

**Dufferin-Peel
Catholic District
School Board**



Energy Conservation and Demand Management Plan

July 2014

Education Sector Background

Funding and Energy Management Planning

All Boards receive 100% of their funding from the Ministry of Education.

The Ministry announces each Board's funding allocation in March for the next Fiscal Year, which runs from September 1st to August 31st. The Ministry does not provide Boards with multi-year funding allocations.

As a result, while a Board may have a five-year energy management strategy, the Board's ability to implement their strategy is dependent on the funding that they receive in each of the five years covered by their energy management plan.

Asset Portfolios and Energy Management Planning

Energy consumption at a site can be impacted by a number of variables. The following lists provide education sector examples that may impact changes in consumption at a site from one year to the next. These examples will play a significant role in the Board's assessment of energy management priorities.

Facility Variables

- Year of Construction
- Building Area
 - Major additions
 - Sites sold
 - Portables
 - installed
 - removed
- Site Use
 - Elementary school
 - Secondary school
 - Administrative building
 - Maintenance/warehouse facility
- Shared Use Sites (e.g. one building, two boards share common areas and/or partnered with a municipality)
 - Swimming pools
 - Libraries
 - Lighted sports fields
 - Enclosed sports domes

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- Equipment/Systems
 - Age
 - Type of technology
 - Lifecycle
 - % air conditioned building area

Other Variables

- Programs
 - Day care
 - Before/After School Programs
 - Summer School
 - Community Use
- Occupancy
 - Significant Increase or decrease in number of students
 - New programs being added to a site

About the Board

The Dufferin-Peel Catholic District School Board is one of the largest and most diverse school boards in Ontario. It serves approximately 84,000 students in 149 schools located throughout Mississauga, Brampton, Caledon and Orangeville and an additional 46,000 students in adult and continuing education programs. With over 10,000 employees, the board is also one of the largest employers in the region.

Background

One of the components of the Board's Strategic System Plan is the Board's commitment to a clean, healthy and safe school environment. Imbedded in this system direction are goals of:

- (i) Good stewardship of resources, and
- (ii) Financial responsibility.

In 2010, the Board of Trustees considered a "Green Report" which outlined a three prong approach to undertaking "green" initiatives:

- Curriculum
- Constructing buildings with improved technologies
- Utilizing eco friendly products and systems in the Plant Department

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The Energy Management Plan lays out a strategy to further promote and track the Board's efforts in the Construction and Plant Department areas. The Energy Management Plan may assist in providing data which instructional staff can utilize in developing curriculum and in the Eco Schools certification program.

Furthermore, the Ontario Green Energy Act, 2009 is a direction to encourage energy conservation. In view of these mandates, a multi-year energy management plan is proposed for the board to incorporate necessary measures and monitoring tools to conserve energy over the next decade.

Furthermore, the Ministry of Education has identified that it will require school boards to commence the collection of utility consumption data in 2013; the data collected through the Plan will position the Board to respond to this Ministry initiative as well. The Energy Management Plan also fulfills one of the recommendations of the Ministry Operational Review which suggested the preparation of energy management plans as a best practice for school boards.

The intent of the plan is to guide the School Board in the development of an energy management foundation. This will be a living plan that will evolve as the School Board's energy needs are revealed and better understood.

Energy conservation and strategic management of energy usage is a necessary step to contribute to reducing the effect of GHG emissions on the environment, ensure a reliable energy supply and secure a sustainable community. As a Catholic institution we are called to be good stewards of our environment.

To date the Board's energy management strategy has included the following:

- Hired an Energy Engineer to pursue energy management goals and monitor energy reduction strategies
- Preparation of the Energy Management Plan and collection of consumption data
- Have established baseline consumption data to measure savings and success of the program
- Have established an Energy Management Steering Committee to pursue energy management goals and encourage Board wide participation
- The Energy Management Plan aligns with the Board's System Strategic Plan goals related to good stewardship of resources and financial responsibility

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Energy Consumption Data for the Board

The values below are “metered” data for the Board.

Utility	Fiscal Year 2012-13 (Baseline)	Fiscal Year 2013-14 (Current)
Total Electricity (kWh)	100,690,496	99,945,360
Total Natural Gas (m3)	8,565,224	9,611,638
Total Heating Fuel (Type 1 and 2) (litres - L)	<i>n/a</i>	<i>n/a</i>
Total Heating Fuel (Type 3 and 4) (litres - L)	<i>n/a</i>	<i>n/a</i>
Total Propane (litres - L)	<i>n/a</i>	<i>n/a</i>
Total Wood (metric tonnes - MT)	<i>n/a</i>	<i>n/a</i>
Total District Heat (GJ)	<i>n/a</i>	<i>n/a</i>
Total District Cool (GJ)	<i>n/a</i>	<i>n/a</i>

The values below are raw data.

	Fiscal Year 2011-12 (Baseline)	Fiscal Year 2012-13 (Current)
Total Energy Consumed (ekWh)	189,083,616	199,137,472
Energy Intensity (ekWh/m ²)	188.24	195.68

Energy Conservation Goal

The Board has set out the following energy conservation goals for the next five fiscal years

Fiscal Year	2013-14 (ekWh/m ²)	2014-15 (ekWh/m ²)	2015-16 (ekWh/m ²)	2016-17 (ekWh/m ²)	2017-18 (ekWh/m ²)
Conservation Goal	4.18	3.90	3.40	3.53	3.53

	FY 2013-14 to 2017-18 (ekWh/m ²)
Cumulative Conservation Goal	57.28

Renewable Energy

For a list of the Board's renewable energy projects, please see Appendix A.

Energy Management Strategies

Energy management strategies fall into three key categories:

1. Design/construction/retrofit
2. Operations and maintenance
3. Occupant Behaviour

1. Design/Construction/Retrofit

Definition

Design/construction/retrofit encompasses the original and ongoing intent of how a building and its systems are to perform as a whole through the integration of disciplines such as, architecture and engineering.

For the Board's relevant projects over the next five years, please refer to Appendix B.

2. Operations and Maintenance

Definition

Operations and maintenance includes the strategies the Board uses to ensure that the existing buildings and equipment perform at peak efficiency. For the Board's relevant projects over the next five years, please refer to Appendix C.

3. Occupant Behaviour

Definition

Strategies that the Board uses to educate occupants, including staff, students and community users, with an emphasis in changing specific behaviours to reduce energy consumption. For the Board's relevant projects over the next five years, please refer to Appendix D

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Environmental Programs

Dufferin-Peel's 149 Catholic schools are now 100% EcoSchool certified, completing a process that began in 2009. Ontario EcoSchools was created in 2002 by a consortium of education stakeholders to address environmental issues in the formal education system. Seven school boards, York University, and the Toronto and Region Conservation Authority (TRCA) collaborated to develop an environmental education program that can be used province-wide. This program is known as Ontario EcoSchools.

Energy Efficient Incentives

Between Fiscal Year 2009-10 and 2012-13, the Board has received \$540,000 in incentive funding from various agencies to support the implementation of energy efficient projects.

Energy Procurement

The Board participates in CSBA Consortia arrangement to purchase electricity and natural gas.

Demand Management

The Board monitors electrical Demand daily or annually depending on the data available at each site. Where "Real Time" monitoring system is installed monitoring is done continuously. Otherwise demand is monitored via invoicing from LDC. By August 2014, "Real Time" energy tracking system will be available for all the Secondary Schools.

The Board uses the following methodologies to reduce electrical Demand: equipment scheduling, and phased/staged use of equipment.

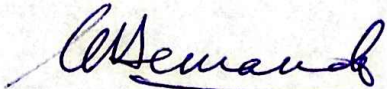
The Local Distribution Companies (LDCs) for the Board explicitly state the Power Factor on each bill. The Board monitors Power Factor annually.

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Senior Management Approval of this Energy Conservation and Demand Management Plan

I confirm that DPCDSB's senior management has reviewed and approved this Energy Conservation and Demand Management Plan.



K.J. Fernando, P. Eng.
Manager of Construction

June 30, 2014

Appendix A

Renewable Energy	Define	Number of systems in asset portfolio	Total size (kW)	Total number of ekWh generated annually	Actual or Estimated Generation (ekWh)
Solar photovoltaic		4	120		156,000
Solar air					
Solar water					
Wind Turbine					
Biomass					
Other					

Appendix B

Design, Construction and Retrofit Strategies												
Lighting	Quantity of Time that Measure will be in place (years)	2013-14		2014-15		2015-16		2016-17		2017-18		Estimated Total Accumulated Energy Savings (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 Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	
High Efficiency Lighting Systems (T-8, T-5, CFL, LED ...)	15	\$ 703,165	694,484	\$ 306,521	302,737	\$ 135,424	133,752	\$ 218,344	215,649	\$ 44,686	44,134	5,560,050
Daylight Sensors	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Outdoor Lighting	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Occupancy Sensors	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Daylight Harvesting	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
HVAC	Quantity of Time that Measure will be in place	2013-14		2014-15		2015-16		2016-17		2017-18		Estimated Total Accumulated Energy Savings (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 Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	
Efficient Boilers (near condensing)	30	\$ 90,940	157,457	\$ 327,984	567,882	\$ 15,788	27,335	\$ 31,036	53,736	\$ -	-	3,248,294
High Efficiency Boilers (condensing)	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
High-efficiency boiler burners	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Geothermal	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Heat recovery/enthalpy wheels	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Economizers	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Energy efficient HVAC systems	30	\$ 893,527	141,472	\$ 893,527	141,472	\$ 1,377,679	218,127	\$ 779,230	123,375	\$ 603,156	95,497	2,269,876
Energy efficient Rooftop units	15	\$ -	-	\$ 32,479	12,856	\$ -	-	\$ 5,746	2,274	\$ 44,039	17,432	73,404
High Efficiency Domestic Hot Water	15	\$ 90,940	186,885	\$ -	-	\$ 2,323	4,774	\$ 2,741	5,634	\$ 17,925	36,836	996,848
Efficient Chillers and Controls	25	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
High-efficiency motors	20	\$ 164,926	81,445	\$ 117,736	58,141	\$ 22,554	11,138	\$ 3,427	1,692	\$ -	-	676,589
VFD	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Demand Ventilation	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Entrance Heater Controls	20	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Controls	Quantity of Time that Measure will be in place	2013-14		2014-15		2015-16		2016-17		2017-18		Estimated Total Accumulated Energy Savings (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 Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	
Building Automation Systems - New	10	\$ 515,954	408,454	\$ 292,311	231,408	\$ 487,159	385,659	\$ 537,415	425,443	\$ -	-	4,975,763
Building Automation Systems - Upgrade	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Building Envelope	Quantity of Time that Measure will be in place	2013-14		2014-15		2015-16		2016-17		2017-18		Estimated Total Accumulated Energy Savings (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 Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	
Glazing	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Increased Wall Insulation	50	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
New Roof	25	\$ 394,483	36,703	\$ 565,541	52,618	\$ 1,238,050	115,189	\$ 1,958,380	182,209	\$ 1,415,843	131,731	1,235,703
New Windows	30	\$ 217,041	50,484	\$ 174,575	40,606	\$ 319,473	74,310	\$ 100,556	23,389	\$ 358,915	83,484	768,039
Treatments	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Shading Devices	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Design, Construction and Retrofit Strategies Total		\$ 3,070,976	1,757,383	\$ 2,710,674	1,407,720	\$ 3,598,450	970,283	\$ 3,636,874	1,033,402	\$ 2,484,563	409,113	19,804,566

Appendix C

Operations and Maintenance Strategies												
Policy and Planning	Quantity of Time that Measure will be in place (years)	2013-14		2014-15		2015-16		2016-17		2017-18		2013/14-2017/18
		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 specifications	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Day and Night Temperature Guidelines for all Schools	10											
Night time blackout of sites	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Interior	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Exterior	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
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	2013-14		2014-15		2015-16		2016-17		2017-18		2013/14-2017/18
		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	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Engineering Audit	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Re Commissioning	5	\$ 400,000	1,583,296	\$ 400,000	1,583,296	\$ 400,000	1,583,296	\$ 400,000	1,583,296	\$ 500,000	1,979,120	24,145,267
Real Time Monitoring	Quantity of Time that Measure will be in place	2013-14		2014-15		2015-16		2016-17		2017-18		2013/14-2017/18
		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	\$ 300,000	871,954	\$ 300,000	871,954	\$ 300,000	871,954	\$ 300,000	871,954	\$ 400,000	1,162,605	13,369,955
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Operations and Maintenance Strategies Total		\$ 700,000	2,455,250	\$ 700,000	2,455,250	\$ 700,000	2,455,250	\$ 700,000	2,455,250	\$ 900,000	3,141,725	37,515,223

Appendix D

Occupant Behaviour Strategies												
Training and Education	Quantity of Time that Measure will be in place (years)	2013-14		2014-15		2015-16		2016-17		2017-18		2013/14-2017/18
		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	\$ 10,000	35,322	\$ -	-	\$ 10,000	35,322	\$ -	-	\$ 10,000	35,322	317,898
NRCan Benchmarking Program	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Building Automation Training (site specific)	3	\$ -	-	\$ 10,000	105,966	\$ -	-	\$ 10,000	105,966	\$ -	-	635,795
Ongoing training and awareness programs for energy conservation	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Provide detailed information on Building Operational costs	1	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Provide detailed information on energy consumption (e.g. via the Utility Consumption Database or other database)	1	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Participate in environmental programs, such as EcoSchools, Earthcare	1	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Other tools (Define)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-
Occupant Behaviour Strategies Total		\$ 10,000	35,322	\$ 10,000	105,966	\$ 10,000	35,322	\$ 10,000	105,966	\$ 10,000	35,322	953,693