bellmoore (New)	15.1	147319.4
Bell-Stone PS	24.0	69572.5
Bennetto (formerly Centennial)	18.3	196527.1
Beverly Central PS	24.0	84494.9
Billy Green E S	13.0	70403.6
Buchanan Park	30.8	112168.8
C H Bray PS	34.4	113179.0
Cardinal Heights	24.3	153313.7
Cathy Wever	14.0	105681.8
Cecil B. Stirling	13.3	95363.1
Central	24.4	95083.6
Chedoke	19.7	153208.4
Collegiate Avenue PS	21.4	98357.5
Dalewood	59.7	671258.1
Delta	19.3	680374.7
Dr John Seaton PS	13.8	48165.4
Dr. J Edgar Davey - New	11.9	116212.8
Dundana PS	21.5	118301.7
Dundas Central S	14.2	144758.1
Earl Kitchener	15.2	126248.6
Eastdale PS	12.2	39702.7
Eastmount Park	21.7	104756.2
Ecole Elementaire Michaelle Jean (old Bellmoore)	20.3	83462.6
Elizabeth Bagshaw	22.7	327435.9
Fessenden PS	22.5	103993.1
Flamborough Centre Senior PS	17.8	110110.8
Franklin Road	23.7	152848.7
Gatestone	11.1	82259.9
George L. Armstrong	15.8	139402.4
George R Allan	18.5	150304.7
Glen Brae Md S	18.1	110636.7
Glen Echo	18.8	92214.9
Glendale	13.9	270788.4
Glenwood (Formerly Fairview)	19.6	71622.5
Gordon Price	20.7	128651.6
Green Acres PS	20.0	116589.8
Greensville PS	25.5	93493.4
Guy B Brown PS	10.7	84392.0
Helen Detwiler	22.5	174134.0
Hess Street	21.9	133054.7
Highland SS	20.3	415841.4
Highview	26.1	216002.4
Hill Park	20.7	519041.5
Hillcrest	14.7	119271.8
Holbrook	18.2	71895.4

Huntington Park	22.3	136697.1
James Macdonald	17.8	87406.2
Janet Lee PS	16.8	115309.2
King George	16.8	132908.5
Lake Avenue	18.4	178377.8
Lawfield Elementary School	15.3	147667.3
Lincoln M. Alexander	19.0	102982.2
Linden Park	20.8	86227.9
Lisgar	16.9	99628.0
Maple Lane	19.3	60096.2
Mary Hopkins PS	22.8	172973.1
Memorial Building PS (Ancaster)	22.0	88260.1
Memorial PS (Hamilton)	14.2	216751.9
Memorial PS (Stoney Creek)	21.1	89563.6
Millgrove PS	26.5	64065.0
Mount Albion PS	20.4	122148.8
Mount Hope PS	21.2	118093.2
Mountain Secondary	29.2	352807.4
Mountain View PS	25.0	113329.2
Mountview	17.8	74193.5
Norwood Park	14.3	103730.0
Orchard Park SS	24.8	644100.2
Parkdale	16.6	131237.1
Parkside HS	22.1	345635.3
Parkview	27.4	310378.7
Pauline Johnson	18.4	91978.3
Prince of Wales	11.3	104597.0
Prince Philip	26.9	134567.8
Queen Mary	19.0	263948.9
Queen Victoria ES	10.3	91285.3
Queens Rangers PS	23.1	76824.1
Queensdale	20.9	96667.7
R A Riddell	19.6	189694.9
R. L. Hyslop	12.4	53834.0
Ray Lewis	14.7	117695.0
Red Hill Centre	28.9	126814.3
Richard Beasley	23.6	103610.1
Ridgemount	16.4	73083.7
Rosedale	24.0	86191.2
Rousseau PS	20.3	76573.1
Roxborough Park	20.8	105630.6
Ryerson	21.8	96928.0
Saltfleet HS	17.3	363559.6
Sherwood SS	19.9	540557.6
Sir Allan MacNab SS	24.8	644001.6
Sir Isaac Brock	22.7	108226.0
Sir John A Macdonald SS	20.3	726419.5
Sir Wilfrid Laurier	29.6	364927.2
Sir William Osler Elementary School	16.3	124292.7
Sir Winston Churchill SS	22.8	632618.8
Spencer Valley PS	20.8	97566.1
Strathcona	16.9	85361.6
Tapleystown PS	22.0	94825.2
Templemead	18.3	169886.9
Vincent Massey Jr PS	50.9	181151.9
Viscount Montgomery	18.5	175811.2
W. H. Ballard	13.5	196782.6

Waterdown DHS	22.6	472492.2
Westdale	17.5	642389.1
Westmount SS	21.1	508266.3
Westview	18.6	109532.1
Westwood	23.4	116723.2
Winona PS (old)	7.4	57882.3
Winona - New	15.2	147721.3
Woodward	22.2	88355.8
Yorkview S	21.2	91181.8

**\*GHG Calculations:**

Energy use by a building results in the emission of GHGs. Each of the energy types has a defined amount of GHGs that is released per unit of energy consumed. In the case of a fuel that is consumed within the building (such as burning natural gas or fuel oil to heat a building), carbon dioxide (and other greenhouse gases) are released as a direct output of the combustion process. In the case of energy that is sourced from the electricity grid or from a district energy plant (hot water and steam), it is the processes that are used in the creation and transmission of those utilities that release GHG. This GHG output is expressed as an emission factor for that particular utility or energy type.

**\*Energy Intensity Calculations:**

Defined as the building's energy use as a function of its size. This has been expressed as energy per square foot per year and calculated by dividing the total energy consumed by the building in one year by the total gross floor area of the building.