Five Year Conservation and Demand Management Plan

September 1, 2013 – August 31, 2018

Peterborough Victoria Northumberland and Clarington Catholic District School Board

Prepared June 2014 by:

VIP energy services, inc.

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1 EXECUTIVE SUMMARY

The Ontario Provincial Government has committed to help public agencies better understand and manage their energy consumption. As part of this commitment, **Ontario Regulation 397/11** under the **Green Energy Act 2009** requires public agencies, including municipalities, municipal service boards, school boards, universities, colleges and hospitals, to report on their energy consumption and greenhouse gas (GHG) emissions annually beginning in 2013, and to develop and implement energy Conservation and Demand Management (CDM) Plans starting in 2014.

The purpose of the Peterborough Victoria Northumberland and Clarington Catholic District School Board (PVNCCDSB) energy Conservation and Demand Management Plan is to develop a framework for Peterborough Victoria Northumberland and Clarington Catholic District School Board to understand the historical impact of its operations on greenhouse gas (GHG) emissions, and to take action by setting GHG reduction targets. The first objective of this report was the development of an energy Conservation and Demand Management Plan that addressed the facets of energy consumption in the School Board. This included the development of a GHG emissions inventory, benchmarking Peterborough Victoria Northumberland and Clarington Catholic District School Board's existing energy intensity performance relative to other School Boards, identifying potential energy efficiency projects, and establishing a GHG emissions reduction target. This strategic approach to energy management ("energy Conservation and Demand Management Plan") supports Peterborough Victoria Northumberland and Clarington Catholic District School Board's ***Strategic Priorities Action Plan 2014-2017.***

Energy efficiency and the wise use of energy are two of the lowest cost options for meeting energy demands, while providing many other environmental, economic and social benefits, including reducing greenhouse gas (GHG) emissions, cost avoidance and savings. Along with the aforementioned benefits, energy efficiencies and the wise use of energy also promote local economic development opportunities, energy system reliability, improved energy supply security, and reduced price volatility.

There are a variety of low cost/no cost initiatives available to Peterborough Victoria Northumberland and Clarington Catholic District School Board, which can jump-start energy consumption and dollar savings. Simple actions such as turning lights and appliances off, shutting off heaters in the summer, establishing efficient usage times, efficient production requirements, and many other actions can result in energy savings. Such actions, along with energy efficient capital and operating process improvements and project implementation, are key components which are outlined within the energy Conservation and Demand Management Plan (CDM Plan).

This CDM Plan is the culmination of a non-linear process involving the:

- Integration of establishing a baseline for performance to be measured against,

- Setting of future performance goals and objectives,
- Continuous improvement through identification of energy conservation potential,
- Strategic alignment of measure implementation and fiscal constraints, and
- Evaluation, measurement and communication of results achieved.

This CDM Plan contains three perspectives: historical, current and future. It looks at “what we have done”, “what we are doing”, and “what are we planning to do”.

2 KEY COMPONENTS

The Big Picture

Sustainability is a concept which meets the needs of the present without compromising the ability of future generations to meet their own needs. This is sometimes referred to as the "triple bottom line".

- Environmental Sustainability: Managing the effects of human activity so that it does not permanently harm the natural environment.
- Economic Sustainability: Managing the financial transactions associated with human activities so that they can be sustained over the long term without incurring unacceptable human hardship.
- Social/Cultural Sustainability: Allowing human activity to proceed in such a way that social relationships between people and the many different cultures around the world are not adversely affected or irreversibly degraded.

An energy Conservation and Demand Management Plan is the sum of measures planned and carried out to achieve the objective of using the minimal possible energy while maintaining comfort levels (in offices or dwellings) and production rates (in factories). It can be applied to any process or building where energy use is required. To make an efficient use of energy and, as a consequence, to save it, actions are focused on:

- Energy Conservation,
- Energy Recovery,
- Energy Substitution,
- Corporate Goals and Objectives, and
- Corporate Fiscal Management.

Analysis and Benchmarking

It is important to recognize the value of benchmarking and comparison as a starting point. By examining the School Board's current energy consumption patterns and comparing them with others, a better understanding of the opportunities and the pitfalls of energy conservation and sustainability planning as experienced by other public agencies is gained. This exposure, combined with the information gleaned from the energy audits, will allow PVNCCDSB to focus on strategies that have been proven successful elsewhere and can be tailored to the unique nature of the School Board.

It is apparent that energy conservation is being considered and implemented in most Public Sectors across Ontario and Canada. As well, the insights gained through their experiences with energy conservation can be used as a springboard to further the PVNCCDSB's sustainability strategies to encompass both operational and policy improvements. Many public agencies are taking their understanding of

environmental issues and conservation beyond energy consumption and recycling, by addressing the more complex issues of water management, heat island effect, and light pollution, to name a few.

Regulatory Requirements

Under Ontario Regulation 397/11 (Part of the **Green Energy Act**, 2009), all public sector agencies must now comply with mandatory reporting requirements. By 2013, all energy consumption at School Board facilities will have to be recorded and submitted to the Ministry annually. By 2014, the requirements become more stringent as the School Board will have to submit a CDM Plan, which encompasses measures taken to date with results, as well as a five year plan for further energy conservation measures to be implemented. PVNCCDSB is well positioned to meet this requirement as audits have been completed at most facilities, resulting in a compiled list of energy reduction projects, some of which are already implemented. The full list is reviewed throughout this Plan while the implementation program is outlined later in this report. This Plan itself is meant to serve as PVNCCDSB's CDM Plan and will help assist PVNCCDSB to meet all of its mandatory reporting requirements.

Key Factors and Constraints

It is important to both PVNCCDSB's future and to its image in the public at large to understand the value of a comprehensive CDM Plan. Many people around the world are beginning to embrace the notion that the earth's environment and precious resources need to be conserved. However, the necessary changes will not happen overnight. To be successful, a comprehensive energy management plan should embrace long-term thinking, taking advantage of "low hanging fruit" to achieve immediate cost savings which will be redirected to more complex projects involving higher initial costs with larger net benefits.

Public agencies should realize that each of their circumstances is unique and may not lend themselves to 'boiler plate' solutions used in many private sector segments. Those who have met their goals have utilized the advantages of the unique physical and non-physical attributes of their facilities, including green power generation on large flat roofs and community gardens on their large properties. While it is easy to be focused on the larger solutions, even seemingly small efforts can make a major long-term impact on the overall goal. A good example of this is Energy Awareness training which encourages Staff to take simple and effective actions such as turning off lights and computers when not in use.

Ongoing professional development is also a key factor in the success of a CDM Plan to ensure that Staff Members understand their role in the greater goal. The CDM Plan and accompanying education should be a required part of their daily activities.

While realities of budget restrictions are an important consideration in any planning activity, it is possible to achieve energy savings while adhering to the financial constraints of a publicly-funded School Board system. It is clear that new technology and ideology changes have produced continued operational cost

reductions while improving indoor comfort and environmental sustainability. These cost saving projects can often fund themselves by avoiding the use of previously allocated funds. As long as the savings are reinvested, these improvements can continue for the foreseeable future, ensuring a sustainable process. Many industries have had environmental programs running for over a decade and continue to hit their 3%-5% intensity reduction goals without sacrificing product quality.

3 HISTORICAL ENERGY MANAGEMENT

Historically, PVNCCDSB has addressed Energy Conservation and Demand Management on a project-by-project basis through the activities of the Building Services Team. Capital projects were implemented based on equipment's expected useful life or in response to equipment emergency breakdowns. Utility savings, realized as a result of the implementation of these individual projects, have not historically been uniquely reported formally, but have been considered as a component of general operations. Thus, they have been reported through utility expenses in the Accounting System. Sustainability and long-term energy reduction goals, through this CDM Plan, will become integral components of the business reporting system.

Utility costs were viewed as a fixed overhead cost. The management of these costs relied on an exception-based investigation approach. In other words, utility costs were only reviewed if a utility bill was much higher, or lower, than typical.

In 2012, PVNCCDSB embarked upon a strategic energy auditing project. The purpose of these audits was to identify and analyze potential energy conservation and demand management opportunities. These efforts have been instrumental in assisting PVNCCDSB in aligning the CDM Plan with the School Board's ***Strategic Priorities Action Plan 2014-2017.***

Historical Energy Reduction Projects Summary		
Year	**Facility**	**Action Taken**
2010 2011	St. Peter	First Floor Heat Pump Replacement Gym HVAC Upgrade
	4 Schools	Boiler Replacement
2011 2012	St. Peter	Lighting System Upgrade Install Variable Frequency Drives Second Floor Heat Pump Replacement
2012 2013	10 Schools	Lighting System Upgrade

4 CURRENT STATE OF CORPORATE ENERGY

Energy Data Management

While PVNCCDSB has an admirable history of managing its energy consumption, the Ontario government has required an increase in School Board energy management practices. This has resulted in the need to enhance current practices and develop new approaches. To meet this need, PVNCCDSB will design a comprehensive program for collecting and analyzing monthly energy billing information, and ensuring Staff is informed about energy consumption. This effort will produce an energy costs and consumption database that will be used for monitoring excessive variations, targeting facility follow-up evaluations, and highlighting areas that could be candidates for improved conservation. These monitoring enhancements will improve PVNCCDSB's understanding of the bottom line impact of energy management.

Energy Supply Management

PVNCCDSB has currently adopted a strategy of procuring its electricity from a number of sources.

Electrical Energy Supply	
Service Provider	**Facilities**
Hydro One Networks Inc.	Good Shepherd CES, Holy Family CES, Holy Trinity CSS, Mother Teresa CES, Monsignor Leo Cleary CES, Pope John Paul II CES, St. Dominic CES, St. John CES (Kirkfield), St. Joseph CES (Duoro), St. Luke CES, St. Martin CES, St. Mary CES (Campbellford), St. Mary CES (Lindsay), St. Mary CES (Grafton), St. Stephen CSS Technical Building
Lakefront Utility Services	Notre Dame CES, St. Joseph CES (Cobourg), St. Michael CES, St. Mary CSS, St. Mary CES (Grafton)
Peterborough Utility Company	Catholic Education Centre, Holy Cross CSS, Immaculate Conception CES, St. Alphonsus CES, St. Anne CES, St. Catherine CES, St. John CES (Peterborough), St. Patrick CES, St. Paul CES (Lakefield), St. Paul CES (Norwood), St. Paul CES (Peterborough), St. Peter CSS, St. Teresa CES
Veridian Connections Inc.	St. Anthony CES, St. Elizabeth CES, St. Francis of Assisi CES, St. Joseph CES (Bowmanville), St. Mary CES (Port Hope) – closed, St. Stephen CSS

The School Board has chosen to contract its natural gas through Reliance, Union Gas and Enbridge Gas. The School Board has chosen to contract its fuel oil through Sunderland Co-operative Inc. This strategy is reviewed annually during the budgeting process.

Energy Use in Facilities

PVNCCDSB Staff Members have retained a great deal of knowledge with regard to their facility's energy use. This knowledge base has been enhanced by a series of comprehensive audits completed at PVNCCDSB's facilities. Through the deployment of energy management software, PVNCCDSB Staff will be

equipped with the information necessary to make effective energy management decisions. This will make it possible to implement an effective energy procurement process, pursue appropriate capital projects, and implement successful conservation and demand management programs.

Equipment Efficiency

PVNCCDSB has pursued many measures to improve the energy efficiency of the School Board's equipment. Some of these measures include:

- Heating and cooling equipment retrofits,
- Building envelope improvements,
- Electrical systems upgrade, and
- The pursuit of the feasibility of solar thermal and solar photovoltaic applications.

As the understanding of corporate energy consumption improves, PVNCCDSB Staff will be equipped with the knowledge necessary to make informed decisions. This improved understanding will also reveal how simple actions like commissioning and maintenance procedures can improve existing equipment efficiencies.

Organizational Integration

Day to day management of energy has been primarily the responsibility of the PVNCCDSB Building Services Team. Current practices will be enhanced with future plans including:

- The creation of an interdepartmental energy management team,
- Improved energy monitoring and feedback, and
- Interactive energy training and awareness.

Staff across all departments will be given the necessary tools to address corporate energy concerns such as budgeting, procurement, conservation, and generation.

Prior to the development of the CDM Plan, VIP assessed PVNCCDSB's energy management practices. This assessment was completed by speaking to PVNCCDSB Staff and reviewing relevant School Board material. Upon completion of this review, VIP determined that PVNCCDSB had provided Staff Members with a mandate to pursue proper energy management, and through PVNCCDSB Staff ingenuity, PVNCCDSB was able to direct resources to energy management. However, VIP also noted that if PVNCCDSB is to achieve the Ministry's mandate, it will require the development of this CDM Plan that will address PVNCCDSB's energy management needs.

5 CURRENT ENERGY CONCERNS

Environmental, societal, and fiscal pressures accentuate the need for an energy Conservation and Demand Management Plan (CDM Plan).

Environmental

Concerns surrounding energy consumption with regard to climate change and air pollution have been well documented. Since 1990, Ontario's greenhouse gas emissions have increased 14%. The Government of Ontario estimates that 75% of Ontario's greenhouse gas emissions are associated with the consumption of fossil fuels for energy purposes. Increased smog and air pollution are also connected to the consumption of energy. Ontario's electricity generation is the Province's second largest source of sulfur dioxide and the third largest source of nitrogen oxides. These pollutants can cause irreparable harm to human health.

Societal

The 2003 Blackout heightened societal concerns surrounding the stability and security of our energy supply. Energy has been imbedded into most societal practices. If energy consumption is not managed appropriately, the frequency of energy interruption and the subsequent societal disruption will increase.

Fiscal

The fossil fuels traditionally used for the generation of energy are no longer financially accessible or environmentally acceptable. This has resulted in the promotion of renewable energy generation which comes with an additional expense. Energy costs are also anticipated to increase as Ontario's existing energy infrastructure is taken off-line or refurbished. Coming off of the lows of the 2009 recession, national electricity and natural gas prices are 27% and 21% greater than they were at the start of the decade. It is not anticipated that this upward trend will be altered in the short to medium future. The Province of Ontario has recently projected an annual 3.5% to 7.9% increase in electricity costs over the next 20 years. Natural gas is also projected to trend upward.

In recent years, PVNCCDSB has experienced some student enrollment growth and is projected to grow into the long term. As PVNCCDSB grows so will the School Board's environmental, societal, and fiscal energy concerns. PVNCCDSB recognizes that proper energy management must be pursued if these concerns are to be addressed. It is anticipated that the PVNCCDSB will experience an annual student enrollment increase of 1 % per annum. This expected growth may result in future energy consumption increases. However, actual future energy consumption will be dependent upon a number of other factors.

6 SCOPE OF THE CDM PLAN

PVNCCDSB provides education to 14,465 students within an area of 10,000 square km. The area includes the City of Peterborough, the County of Peterborough, the City of Kawartha Lakes (formerly called Victoria County), Northumberland County, and the Municipality of Clarington. Schools:

- 31 elementary schools, 9,374 students
- 6 secondary schools, 5,091 students

For the base year (2011), the following table outlines the portfolio of facilities within the PVNCCDSB.

Peterborough Victoria Northumberland and Clarington Catholic District School Board Facilities

Building Name	Operation Type	Address	City	Postal Code	Total Floor Area (m^2)	Average Hours per week	Swimming Pool (Y/N)	Number of Portables
PVNCCDSB Board Offices	Administrative	1355 Lansdowne Street West	Peterbrough	K9J 7M3	1,843.38	40	N	6
Good Shepherd CES	School	20 Farmington Drive	Courtice	L1E 3B9	6,020.00	47.5	N	1
Holy Cross CSS	School	1355 Lansdowne Street West	Peterbrough	K9J 7M3	8,397.62	47.5	N	6
Holy Family CES	School	125 Aspen Springs Drive	Bowmanville	L1C 0C6	6,921.00	47.5	N	0
Holy Trinity CSS	School	2260 Courtice Road South	Courtice	L1E 2M8	10,269.00	67.5	N	23
Immaculate Conception CES	School	76 Robinson Street	Peterbrough	K9H 1E8	3,131.00	47.5	N	0
Monsignor Leo Cleary CES	School	3820 Courtice Road North	Courtice	L1E 2L5	2,074.00	47.5	N	0
Monsignor O`Donoghue CES	School	2400 Marsdale Drive	Peterbrough	K9L 4H7	3,707.00	47.5	N	1
Mother Teresa CES	School	78 Glenabbey Drive	Courtice	L1E 2B5	4,514.00	47.5	N	0
Notre Dame CES	School	760 Burnham Street	Cobourg	K9A 2X6	1,839.00	47.5	N	6
Pope John Paul II CES	School	130 Orchard Park Road	Lindsay	K9V 5K1	1,976.00	47.5	N	4
St. Alphonsus CES	School	875 St. Mary's Street	Peterbrough	K9J 4H7	3,582.00	47.5	N	0
St. Anne CES	School	240 Bellevue Street	Peterbrough	K9H 5E5	3,261.00	47.5	N	6
St. Anthony CES	School	74 Toronto Road	Port Hope	L1A 3R9	4,149.00	47.5	N	0
St. Catherine CES	School	1575 Glenforest Blvd	Peterbrough	K9K 2J6	5,433.00	47.5	N	8
St. Dominic CES	School	320 Mary Street West	Lindsay	K9V 5X5	4,518.00	47.5	N	0
St. Elizabeth Catholic ES	School	610 Longworth Avenue	Bowmanville	L1C 5B8	3,773.00	47.5	N	6
St. Francis of Assisi CES	School	1771 Rudell Road	Newcastle	L1B 1E2	4,963.00	47.5	N	0
St. John CES (Peterborough)	School	746 Park Street South	Peterbrough	K9J 3T4	3,525.00	47.5	N	0
St. John CES (Kirkfield)	School	1047 Portage Road	KirkField	K0M 2B0	787.00	47.5	N	2
St. Joseph CES (Bowmanville)	School	90 Parkway Crescent	Bowmanville	L1C 1C3	3,240.00	47.5	N	2
St. Joseph CES (Cobourg)	School	919 D'arcy Street North	Cobourg	K9A 4B4	2,726.00	47.5	N	1
St. Joseph CES (Douro)	School	RR1	Douro	K0L 1S0	1,810.00	47.5	N	0
St. Luke CES	School	335 St. Luke's Road	Lindsay	K9V 4R5	2,060.00	47.5	N	3
St. Martin CES	School	531 Ennis Road	Ennismore	K0L 1T0	2,160.00	47.5	N	2
St. Mary CES (Campbellford)	School	PO Box 1120	Campbellford	K0L 1L0	2,268.00	47.5	N	0
St. Mary CES (Grafton)	School	PO Box 40	Grafton	K0K 2G0	1,691.00	47.5	N	3
St. Mary CES (Lindsay)	School	16 St. Lawrence Street	Lindsay	K9V 2J8	2,322.00	47.5	N	0
St. Mary CES (Port Hope) - closed	School	10 Pine Street	Port Hope	L1A 3E7	1,237.00	0	N	0
St. Mary CSS	School	1050 Birchwood Trail	Cobourg	K9A 5S9	12,088.00	67.5	N	12
St. Michael CES	School	23 University Avenue West	Cobourg	K9A 2G6	2,004.00	47.5	N	1
St. Patrick CES	School	300 Otonabee Drive	Peterbrough	K9J 8L9	3,103.00	47.5	N	1
St. Paul CES (Lakefield)	School	PO Box 370	Lakefield	K0L 2H0	2,191.00	47.5	N	2
St. Paul CES (Norwood)	School	PO Box 310	Norwood	K0L 2V0	862.00	47.5	N	8
St. Paul CES (Peterborough)	School	1101 Hilliard Street	Peterbrough	K9H 5S3	3,018.00	47.5	N	0
St. Peter CSS	School	730 Medical Drive	Peterborough	K9J 8M4	16,310.00	67.5	N	0
St. Stephen CSS	School	300 Scugog Street	Bowmanville	L1C 3K2	25,878.00	67.5	N	9
St. Teresa CES	School	1525 Fairmount Blvd	Peterbrough	K9J 6S9	2,562.00	47.5	N	3
St. Thomas Aquinas CSS Technical Building	School	269 Angeline Street South	Lindsay	K9V 4R2	8,380.00	47.5	N	13
					180,593.00			

7 ENERGY BASELINE AND CURRENT ENERGY PERFORMANCE

Effectively managing energy requires implementing appropriate energy monitoring procedures. The establishment of an accurate energy baseline is essential in this process. It will assist with energy conservation and greenhouse gas reduction target setting, energy procurement and budgeting, bill verification, energy awareness, and the selection and assessment of potential energy projects. PVNCCDSB, like many School Boards, relies on its utility bills to establish its energy baseline.

To date, the following School Board buildings have been audited:

Audits Performed by VIP Energy Services, Inc. in 2010.

Good Shepherd CES	St. Catherine CES	St. Dominic CES	St. Joseph CES (Cobourg)
Holy Cross CSS	Holy Trinity CSS	St. Peter CSS	St. Thomas Aquinas CSS
St. Mary CSS	St. Stephen CSS		

Audits Performed by VIP Energy Services, Inc. in 2012.

Holy Family CES	Immaculate Conception CES	Monsignor Leo Cleary CES	Monsignor O'Donoghue CES
Mother Teresa's CES	Notre Dame CES	Pope John Paul II CES	St. Alphonsus CES
St. Anne CES	St. Anthony CES	St. Elizabeth CES	St. Francis of Assisi CES
St. John CES (Kirkfield)	St. John CES (Peterborough)	St. Joseph CES (Douro)	St. Joseph CES (Bowmanville)
St. Luke CES	St. Martin CES	St. Mary CES (Campbellford)	St. Mary CES (Grafton)
St. Mary CES (Lindsay)	St. Michael CES	St. Patrick CES	St. Paul CES (Lakefield)
St. Paul CES (Norwood)	St. Paul CES (Peterborough)	St. Teresa CES	

The audits consist of a detailed analysis of historical consumption and demand information as well as a walkthrough of the facility by a qualified energy auditor. Based on the auditor's survey, a detailed equipment list and an energy consumption breakdown have been created, as well as a comprehensive list of potential energy conservation measures for each facility.

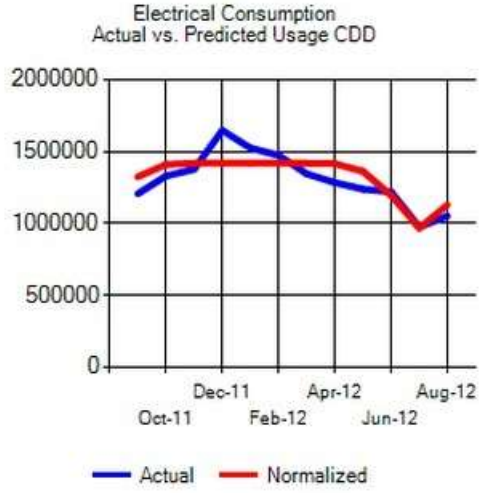
BASELINE PERFORMANCE (2011/2012)

PVNCCDSB has elected to utilize the consumption data from 2011/2012 to represent its baseline energy consumption performance.

Peterborough Victoria Northumberland and Clarington Catholic District School Board - 2011/2012 Energy						
Building Name	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m^3)	Fuel Oil 1&2 Consumption (litres)	GHG Emissions (kg)	Energy Intensity ($ekWh/ft^2$)	Energy Intensity (GJ/m^2)
PVNCCDSB Board Offices	8,809	-		705	0	0.02
Good Shepherd CES	496,695	19,435		76,480	11	0.42
Holy Cross CSS	2,146,896	127,221		412,279	39	1.50
Holy Family CES	620,852	20,690		88,785	11	0.44
Holy Trinity CSS	1,222,737	48,253		189,047	16	0.61
Immaculate Conception CES	157,934	30,666		70,613	14	0.56
Monsignor Leo Cleary CES	213,575	16,035		47,402	17	0.67
Monsignor O`Donoghue CES	351,862	16,035		58,465	13	0.51
Mother Teresa CES	304,729	33,152		87,056	14	0.52
Notre Dame CES	340,950	-		27,276	17	0.67
Pope John Paul II CES	164,631	21,938		54,647	19	0.72
St. Alphonsus CES	157,474	30,728		70,693	13	0.49
St. Anne CES	261,001	37,934		92,599	19	0.73
St. Anthony CES	206,000	26,036		65,704	11	0.42
St. Catherine CES	534,835	39,186		116,873	16	0.63
St. Dominic CES	350,449	37,141		98,256	15	0.59
St. Elizabeth Catholic ES	448,087	15,330		64,830	15	0.58
St. Francis of Assisi CES	344,837	10,017		46,525	8	0.33
St. John CES (Peterborough)	181,215	29,888		71,004	13	0.51
St. John CES (Kirkfield)	42,493	-	13,424	40,012	22	0.86
St. Joseph CES (Bowmanville)	191,631	22,629		58,113	12	0.48
St. Joseph CES (Cobourg)	238,021	24,528		65,415	17	0.66
St. Joseph CES (Douro)	85,231	-	15,398	48,815	13	0.50
St. Luke CES	126,126	-	18,497	60,539	15	0.57
St. Martin CES	246,321	29,299		75,099	24	0.93
St. Mary CES (Campbellford)	96,097	23,360		51,853	14	0.55
St. Mary CES (Grafton)	124,751	15,280		38,869	16	0.61
St. Mary CES (Lindsay)	151,298	27,939		64,926	18	0.69
St. Mary CES (Port Hope) - closed	153,905	11,404		33,873	21	0.80
St. Mary CSS	1,128,387	78,175		238,071	15	0.58
St. Michael CES	79,299	21,175		46,378	14	0.55
St. Patrick CES	262,852	24,431		67,218	16	0.61
St. Paul CES (Lakefield)	158,731	30,622		70,593	21	0.80
St. Paul CES (Norwood)	93,966	9,921		26,274	21	0.83
St. Paul CES (Peterborough)	225,136	38,356		90,528	19	0.75
St. Peter CSS	1,947,953	42,687		236,541	14	0.53
St. Stephen CSS	998,196	66,426		205,442	6	0.24
St. Teresa CES	174,452	34,089		78,406	19	0.75
St. Thomas Aquinas CSS Technical Building	868,832	42,086		149,075	15	0.57
	15,907,246	1,102,092	47,319	3,485,283	14	0.56

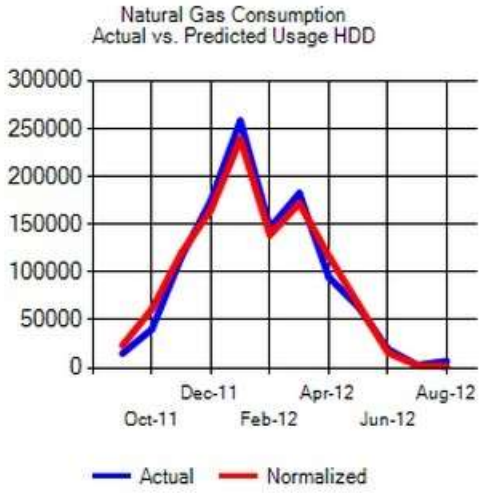
Normalization Analysis for All Accounts

Peterborough Victoria Northumberland and Clarington CDSB



Normalization Analysis for All Accounts

Peterborough Victoria Northumberland and Clarington CDSB



CURRENT PERFORMANCE (2012/2013)

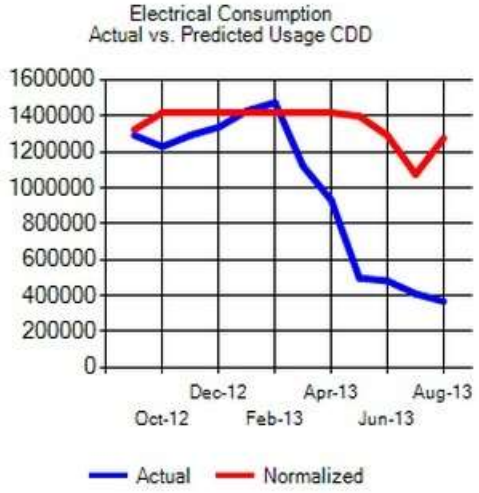
It is imperative to understand the energy characteristics of each facility. By understanding these values, baselines can be established and future retrofits and improvements to the buildings can be monitored and tracked to ensure that the intended benefits are fully realized. PVNCCDSB's most recent energy consumption inventory was completed in 2012/2013. This inventory took into account the electricity and natural gas consumption of PVNCCDSB facilities. In 2012/2013, PVNCCDSB's total energy use, including electricity and natural gas, was 30,649,498 equivalent kilowatt hours (ekWh). This total consisted of

15,224,935 kWh of electricity, 1,405,558 m^3 of natural gas, which is equivalent to 14,937,957 ekWh and 45,149 Litres of fuel oil, which is equivalent to 486,606 ekWh. The 2012/2013 combined total cost of electricity, natural gas and fuel oil was $2,572,803.

Peterborough Victoria Northumberland and Clarington Catholic District School Board - 2012/2013 Energy						
Building Name	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m^3)	Fuel Oil 1&2 Consumption (litres)	GHG Emissions (kg)	Energy Intensity (ekWh/ft^2)	Energy Intensity (GJ/m^2)
PVNCCDSB Board Offices	4,601	-		368	0	0.01
Good Shepherd CES	503,806	33,103		102,890	13	0.51
Holy Cross CSS	1,846,132	148,240		427,957	38	1.47
Holy Family CES	615,716	29,135		104,341	12	0.48
Holy Trinity CSS	1,232,612	70,480		231,860	18	0.69
Immaculate Conception CES	171,714	36,012		81,822	16	0.64
Monsignor Leo Cleary CES	36,534	20,397		41,486	11	0.44
Monsignor O`Donoghue CES	336,003	28,818		81,364	16	0.62
Mother Teresa CES	312,018	41,693		103,787	16	0.60
Notre Dame CES	352,877	-		28,230	18	0.69
Pope John Paul II CES	113,398	16,118		39,545	13	0.52
St. Alphonsus CES	158,062	52,584		112,062	19	0.72
St. Anne CES	321,394	69,292		156,717	30	1.17
St. Anthony CES	217,359	28,549		71,364	12	0.45
St. Catherine CES	522,465	43,732		124,478	17	0.65
St. Dominic CES	421,202	40,473		110,216	18	0.68
St. Elizabeth Catholic ES	449,591	26,033		85,186	18	0.69
St. Francis of Assisi CES	346,215	14,818		55,713	9	0.37
St. John CES (Peterborough)	180,712	36,258		83,007	15	0.58
St. John CES (Kirkfield)	38,903	-	10,864	32,743	18	0.71
St. Joseph CES (Bowmanville)	190,964	31,020		73,924	15	0.58
St. Joseph CES (Cobourg)	142,934	28,418		65,163	15	0.59
St. Joseph CES (Douro)	82,807	-	13,984	44,765	12	0.46
St. Luke CES	120,648	-	20,301	65,021	15	0.59
St. Martin CES	233,590	38,822		92,085	28	1.08
St. Mary CES (Campbellford)	109,026	30,148		65,721	18	0.68
St. Mary CES (Grafton)	225,399	21,275		58,255	25	0.96
St. Mary CES (Lindsay)	151,236	39,875		87,488	23	0.89
St. Mary CES (Port Hope) - closed	136,666	9,694		29,261	18	0.70
St. Mary CSS	1,119,722	93,695		266,720	16	0.63
St. Michael CES	78,412	24,345		52,300	16	0.61
St. Patrick CES	250,267	28,772		74,418	17	0.65
St. Paul CES (Lakefield)	177,408	36,633		83,452	24	0.93
St. Paul CES (Norwood)	120,675	9,902		28,375	24	0.94
St. Paul CES (Peterborough)	230,043	45,926		105,232	22	0.86
St. Peter CSS	1,492,689	52,865		219,363	12	0.45
St. Stephen CSS	1,031,716	76,749		227,641	7	0.26
St. Teresa CES	178,021	44,275		97,949	24	0.91
St. Thomas Aquinas CSS Technical Building	971,398	57,409		186,251	18	0.68
	15,224,935	1,405,558	45,149	3,998,520	16	0.61

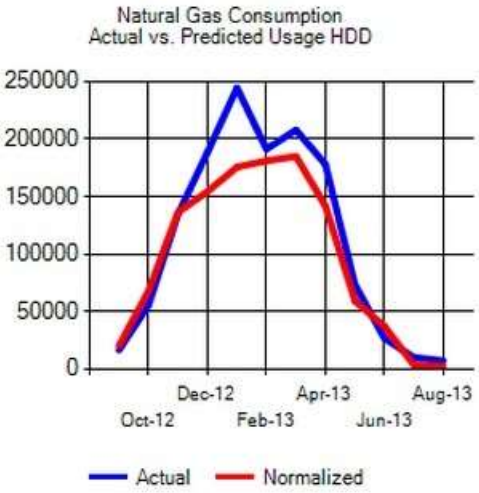
Normalization Analysis for All Accounts

Peterborough Victoria Northumberland and Clarington CDSB



Normalization Analysis for All Accounts

Peterborough Victoria Northumberland and Clarington CDSB



In all, PVNCCDSB has lowered its energy intensity from 2011 to 2012 indicating a slight degradation in energy utilization from 0.56 GJ/m^2 to 0.61 GJ/m^2. Current consumption patterns are tracking reasonably well with the baseline performance.

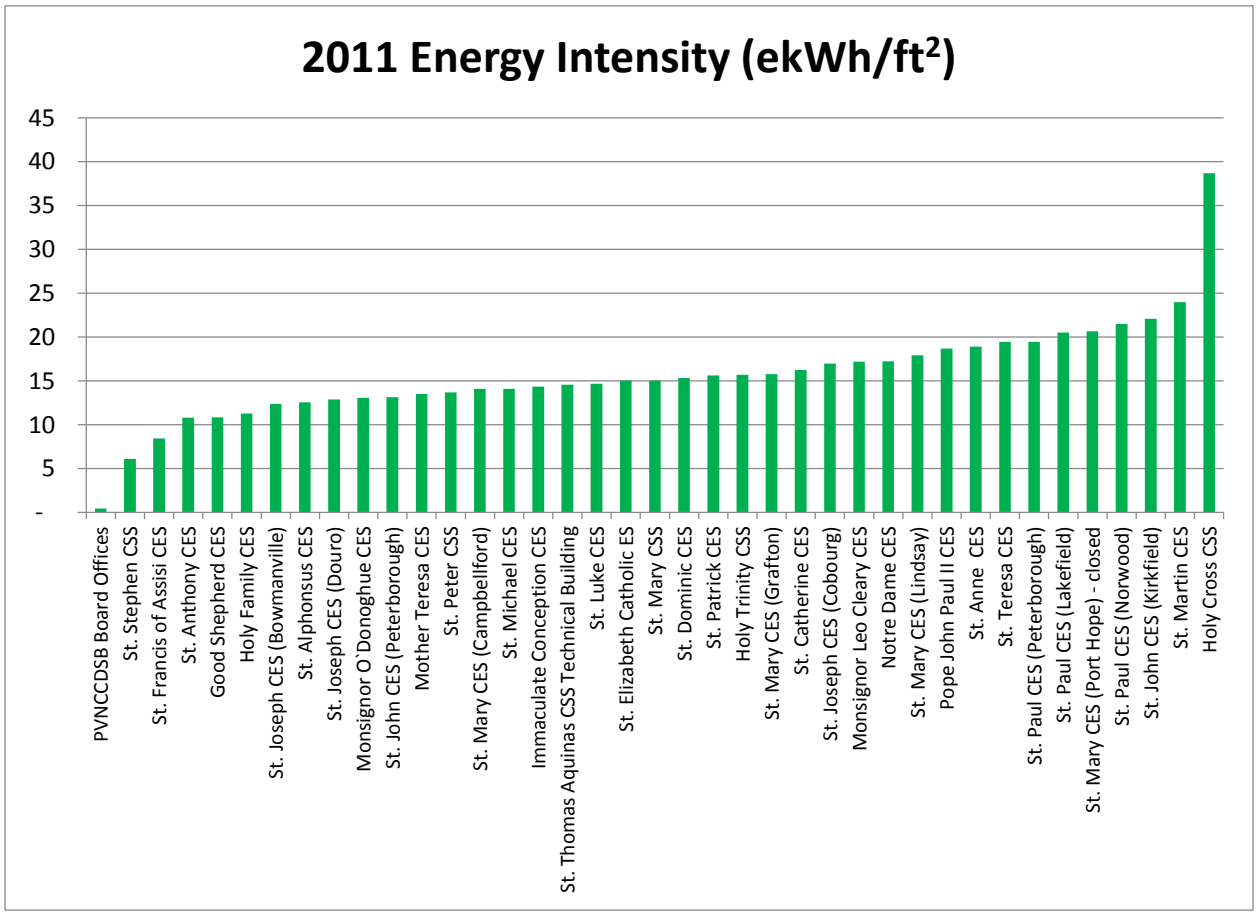
BENCHMARKING

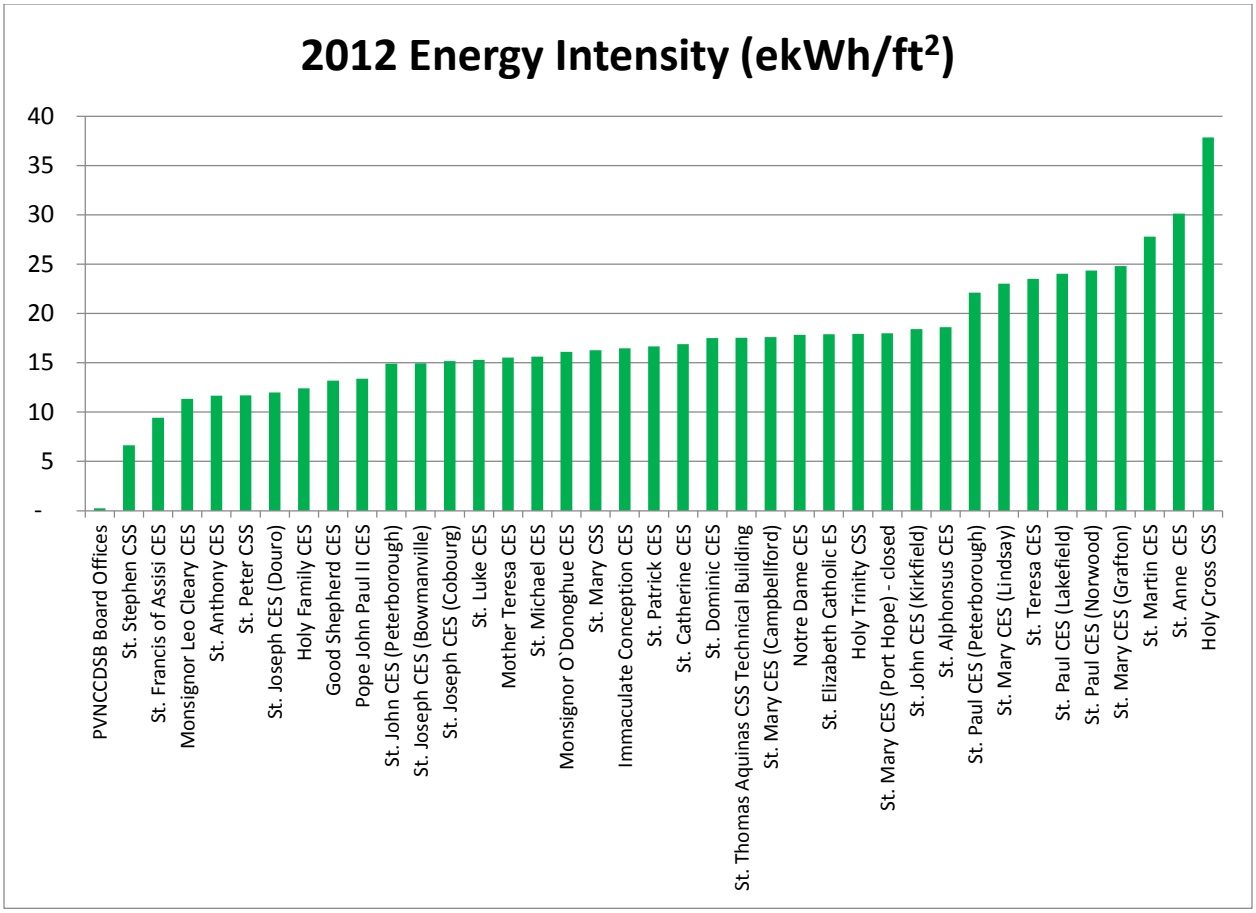
Market Sector

Energy Intensity (*e*kWh/ft²)				
Sector	**Minimum**	**Average**	**Maximum**	**No. of Organizations**
School Board	13.0	19	41	70

PVNCCDSB's facilities have an average 16 ekWh/ft² energy intensity, well below the industry average based on the Ministry of Energy's 2011 Public Sector Energy Consumption Data. PVNCCDSB ranks 12th amongst all School Boards in Ontario for energy intensity.

PVNCCDSB Facilities




2012 Energy Intensity (ekWh/ft2)
40
35
30
25
20
15
10
5
-
PVNCCDSB Board Offices
St. Stephen CSS
St. Francis of Assisi CES
Monsignor Leo Cleary CES
St. Anthony CES
St. Peter CSS
St. Joseph CES (Douro)
Holy Family CES
Good Shepherd CES
Pope John Paul II CES
St. John CES (Peterborough)
St. Joseph CES (Bowmanville)
St. Joseph CES (Cobourg)
St. Luke CES
Mother Teresa CES
St. Michael CES
Monsignor O`Donoghue CES
St. Mary CSS
Immaculate Conception CES
St. Patrick CES
St. Catherine CES
St. Dominic CES
St. Thomas Aquinas CSS Technical Building
St. Mary CES (Campbellford)
Notre Dame CES
St. Elizabeth Catholic ES
Holy Trinity CSS
St. Mary CES (Port Hope) - closed
St. John CES (Kirkfield)
St. Alphonsus CES
St. Paul CES (Peterborough)
St. Mary CES (Lindsay)
St. Teresa CES
St. Paul CES (Lakefield)
St. Paul CES (Norwood)
St. Mary CES (Grafton)
St. Martin CES
St. Anne CES
Holy Cross CSS

8 MISSION AND VISION

Vision

Achieving Excellence in Catholic Education through Learning, Leadership and Service.

The CDM Plan has been developed to address the fiscal, societal, and environmental costs and risks associated with energy consumption. Proper energy management will allow PVNCCDSB to display leadership, improve the delivery of services, and enhance the overall quality of life with respect to the community and students.

This CDM Plan outlines key actions that must be pursued to make this vision a reality. The completion of these actions will assist PVNCCDSB to meet its energy conservation targets and its greenhouse gas emission reduction commitment. Achieving these goals will assist PVNCCDSB in securing a strong energy management reputation and will allow for cost savings that can benefit PVNCCDSB, its employees, and its students.

It is acknowledged that, for this vision to come to fruition, energy management at PVNCCDSB must become an inclusive process. Recognizing that energy affects everyone differently, this Plan was created to address a variety of energy related concerns, while capturing innovative and relevant actions that will lead to meaningful change.

This CDM Plan will allow energy management to be incorporated into all PVNCCDSB activities, including organizational procedures, procurement practices, financial management and investment decisions, and facility capital, operations, and maintenance.

Overview

This CDM Plan is designed to meet the current energy needs and obligations of PVNCCDSB. The intent is to guide PVNCCDSB in the development of an energy management foundation. This will be a living Plan that will evolve as PVNCCDSB's energy needs are revealed and better understood.

PVNCCDSB's approach to energy management is three pronged. It begins with:

- Elimination of waste,
- Improving efficiencies, and
- Optimizing energy supply.

Prior to pursuing these actions, PVNCCDSB must be aware of the facility and Staff behaviours that influence energy consumption. Once encapsulated, this knowledge must be dispersed throughout the organization, allowing for the development of a culture of sustainability.

An improved understanding of corporate energy consumption will require improvements in energy management and awareness. Energy awareness campaigns will strive to make energy a tangible asset that Staff Members can appreciate when it is being consumed or wasted. In addition to increasing energy awareness, this energy Plan will integrate energy efficiency into the capital and operational decision making of the organization.

9 GOALS AND OBJECTIVES

It is of critical importance to improve energy efficiency and reduce our operating costs. Equally important is displaying our commitment to the environment through the reduction of greenhouse gases, while improving our air quality. It is also important that these actions are carried out without adversely impacting PVNCCDSB's operations. All PVNCCDSB Staff will have an essential role in the success of this energy management Plan. It will be the responsibility of the Energy Management Team to ensure that energy management measures are properly communicated and effectively implemented. An Energy Mandate for PVNCCDSB has been developed and is an integral component of this CDM Plan.

PVNCCDSB's CDM Plan was completed to help support the following strategic priorities:

- Ensure our structures, processes, relationships, and actions reflect our Gospel values and Catholic Social Teachings
- Implement the most effective, evidence-based instructional and assessment practices to help all students meet the Catholic School Graduate Expectations
- Embed technology to support digital literacy, creativity, innovation, collaboration, and the learning needs of all students
- Develop the intellectual, spiritual, mental, physical, and emotional well-being of students in safe, diverse, respectful, and faith-filled learning environments
- Implement fair and transparent processes in recruitment, leadership, talent development, and succession planning to ensure our employees have the necessary knowledge, skills, and attributes to support our Vision

The primary objective of this Plan is to improve the management of PVNCCDSB's energy consumption. Part of this objective is setting a conservation target that will see PVNCCDSB reduce its 2011 energy consumption by 3% by the end of the 2017/2018 period. Recognizing that PVNCCDSB has a growing student base, PVNCCDSB's energy conservation target will be intensity based. It is also the objective of this Plan to improve PVNCCDSB's understanding of energy consumption which is essential for PVNCCDSB to meet its corporate energy management goals.

Measurements of Success

The measurements of success will be based on a variety of indicators:

- Reaching the CDM Plan's energy conservation target,
- Assisting with the corporate greenhouse gas reduction target,
- Achieving the savings outlined in the Plan's budget section, and
- Imbedding energy management in PVNCCDSB's capital and operations decision making process.

Reporting Standards

The CDM Plan will allow for the monitoring and reporting that is necessary for PVNCCDSB to meet the regulatory requirements of the **Green Energy Act** and PVNCCDSB's greenhouse gas reduction targets. Regular energy monitoring and feedback to the Ministry and PVNCCDSB Management and Staff will improve knowledge and help make energy consumption a tangible asset, making possible appropriate behavioural changes. The intent of monitoring and reporting on energy consumption is to make energy management transparent and the consumer accountable. The Ministry will be provided with annual updates on the state of energy management at PVNCCDSB. Energy consumption feedback provided to Staff will be imbedded into PVNCCDSB's regular business.

10 ENERGY MANAGEMENT TEAM

The Energy Management Team at PVNCCDSB is comprised of the:

- Superintendent of Business,
- Manager of Plant,
- Mechanical / Electrical Supervisor, and
- Manager of Purchasing.

Historically, PVNCCDSB addressed Energy Conservation and Demand Management on a project-by-project basis through the activities of the Building Services Team. Strategic directives have been provided by the School Board's Board of Trustees.

This CDM Plan outlines a commitment to integrate Energy Conservation and Demand Management into the operations of the School Board, as indicated in the covering letter from the Superintendent of Business. Within the duration of the CDM Plan, CDM planned activities will become an integral component of the annual budgeting process. A collaborative effort will be undertaken to achieve this integration, involving:

- Internal Staff (which may include but will not be limited to Facilities Management, Finance, and Procurement),
- Advisement from the Ministry of Energy and Ministry of Education, and
- Consultations with Energy Management experts.

11 FINANCIAL ASSESSMENT

The energy Conservation and Demand Management Plan's financial assessment philosophy is to treat fiscal resources as if they were energy assets. Therefore, financial investments follow the same three pronged approach used for the management of energy:

- Elimination of waste,
- Improving efficiencies, and
- Optimizing energy supply.

The initial cost and saving estimates for the proposed process improvements, program implementation, and projects are broken down as follows:

Energy Conservation Financial Summary

Facility	Opportunity	Annual Savings ($)	Estimated Installation Cost ($)	Payback Period (years)
Education Centre	Energy Efficient HVAC	$20,000	$300,000	15
	Install BAS	$6,667	$100,000	15
Holy Cross SS	Lighting Retrofit	$4,667	$35,000	7.5
	BAS Upgrade	$13,333	$200,000	15
Holy Trinity SS	Lighting Upgrade	$2,667	$20,000	7.5
	Domestic Hot Water Plant Upgrade	$1,333	$20,000	15
St. Mary SS	Domestic Hot Water Plant Upgrade	$2,667	$40,000	15
	Lighting Upgrade	$2,667	$20,000	7.5
St. Stephen SS	Lighting Upgrade	$2,667	$20,000	7.5
	Domestic Hot Water Plant Upgrade	$1,333	$20,000	15
St. Thomas Aquinas SS	Lighting Retrofit	$2,667	$20,000	7.5
	Domestic Hot Water Plant Upgrade	$1,333	$20,000	15
St. Alphonsus CES	Install High Efficiency Condensing Boilers	$8,500	$85,000	10
	BAS Upgrade	$5,000	$75,000	15
St. Anne CES	Install High Efficiency Condensing Boilers	$8,000	$80,000	10
St. Catherine CES	Install High Efficiency Condensing Boilers	$8,500	$85,000	10
St. Elizabeth (Bowmanville)	Energy Efficient HVAC	$16,667	$250,000	15
St. Joseph CES (Cobourg)	Install High Efficiency Condensing Boilers	$8,000	$80,000	10
St. Luke CES	Lighting Retrofit	$2,000	$15,000	7.5
St. Mary CES (Campbellford)	Domestic Hot Water Plant Upgrade	$667	$10,000	15

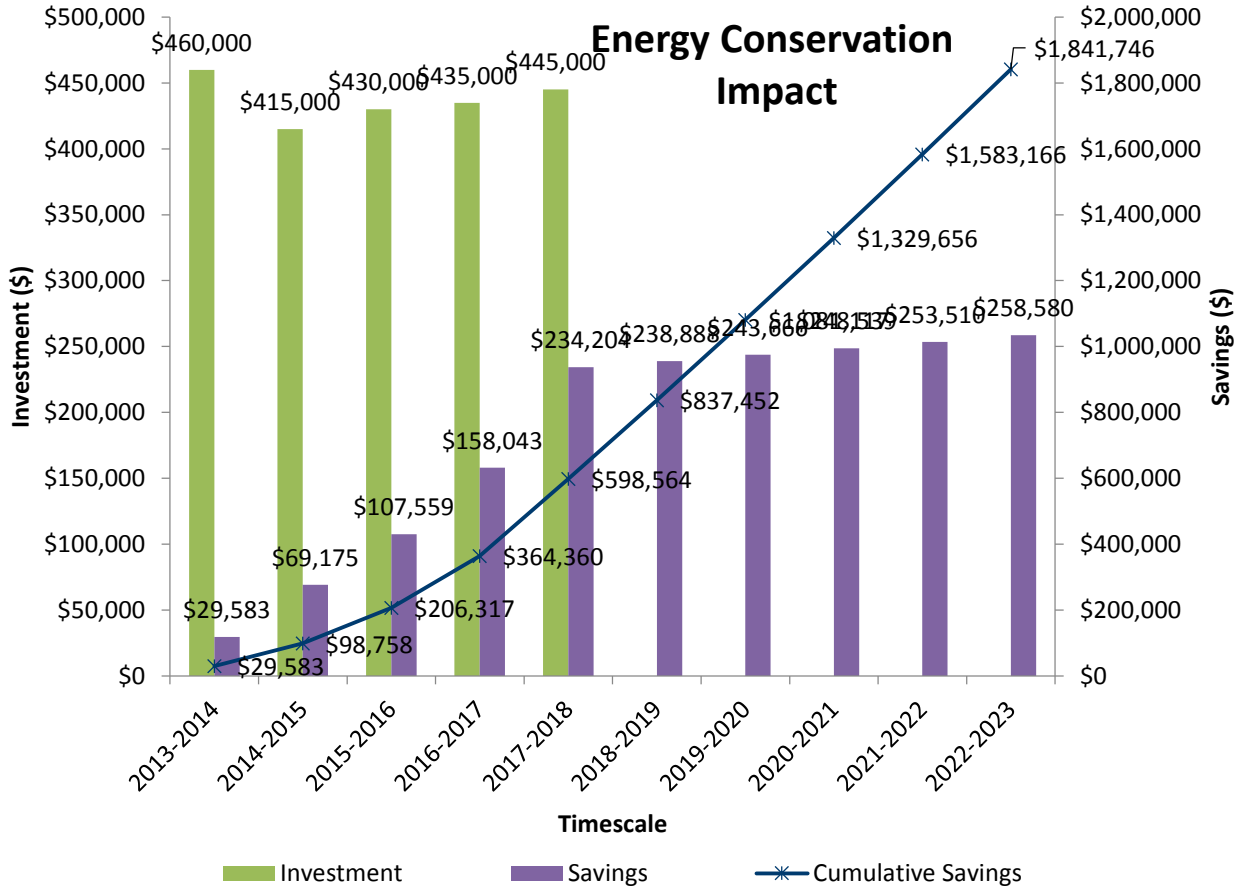
Energy Conservation Financial Summary				
Facility	**Opportunity**	**Annual Savings ($)**	**Estimated Installation Cost ($)**	**Payback Period (years)**
St. Mary CES (Grafton)	Domestic Hot Water Plant Upgrade	$333	$5,000	15
St. Mary CES (Lindsay)	Envelope Upgrade, Exterior Door Replacement	$250	$20,000	80
St. Patrick CES	Install High Efficiency Condensing Boilers	$8,500	$85,000	10
St. Paul CES (Peterborough)	Install High Efficiency Condensing Boilers	$8,500	$85,000	10
St. Teresa CES	Install High Efficiency Condensing Boilers	$8.000	$80,000	10
	Domestic Hot Water Plant Upgrade	$1,333	$10,000	15
10 Schools	Install Variable Frequency Drives – Gym HVAC	$20,000	$100,000	5
27 Schools	Install Variable Frequency Drives – Gym HVAC	$5,700	$285,000	5
		$223,917	$2,185,000	9.8

The listed costs and savings are for the inaugural year of a process, program, or project. If initiated and monitored effectively, it can be anticipated that savings can be sustained. It should also be noted that the price of energy is anticipated to increase, whereas the costs of capital projects will likely decrease with advancements in technology. This could potentially lead to increased savings and decreased costs in the later years of the plan. The potential for avoided costs adds to the relevance of a plan of this nature.

This fiscal assessment does not take into account the economic benefits of achieving all of the corporate energy management goals. Due to the difficulty in quantifying the economic value of extended equipment longevity, improved comfort and productivity, and climate change mitigation, it should not be discounted.

12 CORPORATE ENERGY BUDGET

The following budget was derived from the planned actions within the CDM Plan. Each year's estimated cumulative savings have also been displayed in the figure below. These projected costs and savings do not consider the human resource expenditures.



Prior to requesting funding for energy actions, PVNCCDSB will consult with utility representatives and/or energy consultants, allowing PVNCCDSB to schedule project launch dates in parallel with applicable incentive funding programs. The projects may be moved forward or delayed based on changes to incentive programs as well as changes to the CDM Plan. However, PVNCCDSB will not make significant alterations to the Plan in a quest for incentive funding. This is not a prudent approach to planning. Actions will be pursued only when they coincide with the PVNCCDSB's objectives and are appropriate to be pursued at that time.

As PVNCCDSB continues to evolve and its energy needs become greater, it will be essential to reassess and clarify, as necessary, the financial indicators that are applied to investment analysis and prioritization of proposed energy projects. Energy efficiency projects must be weighted appropriately relative to other investment needs. There will also be a need to develop procedures for the annual allocation of capital resources for energy efficiency measures in the capital budget.

13 ENERGY MANAGEMENT ACTIONS

The economic feasibility of proposed actions played a large role in the prioritization of the processes, programs, and projects. Equally important in this prioritization exercise was the evaluation of PVNCCDSB's internal capacity to complete the proposed initiatives. Recognizing the need to develop PVNCCDSB's internal capacity, the initial years of the Plan focus heavily on processes and programs. The implementation of the recommended processes and programs will result in an improved understanding and awareness of energy consumption. This will allow for improved decision making and greater success with future energy projects (See **Appendix C** for the CDM Plan timeline). As these actions are completed, the Energy Management Team will meet to discuss monitoring results and how they can be used to enhance the Plan. The CDM Plan is intended to be a living document. Anticipated improvements in knowledge and capacity will result in enhancement of the proposed actions.

Annual Reporting

An Annual Conservation and Demand Management Plan Update Report will be provided that details PVNCCDSB's activities and results relating to this 2014-2018 Energy Conservation and Demand Management (CDM) Plan. The Report will describe the CDM Plan related activities that have happened in the previous year and will focus on linking actions to results. In addition, the Report will take a forward view of the upcoming year to lay out the roadmap and identify any changes or adjustments that should be considered based on what the current market conditions are. The overarching goal of the report is to make the 5 year CDM Plan a living document that is reviewed and updated on a yearly basis.

Future Energy Projects

Energy projects at PVNCCDSB were evaluated prior to the development of the CDM Plan. PVNCCDSB Staff Members have advocated for some ambitious energy initiatives that were investigated and determined to be not feasible for a variety of reasons. It is anticipated that as PVNCCDSB grows and energy management practices improve, these actions will be reassessed.

Future Energy Reduction Projects Summary		
Year	**Planned Activity**	**Facility**
2013 2014	HVAC Upgrade	Education Centre
	BAS Installation	Education Centre
	Domestic Hot Water Plant Upgrade	St. Mary SS
	Envelope Upgrade, Exterior Door Replacement	St. Mary CES (Lindsay)
2014 2015	Install High Efficiency Condensing Boilers	St. Alphonsus CES, St. Catherine CES, St. Patrick CES, St. Paul CES (Peterborough)
	BAS Upgrade	St. Alphonsus CES
2015 2016	HVAC Upgrade	St. Elizabeth CES
	Domestic Hot Water Plant Upgrade	St. Teresa CES, St. Mary CES (Campbellford)
	Install High Efficiency Condensing Boilers	St. Anne CES, St. Teresa CES, St. Joseph CES (Cobourg)
2016 2017	Domestic Hot Water Plant Upgrade	St. Mary CES (Grafton)
	BAS Upgrade	Holy Cross SS
	Install Variable Frequency Drives – Gym HVAC	10 Schools
	Lighting Retrofit	St. Luke CES, Holy Cross SS
2017 2018	Lighting Retrofit	St. Thomas Aquinas SS, Holy Trinity SS, St. Stephen SS, St. Mary SS
	Install Variable Frequency Drives – Gym HVAC	27 Schools
	Domestic Hot Water Plant Upgrade	St. Thomas Aquinas SS, Holy Trinity SS, St. Stephen SS, St. Mary SS

Renewable Energy

Feasibility and promotion of renewable energy technologies were examined throughout the development of the CDM Plan. These technologies have been incorporated into the CDM Plan where it made sense to do so, strategically or fiscally.

Purchasing Practices

Traditionally, purchasing practices in the public sector were designed to favour equipment or physical retrofits at the lowest cost in order to ensure the highest possible financial responsibility. As energy conservation best practices emerged, it was revealed that there is a major issue in doing this. Almost all wasteful energy consuming equipment is less expensive than their energy conserving counterparts. The practice in itself does not encourage energy efficiency, as most energy intensive alternatives such as standard efficiency motors are less costly than their higher efficiency counterparts. When dealing with energy intensive hardware, the initial capital cost is only a fraction (5%-10%) of the total lifecycle cost.

The practice of 'low bidder wins' purchasing limits the Staff when trying to make the right environmental decision. Making a specific amount of money available to include the conservation upgrades allows the School Board to take advantage of necessary investments in order to reduce their impact on the bottom line after the cost of purchase. For example, when purchasing a motor, all suppliers will specify standard efficiency motors. An energy smart buyer will know that 90%+ of the motor's lifecycle cost is in its energy use. Therefore, buying a premium efficiency motor at a small incremental cost has a payback of less than three years. Missing this opportunity translates into a long-term financial increase. In fact, the incremental cost between a less efficient and a more efficient alternative is often less than 5% of the capital cost. That 5% capital cost difference is often recuperated in less than three years. This allows Staff to make the right environmental decision based on industry best financial practices.

Energy Management and Information Systems

An Energy Management and Information System (EMIS) is an important element of a comprehensive Energy Management Program (EMP), as it helps to ensure that the full benefits of other energy conservation efforts are achieved and sustained. In fact, a quality EMIS can reduce energy use and cost by at least 5%. (Reference: Office of Energy Efficiency, National Resources Canada). Current industry and international standards, such as the International Performance Measurement & Verification Protocol (IPMVP), use an average of an 8%-10% reduction in energy consumption and costs. VIP Energy Services has documented a conservation average of 17% over customers served to date. However, in order to be as conservative as possible in its financial calculations, VIP generally uses NRCan's conservative numbers (5%) to ensure objectivity in the investment matter. The savings from an EMIS result from the following measured impacts:

- Early detection of poor performance,
- Support for optimal decision making,
- Effective performance reporting,
- Auditing of historical performance,
- Identification and justification of energy projects,

- Evidence of implementation success,
- Support for energy budgeting and accounting, and
- Provision of energy data to other systems (such as Building Automation Systems, BAS).

When looking at performance reports, an EMIS facilitates ensuring that upgrades or changes actually meet forecasted savings, as well as the quantification of losses or gains. However, it is important to note that placing meters to isolate individual retrofit projects determined by their scope is generally cost ineffective and typically does not allow incorporation of out-of-scope project factors that directly affect equipment performance.

Collecting the information in any EMIS program is really only the first step, as the data must then be used to instigate change and push action. This can only be done through analysis and warning systems built on baseline information. In order for an EMIS system to function properly, communication loops must also be established between departments in order for the maximum benefit to be realized.

Building Re-Commissioning

Building re-commissioning, or retro-commissioning, refers to the optimization of the current automation, controls and energy consuming systems. As buildings age, both the functionality of the equipment and the functions that they serve can undergo significant changes. A re-commissioning program generally focuses on ensuring that the equipment operations are modified to include any new or deleted duties. The following is a list of common problems found in re-commissioning projects that result in increased energy costs:

- Inefficient scheduling of HVAC equipment,
- Simultaneous heating and cooling,
- Economizer sequences not optimized,
- Incorrect airflow and water balance,
- Malfunctioning sensors or incorrect calibration,
- Fan VFD control overridden,
- Supply air static pressure set-points not optimized,
- Boiler controls not operating efficiently,
- Balancing dampers and valves not installed or installed in poor or unusable locations,
- Incorrectly piped water coils,
- Process or space classification changes (lab space to office, etc.),
- Incomplete or incorrect control component installation,
- Control sequence incorrectly implemented,

- Substituted control components,
- Incomplete installations (missing control valve, actuators, etc.), and
- Testing, adjusting, and balancing (TAB) not completed or only partially completed.

National Resources Canada (NRCan) has published several guidelines for costing and expected returns from re-commissioning projects. Building re-commissioning is an increasingly important practice, not only from an energy standpoint, but also from a comfort and safety perspective as well. The more complex building controls and ventilation become, the more risk there is that one or more components will fail or deliver incorrect measurements.

Energy and Resource Awareness (ERA) Programs

Independent studies done by organizations such as Natural Resources Canada (NRCan) show that initiatives directed at Staff and facility users, in particular ERA Programs, can lead to significant savings on their own. In fact, NRCAN reports indicate that dedicated, consistent Energy Awareness Programs are proven to be the most effective way to reduce energy usage with no capital costs and minor operational expenses. A conservative estimate of savings for an effective ERA Program can be as high as 5% -7% of annual utilities spending.

An effective ERA Program is designed to assist organizations to attain energy savings by promoting a fundamental shift in the personal philosophies of Staff and facility users towards reducing their energy use. The Program utilizes community-based social marketing to develop influential communication materials and in-house displays that are carefully designed to inform and motivate employees to effectively decrease energy consumption. In many cases, an ERA Program has proven to be the most effective way to lower energy usage without any capital costs and minimal operational expenses.

A continuous and consistent ERA Program is not only an effective way to lower energy use within a facility, but can also serve to be an effective marketing tool to spread the word that the School Board is a community leader in energy conservation and environmental sustainability.

APPENDIX A
Energy Data

ENERGY CONSUMPTION

Peterborough Victoria Northumberland and Clarington Catholic District School Board Electricity and Natural Gas Consumption				
Building Name	2011/2012 Electricity Consumption (kWh)	2011/2012 Natural Gas Consumption (m^3)	2012/2013 Electricity Consumption (kWh)	2012/2013 Natural Gas Consumption (m^3)
PVNCCDSB Board Offices	8,809	-	4,601	-
Good Shepherd CES	496,695	19,435	503,806	33,103
Holy Cross CSS	2,146,896	127,221	1,846,132	148,240
Holy Family CES	620,852	20,690	615,716	29,135
Holy Trinity CSS	1,222,737	48,253	1,232,612	70,480
Immaculate Conception CES	157,934	30,666	171,714	36,012
Monsignor Leo Cleary CES	213,575	16,035	36,534	20,397
Monsignor O`Donoghue CES	351,862	16,035	336,003	28,818
Mother Teresa CES	304,729	33,152	312,018	41,693
Notre Dame CES	340,950	-	352,877	-
Pope John Paul II CES	164,631	21,938	113,398	16,118
St. Alphonsus CES	157,474	30,728	158,062	52,584
St. Anne CES	261,001	37,934	321,394	69,292
St. Anthony CES	206,000	26,036	217,359	28,549
St. Catherine CES	534,835	39,186	522,465	43,732
St. Dominic CES	350,449	37,141	421,202	40,473
St. Elizabeth Catholic ES	448,087	15,330	449,591	26,033
St. Francis of Assisi CES	344,837	10,017	346,215	14,818
St. John CES (Peterborough)	181,215	29,888	180,712	36,258
St. John CES (Kirkfield)	42,493	-	38,903	-
St. Joseph CES (Bowmanville)	191,631	22,629	190,964	31,020
St. Joseph CES (Cobourg)	238,021	24,528	142,934	28,418
St. Joseph CES (Douro)	85,231	-	82,807	-
St. Luke CES	126,126	-	120,648	-
St. Martin CES	246,321	29,299	233,590	38,822
St. Mary CES (Campbellford)	96,097	23,360	109,026	30,148
St. Mary CES (Grafton)	124,751	15,280	225,399	21,275
St. Mary CES (Lindsay)	151,298	27,939	151,236	39,875
St. Mary CES (Port Hope) - closed	153,905	11,404	136,666	9,694
St. Mary CSS	1,128,387	78,175	1,119,722	93,695
St. Michael CES	79,299	21,175	78,412	24,345

Peterborough Victoria Northumberland and Clarington Catholic District School Board Electricity and Natural Gas Consumption				
Building Name	**2011/2012 Electricity Consumption (kWh)**	**2011/2012 Natural Gas Consumption (m^3)**	**2012/2013 Electricity Consumption (kWh)**	**2012/2013 Natural Gas Consumption (m^3)**
St. Patrick CES	262,852	24,431	250,267	28,772
St. Paul CES (Lakefield)	158,731	30,622	177,408	36,633
St. Paul CES (Norwood)	93,966	9,921	120,675	9,902
St. Paul CES (Peterborough)	225,136	38,356	230,043	45,926
St. Peter CSS	1,947,953	42,687	1,492,689	52,865
St. Stephen CSS	998,196	66,426	1,031,716	76,749
St. Teresa CES	174,452	34,089	178,021	44,275
St. Thomas Aquinas CSS Technical Building	868,832	42,086	971,398	57,409
TOTAL	**15,907,246**	**1,102,092**	**15,224,935**	**1,405,558**

Peterborough Victoria Northumberland and Clarington Catholic District School Board Fuel Oil Consumption		
Building Name	**2011/2012 Fuel Oil 1&2 Consumption (litres)**	**2012/2013 Fuel Oil 1&2 Consumption (litres)**
St. John CES (Kirkfield)	13,424	10,864
St. Joseph CES (Duoro)	15,398	13,984
St. Luke CES	18,497	20,301
Total	47,319	45,149

APPENDIX B

Energy Use Breakdown

ENERGY USE BREAKDOWN

Peterborough Victoria Northumberland and Clarington Catholic District School Board Facilities 2012 Energy			
Building Name	**Total Electricity Consumption (kWh)**	**Total Natural Gas Consumption (m^3)**	**Fuel Oil 1&2 Consumption (litres)**
Administrative	4,601		
High School	7,694,269	499,438	
Elementary School	7,526,065	906,120	45,149
Total	15,224,935	1,405,558	45,149

Peterborough Victoria Northumberland and Clarington Catholic District School Board Facilities 2012 Energy			
Building Name	**Total Electricity Consumption (%)**	**Total Natural Gas Consumption (%)**	**Fuel Oil 1&2 Consumption (%)**
Administrative	.03		
High School	50.54	35.53	
Elementary School	49.43	64.47	100.00
Total	100.00	100.00	100.00

APPENDIX C

Energy Conservation Measure Schedules

Peterborough Victoria Northumberland and Clarington CDSB Energy Management Strategies

Opportunities		Annual Energy Savings							
EMS #	Opportunity	Electrical (kWh/yr)	Natural Gas (m^3/yr)	Water (m^3/yr)	Total (GJ/yr)	Estimated Cost ($)	Annual Savings ($)	tCO2e Savings	Payback Period (years)
1	HVAC Upgrade (Education Centre)					$300,000	$20,000		15
2	BAS Upgrade (Education Centre)					$100,000	$6,667		15
3	DHW Upgrade (St. Mary SS)					$40,000	$2,667		15
4	Exterior Door Replacement (St. Mary CES (Lindsay))					$20,000	$250		80
5	Install High Efficiency Condensing Boilers (St. Alphonsus CES, St. Catherine CES, St. Patrick CES, St. Paul CES (Peterborough))					$340,000	$34,000		10
6	BAS Upgrade (St. Alphonsus CES)					$75,000	$5,000		15
7	HVAC Upgrade (St. Elizabeth CES)					$250,000	$25,000		15
8	Install High Efficiency Condensing Boilers (St. Anne CES, St. Teresa CES)					$160,000	$10,667		10
9	DHW Upgrade (St. Teresa CES, St. Mary CES (Campbellford))					$20,000	$1,333		15
10	DHW Upgrade (St. Mary CES (Grafton))					$5,000	$333.33		15
11	Lighting Retrofit (St. Luke CES, Holy Cross SS)					$50,000	$6,667		7.5
12	BAS Upgrade (Holy Cross SS)					$200,000	$13,333		15
13	Install Variable Frequency Drives – Gym HVAC (10 Schools)					$100,000	$20,000		5
14	Install High Efficiency Condensing Boilers (St. Joseph (Cobourg))					$80,000	$8,000		10
15	Lighting Retrofit (St. Thomas Aquinas SS, Holy Trinity SS, St. Stephen SS, St. Mary SS)					$80,000	$10,667		7.5
16	DHW Upgrade (St. Thomas Aquinas SS, Holy Trinity SS, St. Stephen SS, St. Mary SS)					$80,000	$5,333		15
17	Install Variable Frequency Drives – Gym HVAC (27 Schools)					$285,000	$57,000		5
	TOTAL					**$2,185,000**	**$226,917**		

Peterborough Victoria Northumberland and Clarington CDSB Projected Energy Conservation Savings and Investment

EMS	Savings	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	
1	HVAC Upgrade (Education Centre)	$20,000	$20,400	$20,808	$21,224	$21,649	$22,082	$22,523	$22,974	$23,433	$23,902	**$218,994**
2	BAS Upgrade (Education Centre)	$6,667	$6,800	$6,936	$7,075	$7,216	$7,361	$7,508	$7,658	$7,811	$7,967	**$72,998**
3	DHW Upgrade (St. Mary SS)	$2,667	$2,720	$2,774	$2,830	$2,886	$2,944	$3,003	$3,063	$3,124	$3,187	**$29,199**
4	Exterior Door Replacement (St. Mary CES (Lindsay))	$250	$255	$260	$265	$271	$276	$282	$287	$293	$299	**$2,737**
5	Install High Efficiency Condensing Boilers (St. Alphonsus CES, St. Catherine CES, St. Patrick CES, St. Paul CES (Peterborough))		$34,000	$34,680	$35,374	$36,081	$36,803	$37,539	$38,290	$39,055	$39,836	**$331,657**
6	BAS Upgrade (St. Alphonsus CES)		$5,000	$5,100	$5,202	$5,306	$5,412	$5,520	$5,631	$5,743	$5,858	**$48,773**
7	HVAC Upgrade (St. Elizabeth CES)			$16,667	$17,000	$17,340	$17,687	$18,041	$18,401	$18,769	$19,145	**$143,049**
8	Install High Efficiency Condensing Boilers (St. Anne CES, St. Teresa CES)			$16,000	$16,320	$16,646	$16,979	$17,319	$17,665	$18,019	$18,379	**$137,328**
9	DHW Upgrade (St. Teresa CES, St. Mary CES (Campbellford))			$1,333	$1,360	$1,387	$1,415	$1,443	$1,472	$1,502	$1,532	**$11,444**
10	DHW Upgrade (St. Mary CES (Grafton))				$333	$340	$347	$354	$361	$368	$375	**$2,478**
11	Lighting Retrofit (St. Luke CES, Holy Cross SS)				$6,667	$6,800	$6,936	$7,075	$7,216	$7,361	$7,508	**$49,562**
12	BAS Upgrade (Holy Cross SS)				$13,333	$13,600	$13,872	$14,149	$14,432	$14,721	$15,015	**$99,124**
13	Install Variable Frequency Drives – Gym HVAC (10 Schools)				$20,000	$20,400	$20,808	$21,224	$21,649	$22,082	$22,523	**$148,686**
14	Install High Efficiency Condensing Boilers (St. Joseph (Cobourg))				$8,000	$8,160	$8,323	$8,490	$8,659	$8,833	$9,009	**$59,474**
15	Lighting Retrofit (St. Thomas Aquinas SS, Holy Trinity SS, St. Stephen SS, St. Mary SS)					$10,667	$10,880	$11,098	$11,320	$11,546	$11,777	**$67,287**
16	DHW Upgrade (St. Thomas Aquinas SS, Holy Trinity SS, St. Stephen SS, St. Mary SS)					$5,333	$5,440	$5,549	$5,660	$5,773	$5,888	**$33,643**
17	Install Variable Frequency Drives – Gym HVAC (27 Schools)					$57,000	$58,140	$59,303	$60,489	$61,699	$62,933	**$359,563**
	Total Savings	**$29,583**	**$69,175**	**$104,559**	**$154,983**	**$231,083**	**$235,704**	**$240,418**	**$245,227**	**$250,131**	**$255,134**	**$1,815,997**

EMS	Cost (Investment)	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	
1	HVAC Upgrade (Education Centre)	$300,000										
2	BAS Upgrade (Education Centre)	$100,000										
3	DHW Upgrade (St. Mary SS)	$40,000										
4	Exterior Door Replacement (St. Mary CES (Lindsay))	$20,000										
5	Install High Efficiency Condensing Boilers (St. Alphonsus CES, St. Catherine CES, St. Patrick CES, St. Paul CES (Peterborough))		$340,000									
6	BAS Upgrade (St. Alphonsus CES)		$75,000									
7	HVAC Upgrade (St. Elizabeth CES)			$250,000								
8	Install High Efficiency Condensing Boilers (St. Anne CES, St. Teresa CES)			$160,000								
9	DHW Upgrade (St. Teresa CES, St. Mary CES (Campbellford))			$20,000								
10	DHW Upgrade (St. Mary CES (Grafton))				$5,000							
11	Lighting Retrofit (St. Luke CES, Holy Cross SS)				$50,000							
12	BAS Upgrade (Holy Cross SS)				$200,000							
13	Install Variable Frequency Drives – Gym HVAC (10 Schools)				$100,000							
14	Install High Efficiency Condensing Boilers (St. Joseph (Cobourg))				$80,000							
15	Lighting Retrofit (St. Thomas Aquinas SS, Holy Trinity SS, St. Stephen SS, St. Mary SS)					$80,000						
16	DHW Upgrade (St. Thomas Aquinas SS, Holy Trinity SS, St. Stephen SS, St. Mary SS)					$80,000						
17	Install Variable Frequency Drives – Gym HVAC (27 Schools)					$285,000						
	Total Costs	**$460,000**	**$415,000**	**$430,000**	**$435,000**	**$445,000**						