

Five Year Conservation and Demand Management Plan September 2013– August 2018



Hamilton-Wentworth Catholic District School Board
Believing, Achieving, Serving

Prepared June 2014 by:





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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 Hamilton-Wentworth Catholic District School Board (HWCDSB) energy Conservation and Demand Management Plan is to develop a framework for Hamilton-Wentworth 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 the 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 the Hamilton-Wentworth Catholic District School Board's ***Strategic Priorities Multi-year Plan 2011-2014, updated March 2014.***

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 Hamilton-Wentworth 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 the 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 the energy and, as a consequence, to save it, the 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 HWCDSB 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 HWCDSB’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. HWCDSB 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 HWCDSB's CDM Plan and will help assist HWCDSB to meet all of its mandatory reporting requirements.

Key Factors and Constraints

It is important to both HWCDSB'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, HWCDSB has addressed Energy Conservation and Demand Management on a project-by-project basis through the activities of the Plant Department. 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 2010, HWCDSB 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 HWCDSB in aligning the CDM Plan with the School Board's ***Strategic Priorities Multi-year Plan 2011-2014, updated March 2014.***

Energy Conservation Projects Implemented in the last Two Years	
Facility	Action Taken
Brébeuf Tech wing	lighting Replacement: T12 to T5
St. Vincent de Paul	Rooftop Units: 5 units replaced
St. Francis Xavier	Library Change air unit replaced
Cathedral High School	Gym lighting replaced Metal Halide to T5
St. Eugene	Window Replacement Classroom Windows
St. Patrick	3 Classroom Window Replacements
St. Thomas More	Domestic Boiler Replacements
Cathedral	Domestic Boiler Replacements
St. Brigid	Lighting replaced in 3rd Floor and Gym corridor lighting replaced T8 – T5
St. Paul	50% of Roof Replaced
Our Lady of Peace	50% of Roof Replaced
St. Joachim	Rooftop HVAC Units replaced 5 units
St. Brigid	Replaced Classroom Windows in 6 Classrooms
St. Columba	Rooftop HVAC Unit Replaced
St. Ann (Ancaster)	Gym Windows Replaced
Holy Name of Mary	Gym HVAC Unit Replacement
Sacred Heart of Jesus	Main office HVAC Unit Replacement

Our Lady of Mount Carmel	Cooling Tower Replacement
St. Marguerite d'Youville	Cooling Tower Replacement

4 CURRENT STATE OF CORPORATE ENERGY

Energy Data Management

While HWCDSB 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, HWCDSB 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 HWCDSB's understanding of the bottom line impact of energy management.

Energy Use in Facilities

HWCDSB 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 the HWCDSB's facilities. Through the deployment of energy management software, HWCDSB 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

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

Similar to many School Boards in Ontario, the HWCDSB is currently in a declining student enrollment situation. As the Board stabilizes its student capacity, so will the HWCDSB's environmental, societal and fiscal energy concerns. The Board recognizes that proper energy management must be pursued if these concerns are to be addressed.

6 SCOPE OF THE CDM PLAN

Hamilton Wentworth Catholic District School Board Facilities - General Information					
Building Name	Operation Type	Address	City	Postal Code	Total Floor Area (m ²)
Annunciation of Our Lord (Gemini)	School	20 Gemini Drive	Hamilton	L9C 5V7	2,358
Annunciation of Our Lord (Limeridge)	School	250 Limeridge Road West	Hamilton	L9C 2V2	6,822
Bay Street North Offices	Administrative offices	166 Bay Street North	Hamilton	L8R 2P7	93
Bishop Ryan Catholic Secondary School	School	50 Albright Road	Hamilton	L8K 5J3	17,187
Bishop Tonnos Catholic Secondary School	School	100 Panabaker Drive	Ancaster	L9G 5E3	15,857
Blessed John Paul II Catholic Elementary School	School	600 Acadia Drive	Hamilton	L8W 3A6	4,167
Blessed Kateri Tekakwitha	School	22 Queensbury Drive	Hamilton	L8W 1Z6	2,991
Blessed Sacrament Catholic Elementary School	School	315 East 37th Street	Hamilton	L8V 4B5	3,951
Blessed Teresa of Calcutta	School	1 Rexford Drive	Hamilton	L8W 3E8	4,112
Canadian Martyrs Catholic Elementary School	School	1355 Main Street West	Hamilton	L8S 4M7	3,581
Cardinal Newman Catholic Secondary School	School	127 Grays Road	Stoney Creek	L8G 3V3	16,087
Cathedral Catholic Secondary School	School	30 Wentworth Street North	Hamilton	L8L 8H5	18,268
Corpus Christi	School	25 Alderson Drive	Hamilton	L9B 1G3	3,482
Father K. Kennedy Catholic Education Centre	Administrative offices	90 Mulberry Street	Hamilton	L8N 3R9	2,076
Guardian Angels Catholic Elementary School	School	705 Centre Road	Waterdown	L8N 2Z7	4,830
Holy Family Catholic Elementary School	School	190 Britannia Avenue	Hamilton	L8H 1X5	4,984
Holy Name of Jesus	School	181 Belmont Avenue	Hamilton	L8L 7M5	5,478
Holy Name of Mary Catholic Elementary School	School	161 Meadowlands Boulevard	Ancaster	L9K 1H8	4,441
Holy Spirit Catholic Elementary School	School	115 Barnesdale Avenue North	Hamilton	L8L 6S6	1,277
Immaculate Conception	School	470 Kitty Murray Lane	Ancaster	L9K 0C3	6,016
Immaculate Heart of Mary Catholic Elementary School	School	190 Glover Road	Winona	L8E 1A0	6,715
Nicholas Mancini Centre	Administrative offices	44 Hunt Street	Hamilton	L8R 3R1	5,050
Our Lady of Assumption Catholic Elementary School	School	55 Highway 20 South	Stoney Creek	L8J 2W9	2,786
Our Lady of Lourdes Catholic Elementary School	School	420 Mohawk Road East	Hamilton	L8V 2H7	4,149
Our Lady of Mount Carmel	School	1624 Centre Road	Carlisle	L0R 1H0	3,659
Our Lady of Peace	School	252 Dewitt Road	Stoney Creek	L8E 2R1	3,700
Pastoral Services	Administrative offices	42 Pearl Street North	Hamilton	L8R 1S8	186
Regina Mundi Catholic Elementary School	School	675 Mohawk Road West	Hamilton	L9C 1X7	2,317
Sacred Heart Catholic Elementary School	School	5 Hamilton Avenue	Hamilton	L8V 2S3	2,270
Saints Peter and Paul Catholic Elementary School	School	49 Fennell Avenue East	Hamilton	L9A 1R5	4,189
St. Agnes	School	80 Colcrest Street	Hamilton	L8E 3Y8	3,113
St. Ann (Ancaster) Catholic Elementary School	School	24 Fiddlers Green Road	Ancaster	L9G 1W1	3,007
St. Ann (Hamilton) Catholic Elementary School	School	118 Sherman Avenue North	Hamilton	L8L 6M6	3,480
St. Augustine Catholic Elementary School	School	25 Alma Street	Dundas	L9H 2C9	3,320
St. Bernadette Catholic Elementary School	School	270 Governors Road	Dundas	L9H 5E3	4,076
St. Brigid Catholic Elementary School	School	24 Smith Avenue	Hamilton	L8L 5P1	3,797
St. Charles Adult Education Centre	School	60 Barlake Avenue	Stoney Creek	L8E 1G7	1,734
St. Charles Centre	School	45 Young Street	Hamilton	L8N 1V1	1,519
St. Charles Mountain	School	150 East 5th Street	Hamilton	L9A 2Z8	6,411
St. Clare of Assisi Catholic Elementary School	School	185 Glenashton Drive	Stoney Creek	L8G 4E7	2,983
St. Columba Catholic Elementary School	School	770 Main Street East	Hamilton	L8M 1L1	1,993
St. Daniel Catholic Elementary School	School	75 Anson Avenue	Hamilton	L8T 2X5	3,318
St. David Catholic Elementary School	School	33 Cromwell Crescent	Hamilton	L8G 2E9	6,926
St. Eugene Catholic Elementary School	School	120 Parkdale Avenue South	Hamilton	L8K 3P3	4,807
St. Francis Xavier Catholic Elementary School	School	298 Highway 8	Stoney Creek	L8G 1E6	4,261
St. Helen Catholic Elementary School	Administrative offices	785 Britannia Avenue	Hamilton	L8H 2B6	3,518
St. James the Apostle Catholic Elementary School	School	29 John Murray Street	Stoney Creek	L8J 1C5	3,692
St. Jean de Brébeuf Catholic Secondary School	School	200 Acadia Drive	Hamilton	L8W 1B8	16,540
St. Joachim Catholic Elementary School	School	75 Concerto Court	Ancaster	L8G 4V6	4,478
St. John the Baptist Catholic Elementary School	School	115 London Street South	Hamilton	L8K 2G6	3,571
St. Joseph Catholic Elementary School	School	270 Locke Street South	Hamilton	L8P 4C1	4,215
St. Lawrence Catholic Elementary School	School	88 Macaulay Street East	Hamilton	L8L 3X3	4,179
St. Luke Catholic Elementary School	School	345 Albright Road	Hamilton	L8K 6N3	3,414

Hamilton Wentworth Catholic District School Board Facilities - General Information					
Building Name	Operation Type	Address	City	Postal Code	Total Floor Area (m ²)
St. Margaret Mary Catholic Elementary School	School	25 Brentwood Drive	Hamilton	L8T 3V9	3,529
St. Marguerite d'Youville Catholic Elementary School	School	20 Bonaparte Way	Hamilton	L9B 2E3	4,618
St. Mark Catholic Elementary School	School	43 Whitdeer Road	Stoney Creek	L8J 3T1	5,262
St. Martin of Tours Catholic Elementary School	School	60 Grays Road	Stoney Creek	L8G 2X5	2,230
St. Mary Catholic Elementary School	Administrative offices	209 MacNab Street North	Hamilton	L8R 2M5	4,658
St. Mary Catholic Secondary School	School	200 Whitney Avenue	Hamilton	L8S 2G7	17,497
St. Matthew Catholic Elementary School	School	200 Windwood Drive	Binbrook	L0R 1C0	6,857
St. Michael Catholic Elementary School	School	135 Hester Street	Hamilton	L9A 2H9	3,742
St. Patrick Catholic Elementary School	School	20 East Avenue South	Hamilton	L8N 3X1	3,695
St. Paul Catholic Elementary School	School	24 Amberwood Street	Stoney Creek	L8J 2H9	3,178
St. Teresa of Avila Catholic Elementary School	School	171 San Remo Drive	Hamilton	L9C 6P8	2,374
St. St. Thérèse of Lisieux Catholic Elementary School	School	1760 Garth Street	Hamilton	L9B 2X5	5,304
St. Thomas the Apostle Catholic Elementary School	School	70 Barton Street	Waterdown	L0R 2H0	2,766
St. Thomas Moore Catholic Secondary School	School	1045 Upper Paradise Road	Hamilton	L9B 2N4	18,344
St. Vincent de Paul Catholic Elementary School	School	295 Green Cedar Drive	Hamilton	L9C 7M9	4,182
Thomas J. Mahony Building	Administrative offices	57 Stuart Street	Hamilton	L8L 1B5	942
Wilma's Place	School	380 Main Street East	Hamilton	L8N 1J8	2,638
					353,247

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. HWCDSB, like many School Boards, relies on its utility bills to establish its energy baseline.

In 2010, HWCDSB undertook an Energy Audit Project, executed by Trane Canada Inc. The audits consisted 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)

The HWCDSB has elected to utilize the consumption data from 2011/2012 to represent its baseline energy consumption performance. Based on this information, and normalizing for weather conditions, the baseline energy performance may be represented by a normalization analysis.

Hamilton Wentworth Catholic District School Board Facilities - 2011/2012 Energy Data					
Building Name	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m³)	GHG Emissions (kg)	Energy Intensity (ekWh/ft²)	Energy Intensity (GJ/m²)
ANNUNCIATION OF OUR LORD	349,502	59,735	140,897	13	0.52
ANNUNCIATION OF OUR LORD - WEST	200,801	18,273	50,611	16	0.60
BAY STREET NORTH OFFICES	8,134	3,514	7,294	45	1.76
BISHOP RYAN	3,381,785	22,532	313,143	20	0.76
BISHOP TONNOS	1,495,189	107,582	323,012	15	0.60
ST. JOHN PAUL II	387,853	29,704	87,188	16	0.61
BLESSED SACRAMENT	196,762	59,878	128,948	20	0.76
BLESSED TERESA OF CALCUTTA	523,491	52,103	140,387	24	0.94
CANADIAN MARTYRS	220,471	41,415	95,937	17	0.66
CARDINAL NEWMAN	2,049,698	126,271	402,708	20	0.76
CATHEDRAL	2,969,219	245,991	702,615	28	1.10
CORPUS CHRISTI	28,600	24,712	49,010	8	0.30
FATHER KRYAN KENNEDY CATHOLIC EDUCATION	432,598	38,617	107,618	38	1.46
GUARDIAN ANGELS	470,013	39,735	112,725	17	0.67
HOLY FAMILY	207,075	54,406	119,427	15	0.57
HOLY NAME OF JESUS	225,541	30,286	75,303	9	0.36
HOLY NAME OF MARY	540,174	52,907	143,241	23	0.89
HOLY SPIRIT	108,847	61,550	125,076	55	2.15

Hamilton Wentworth Catholic District School Board Facilities - 2011/2012 Energy Data

Building Name	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m ³)	GHG Emissions (kg)	Energy Intensity (ekWh/ft ²)	Energy Intensity (GJ/m ²)
IMMACULATE CONCEPTION	254,381	53,876	122,210	13	0.49
IMMACULATE HEART OF MARY	900,391	27,010	123,098	16	0.64
NICHOLAS MANCINI CENTRE	660,545	52,625	152,339	22	0.87
OUR LADY OF THE ASSUMPTION	204,508	40,644	93,204	21	0.82
OUR LADY OF LOURDES	290,149	53,085	123,576	19	0.74
OUR LADY OF MOUNT CARMEL	570,079	71,214	180,246	34	1.31
OUR LADY OF PEACE	363,916	9,512	47,096	12	0.45
PASTORAL SERVICES	9,218	3,175	6,739	21	0.83
REGINA MUNDI	146,018	52,297	110,556	28	1.09
SACRED HEART OF JESUS	188,054	40,691	91,975	25	0.98
ST. KATERI TEKAKWITHA	321,674	39,167	99,784	23	0.89
ST. AGNES	323,275	24,834	72,813	18	0.68
ST. ANN, ANCASTER	22,644	40,663	78,690	14	0.54
ST. ANN, HAMILTON	97,807	34,191	72,467	12	0.48
ST. AUGUSTINE	187,484	51,466	112,302	21	0.80
ST. BERNADETTE	407,685	16,824	64,423	13	0.52
ST. BRIGID	189,064	77,066	160,828	25	0.96
ST. CHARLES BARLAKE	249,699	19,082	56,053	24	0.94
ST. CHARLES CENTRE	103,428	29,250	63,575	25	0.98
ST. CHARLES MOUNTAIN	478,212	53,032	138,521	15	0.59
ST. CLARE OF ASSISI	343,189	22,857	70,669	18	0.71
ST. COLUMBA	228,023	15,424	47,403	18	0.71
ST. DANIEL	197,627	55,751	121,214	22	0.86
ST. DAVID	1,042,243	89,882	253,313	27	1.04
ST. EUGENE	235,918	69,170	149,648	19	0.73
ST. FRANCIS XAVIER	267,971	64,144	142,709	21	0.80
ST. HELEN	218,667	45,821	104,124	19	0.72
ST. JAMES THE APOSTLE	431,031	32,195	95,351	19	0.75
ST. JEAN DE BRÉBEUF	1,641,619	314,173	725,314	28	1.08
ST. JOACHIM	794,641	14,013	90,064	20	0.76
ST. JOHN THE BAPTIST	419,334	39,604	108,424	22	0.85
ST. JOSEPH	302,817	41,592	102,861	16	0.64
ST. LAWRENCE	354,200	57,550	137,141	21	0.83
ST. LUKE	529,132	51,209	139,147	29	1.13
ST. MARGARET MARY	188,683	73,286	153,652	25	0.99
ST. MARGUERITE D'YOUVILLE	694,846	35,748	123,174	22	0.84
ST. MARK	557,946	27,087	95,848	15	0.58
ST. MARTIN OF TOURS	164,549	25,206	60,818	18	0.70
ST. MARY ELEM.	219,238	93,749	194,783	24	0.94
ST. MARY HIGH	2,246,427	164,705	491,110	21	0.82
ST. MATTHEW	259,717	51,384	117,926	11	0.42
ST. MICHAEL	287,473	48,515	114,722	20	0.77
ST. PATRICK	340,879	36,880	96,996	18	0.71
ST. PAUL	304,141	16,412	55,359	14	0.54
ST. TERESA OF AVILA	297,054	14,102	50,426	17	0.68
ST. THÉRÈSE OF LISIEUX	595,575	46,859	136,239	19	0.74
ST. THOMAS MORE	2,469,972	244,116	659,129	26	0.99
ST. THOMAS WATERDOWN	226,496	19,327	54,660	15	0.56
ST. VINCENT DE PAUL	355,308	13,127	53,242	11	0.43
STS. PETER AND PAUL	316,523	70,487	158,586	24	0.92
THOMAS MAHONY BUILDING	61,642	17,665	38,329	25	0.95
WILMA'S PLACE	237,346	79,862	169,977	38	1.48
	36,594,210	3,850,816	10,207,994	20	0.79

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. HWCDSB's most recent energy consumption inventory was completed in 2012/2013. This inventory took into account the electricity and natural gas consumption of HWCDSB's facilities. In 2012/2013, HWCDSB's total energy use, including electricity and natural gas, was 90,821,224 equivalent kilowatt hours (ekWh). This total consisted of 38,198,211 kWh of electricity and 4,951,460 m³ of natural gas, which is equivalent to 52,623,013 ekWh.

Hamilton Wentworth Catholic District School Board Facilities - 2012/2013 Energy					
Building Name	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m ³)	GHG Emissions (kg)	Energy Intensity (ekWh/ft ²)	Energy Intensity (GJ/m ²)
Annunciation of Our Lord (Gemini)	497,607	58,525	150,458	44	1.71
Annunciation of Our Lord (Limeridge)	44,498	17,574	36,786	3	0.12
Bay Street North Offices	6,170	4,319	8,659	52	2.02
Bishop Ryan Catholic Secondary School	3,352,622	273,011	784,372	34	1.31
Bishop Tonnos Catholic Secondary School	1,756,790	130,042	386,404	18	0.71
Blessed John Paul II Catholic Elementary School	416,141	56,317	139,766	23	0.88
Blessed Kateri Tekakwitha	303,895	45,291	109,940	24	0.95
Blessed Sacrament Catholic Elementary School	218,474	65,639	141,577	22	0.83
Blessed Teresa of Calcutta	472,762	44,179	121,347	21	0.82
Canadian Martyrs Catholic Elementary School	222,320	46,767	106,205	19	0.72
Cardinal Newman Catholic Secondary School	1,957,033	154,524	448,710	21	0.81
Cathedral Catholic Secondary School	3,087,787	347,128	903,313	34	1.34
Corpus Christi	303,110	30,894	82,658	17	0.65
Father K. Kennedy Catholic Education Centre	338,618	51,637	124,716	40	1.54
Guardian Angels Catholic Elementary School	433,180	36,939	104,492	16	0.62
Holy Family Catholic Elementary School	204,380	59,689	129,200	16	0.61
Holy Name of Jesus	528,518	34,051	106,659	15	0.59
Holy Name of Mary Catholic Elementary School	638,468	73,669	190,358	30	1.15
Holy Spirit Catholic Elementary School	97,717	76,246	151,970	66	2.56
Immaculate Conception	285,404	48,149	113,864	12	0.48
Immaculate Heart of Mary Catholic Elementary School	893,426	42,132	151,130	19	0.72
Nicholas Mancini Centre	663,964	67,094	179,967	25	0.98
Our Lady of Assumption Catholic Elementary School	225,246	58,358	128,353	28	1.09
Our Lady of Lourdes Catholic Elementary School	276,424	69,585	153,673	23	0.88
Our Lady of Mount Carmel	709,864	77,431	203,182	39	1.51
Our Lady of Peace	397,683	12,569	55,578	13	0.52
Pastoral Services	6,355	3,822	7,734	23	0.91
Regina Mundi Catholic Elementary School	132,288	49,822	104,778	27	1.03
Sacred Heart Catholic Elementary School	190,445	50,886	111,442	30	1.16
Saints Peter and Paul Catholic Elementary School	295,693	70,515	156,973	23	0.90
St. Agnes	321,608	30,065	82,570	19	0.74
St. Ann (Ancaster) Catholic Elementary School	222,565	48,211	108,954	23	0.88
St. Ann (Hamilton) Catholic Elementary School	98,000	34,000	72,121	12	0.48
St. Augustine Catholic Elementary School	221,636	69,440	149,016	27	1.04
St. Bernadette Catholic Elementary School	511,286	25,011	88,189	18	0.69
St. Brigid Catholic Elementary School	192,081	91,072	187,550	28	1.10
St. Charles Adult Education Centre	213,578	21,228	57,220	24	0.91
St. Charles Centre	110,478	36,604	78,043	31	1.18

Hamilton Wentworth Catholic District School Board Facilities - 2012/2013 Energy					
Building Name	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m ³)	GHG Emissions (kg)	Energy Intensity (ekWh/ft ²)	Energy Intensity (GJ/m ²)
St. Charles Mountain	516,338	60,306	155,323	17	0.65
St. Clare of Assisi Catholic Elementary School	303,836	43,887	107,281	24	0.93
St. Columba Catholic Elementary School	212,739	30,674	75,012	25	0.97
St. Daniel Catholic Elementary School	191,504	62,852	134,150	24	0.93
St. David Catholic Elementary School	1,040,290	102,797	277,574	29	1.11
St. Eugene Catholic Elementary School	238,627	87,279	184,102	23	0.87
St. Francis Xavier Catholic Elementary School	276,068	68,911	152,370	22	0.85
St. Helen Catholic Elementary School	201,124	60,902	131,233	22	0.87
St. James the Apostle Catholic Elementary School	432,409	34,734	100,262	20	0.78
St. Jean de Brébeuf Catholic Secondary School	1,743,257	346,567	794,689	30	1.18
St. Joachim Catholic Elementary School	543,916	17,386	76,384	15	0.59
St. John the Baptist Catholic Elementary School	365,774	43,882	112,226	22	0.84
St. Joseph Catholic Elementary School	281,529	50,957	118,863	18	0.70
St. Lawrence Catholic Elementary School	342,072	58,000	137,022	21	0.83
St. Luke Catholic Elementary School	498,953	68,689	169,782	33	1.30
St. Margaret Mary Catholic Elementary School	185,111	74,958	156,526	26	1.00
St. Marguerite d'Youville Catholic Elementary School	787,264	102,658	257,069	38	1.46
St. Mark Catholic Elementary School	631,110	36,022	118,593	18	0.69
St. Martin of Tours Catholic Elementary School	171,243	33,065	76,213	22	0.84
St. Mary Catholic Elementary School	212,916	93,748	194,276	24	0.93
St. Mary Catholic Secondary School	2,319,444	305,154	762,488	30	1.14
St. Matthew Catholic Elementary School	427,383	64,865	156,826	15	0.59
St. Michael Catholic Elementary School	304,949	57,818	133,708	23	0.88
St. Patrick Catholic Elementary School	342,348	45,146	112,742	21	0.80
St. Paul Catholic Elementary School	314,160	17,529	58,274	15	0.57
St. Teresa of Avila Catholic Elementary School	268,998	18,220	55,967	18	0.70
St. Thérèse of Lisieux Catholic Elementary School	684,330	53,577	156,041	22	0.85
St. Thomas the Apostle Catholic Elementary School	204,963	22,762	59,431	15	0.58
St. Thomas Moore Catholic Secondary School	2,665,102	255,286	695,859	27	1.06
St. Vincent de Paul Catholic Elementary School	339,060	26,099	76,468	14	0.53
Thomas J. Mahony Building	65,280	14,295	32,249	21	0.83
Wilma's Place	238,000	80,000	170,290	38	1.49
	38,198,211	4,951,460	12,417,221	24	0.93

In all, HWCDSB has lowered its energy intensity from 2011 to 2012 indicating an improvement in energy utilization from 0.79 GJ/m² to 0.93 GJ/m².

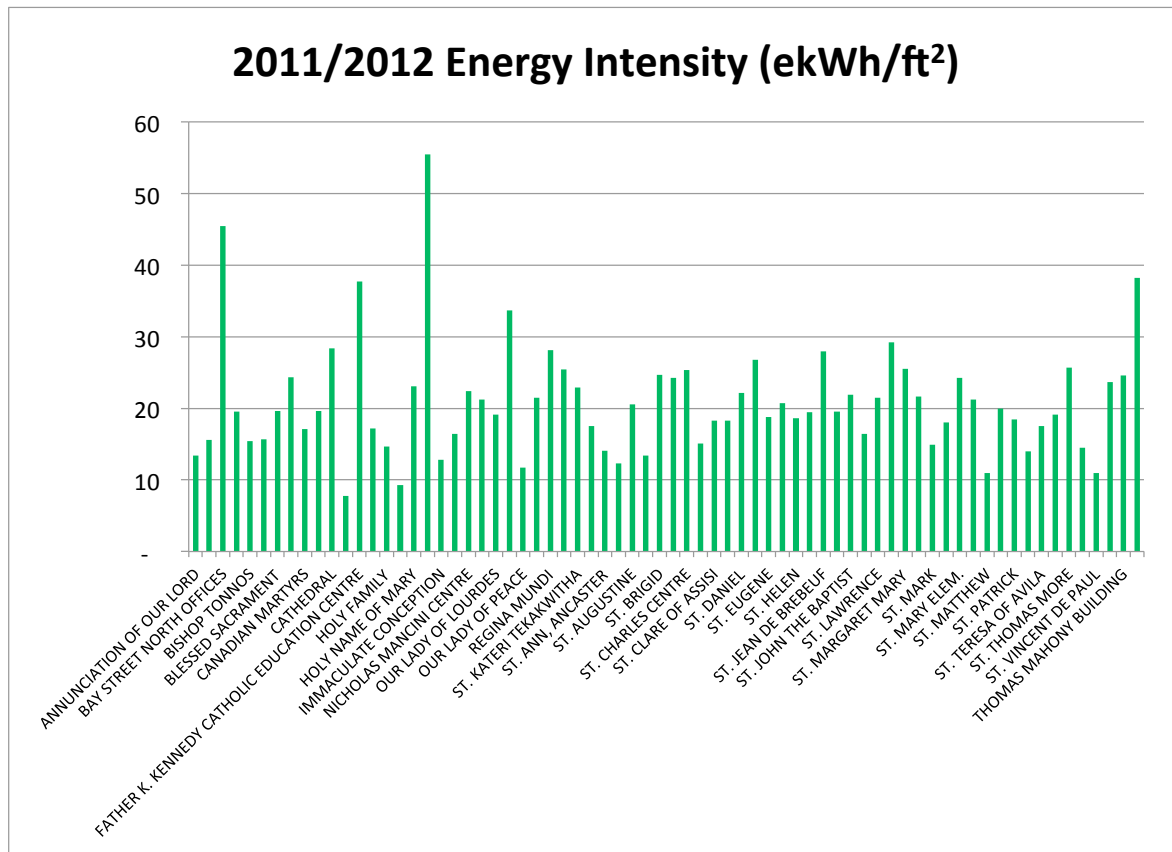
BENCHMARKING

Market Sector

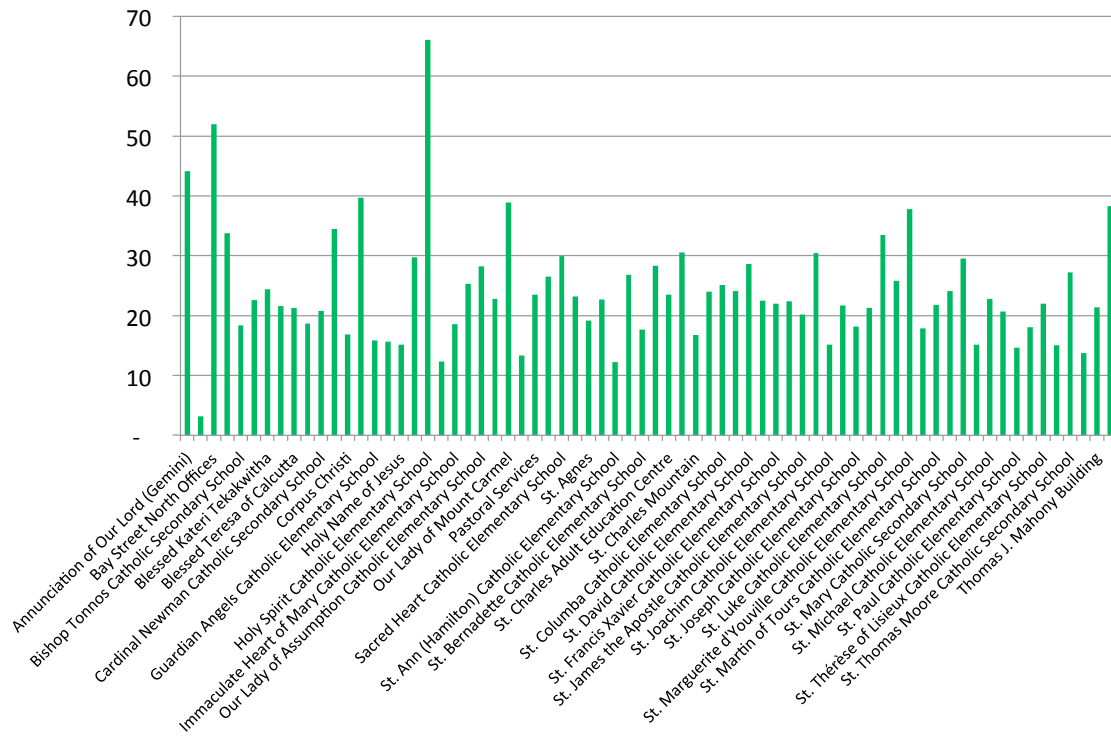
Energy Intensity (ekWh/ft ²)				
Sector	Minimum	Average	Maximum	No. of Organizations
School Board	13.0	19	41	70

HWCD SB facilities have an average 24 ekWh/ft² energy intensity, slightly above the industry average based on the Ministry of Energy's 2011 Public Sector Energy Consumption Data.

HWCD SB Facilities



2012 /2013 Energy Intensity (ekWh/ft²)



8 MISSION AND VISION

Mission

The mission of Catholic Education in Hamilton-Wentworth, in union with our Bishop, is to enable all learners to realize the fullness of humanity of which our Lord Jesus Christ is the model.

Vision

Learners from Hamilton-Wentworth Catholic Schools will demonstrate:

- ***knowledge and practice of their Catholic faith;***
- ***the capability of nurturing a strong family unit esteem;***
- ***respect and responsibility for self and others;***
- ***academic competence;***
- ***the ability to listen accurately and express knowledge clearly;***
- ***independence, critical thinking and effective problem solving;***
- ***proficiency with technology in order to adapt to a changing world;***
- ***the values, attitudes and skills for effective partnerships; and***
- ***the ability to transform our society.***

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 HWCDSB to display leadership, improve the delivery of services, and enhance the overall quality of life with respect to the school environment.

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

It is acknowledged that, for this vision to come to fruition, energy management at HWCDSB 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 HWCDSB activities, including organizational and human resource 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 HWCDSB. The intent is to guide HWCDSB in the development of an energy management foundation. This will be a living Plan that will evolve as HWCDSB's energy needs are revealed and better understood.

HWCDSB'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, HWCDSB 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 HWCDSB's operations. All HWCDSB 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 HWCDSB has been developed and is an integral component of this CDM Plan.

The CDM Plan was completed to help support the following goals:

- Encourage reduced greenhouse gas emissions and energy consumption in the School Board by promoting built forms that create more sustainable, efficient, healthy, and livable school communities,
- Maximize the use of operational budgets by ensuring that School Board facilities are operating in as energy efficient manner as possible,
- Ensure that minimizing energy use is considered throughout the various aspects of HWCDSB's operations including purchasing where financially viable, and
- Recognize the importance of the input and participation of HWCDSB employees and students in supporting energy conservation and sustainability initiatives through education, awareness and training.

The primary objective of this Plan is to improve the management of HWCDSB's energy consumption. Part of this objective is setting a conservation target that will see HWCDSB reduce its 2011/2012 energy consumption by 2% by the end of 2018. Recognizing that HWCDSB has a growing student base, HWCDSB's energy conservation target will be intensity based. It is also the objective of this Plan to improve HWCDSB's understanding of energy consumption that is essential for HWCDSB 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 HWCDSB's capital and operations decision-making process.

Reporting Standards

The CDM Plan will allow for the monitoring and reporting that is necessary for HWCDSB to meet the regulatory requirements of the **Green Energy Act** and HWCDSB's greenhouse gas reduction targets. Regular energy monitoring and feedback to the Ministry and HWCDSB 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 HWCDSB. Energy consumption feedback provided to Staff will be imbedded into HWCDSB's regular business.

10 ENERGY MANAGEMENT TEAM

Currently, all energy conservation and demand management activities are the co-ordinated and implemented through the Plant Services Division. Historically, HWCDSB addressed Energy Conservation and Demand Management on a project-by-project basis through the activities of the Building Services Group. Strategic directives have been provided by the School Board Trustees and the Senior Executive Team.

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 Director of Education. 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:

Hamilton-Wentworth Catholic District School Board				
Facility	Opportunity	Annual Savings (\$)	Estimated Installation Cost (\$)	Payback Period (years)
Blessed Sacrament Catholic Elementary School	Install Lighting Occupancy Sensors	\$11,755	\$12,392	1.1
Blessed Sacrament Catholic Elementary School	Replace Weather Stripping	\$592	\$401	0.7
Blessed Sacrament Catholic Elementary School	Install Demand Control Ventilation	\$2,981	\$2,487	0.8
Blessed Sacrament Catholic Elementary School	Lighting Retrofit	\$17,634	\$20,850	1.2
Blessed Sacrament Catholic Elementary School	Replace Existing Exhaust Fans	\$0	\$45,401	0.0
Blessed Sacrament Catholic Elementary School	Replace Windows	\$6,112	\$28,755	4.7
Blessed Sacrament Catholic Elementary School	Replace In-Ceiling Radiant Heating with Perimeter Radiators	\$11,272	\$85,163	7.6
Blessed Sacrament Catholic Elementary School	Project, Construction Management and Commissioning	\$23,555	\$120,454	5.1
Blessed Teresa of Calcutta	Water Conservation	\$18,162	\$12,509	0.7
Blessed Teresa of	Install Demand Control Ventilation	\$20,180	\$5,868	0.3

Calcutta				
Canadian Martyrs Catholic Elementary School	Install Lighting Occupancy Sensors	\$33,276	\$12,392	0.4
Canadian Martyrs Catholic Elementary School	Replace Weather Stripping	\$491	\$330	0.7
Canadian Martyrs Catholic Elementary School	Lighting Retrofit	\$16,265	\$14,956	0.9
Canadian Martyrs Catholic Elementary School	Install Low Flow Water Fixtures	\$2,836	\$9,831	3.5
Canadian Martyrs Catholic Elementary School	Install Demand Control Ventilation	\$2,168	\$12,437	5.7
Canadian Martyrs Catholic Elementary School	Project, Construction Management and Commissioning	\$0	\$56,524	0.0
Cardinal Newman Catholic Secondary School	Lighting Upgrades	\$88,598	\$265,953	3.0
Cardinal Newman Catholic Secondary School	Chilled Water Variable Flow	\$60,987	\$36,753	0.6
Cardinal Newman Catholic Secondary School	Water Conservation	\$28,753	\$43,805	1.5
Cardinal Newman Catholic Secondary School	Demand Control Ventilation in Gym	\$92,748	\$17,605	0.2
Cardinal Newman Catholic Secondary School	High Efficiency Motors	\$8,618	\$22,459	2.6
Cathedral Catholic Secondary School	Lighting Upgrades	\$223,281	\$309,633	1.4
Cathedral Catholic Secondary School	Demand Control Ventilation in Gym	\$123,944	\$12,575	0.1
Cathedral Catholic Secondary School	Water Source Heat Pumps Variable Flow	\$38,234	\$41,280	1.1
Cathedral Catholic Secondary School	VendingMisers	\$5,412	\$3,018	0.6
Corpus Christi	Install Occupancy Sensors	\$6,812	\$6,008	0.9
Corpus Christi	Re-Cx Exhaust Fans	\$0	\$758	0.0
Corpus Christi	Demand Control Ventilation	\$3,918	\$7,462	1.9
Corpus Christi	Lighting Retrofit	\$6,195	\$21,687	3.5

Corpus Christi	Upgrade Control System	\$5,098	\$90,880	17.8
Corpus Christi	Project, Construction Management and Commissioning	\$0	\$53,839	0.0
Father Kryan Kennedy Catholic Education Centre	Replace HVAC Equipment	\$192,776	\$608,474	3.2
Father Kryan Kennedy Catholic Education Centre	Install a BAS	\$29,737	\$89,536	3.0
Guardian Angels Catholic Elementary School	Install Lighting Occupancy Sensors	\$14,133	\$9,388	0.7
Guardian Angels Catholic Elementary School	Install Demand Control Ventilation	\$13,928	\$16,066	1.2
Guardian Angels Catholic Elementary School	install VFD and Schedule MUA-1	\$13,588	\$22,077	1.6
Guardian Angels Catholic Elementary School	Upgrade Control System	\$13,228	\$123,306	9.3
Guardian Angels Catholic Elementary School	Project, Construction Management and Commissioning	\$0	\$88,895	0.0
Holy Name of Mary Catholic Elementary School	Water Conservation	\$9,850	\$15,694	1.6
Nicholas Mancini Centre	Lighting Upgrades	\$48,200	\$90,563	1.9
Nicholas Mancini Centre	Water Conservation	\$2,138	\$5,676	2.7
Our Lady of Lourdes Catholic Elementary School	Lighting Upgrades	\$28,387	\$98,196	3.5
Our Lady of Mount Carmel	Install Occupancy Sensors	\$25,031	\$12,767	0.5
Our Lady of Mount Carmel	Install VFD and schedule HRU-1	\$33,841	\$27,021	0.8
Our Lady of Mount Carmel	Install Solar Hot Air System	\$315	\$449	1.4
Our Lady of Mount Carmel	Install 10kW PV Panels	\$73,651	\$129,192	1.8
Our Lady of Mount Carmel	Upgrade Control System	\$19,738	\$97,383	4.9
Our Lady of Mount Carmel	Project, Construction Management and Commissioning	\$0	\$107,059	0.0
Our Lady of Peace	Water Conservation	\$18,494	\$18,633	1.0
Our Lady of Peace	Replace RTUs and Electric Heaters	\$13,991	\$107,795	7.7

Our Lady of Peace	Vending Machine Controls	\$2,624	\$1,509	0.6
Regina Mundi Catholic Elementary School	Lighting Upgrades	\$19,088	\$58,083	3.0
Regina Mundi Catholic Elementary School	Replace Unit Ventilators	\$12,995	\$247,899	19.1
Regina Mundi Catholic Elementary School	Water Conservation	\$2,321	\$17,209	7.4
Regina Mundi Catholic Elementary School	Replace Windows	-\$268	\$20,120	-75.1
Sacred Heart of Jesus Catholic Elementary School	Water Conservation	\$1,792	\$10,500	5.9
Saints Peter and Paul Catholic Elementary School	Install Low Flow Water Fixtures	\$3,137	\$1,058	0.3
Saints Peter and Paul Catholic Elementary School	Install Lighting Occupancy Sensors	\$11,887	\$7,135	0.6
Saints Peter and Paul Catholic Elementary School	Install Demand Control Ventilation	\$1,707	\$2,487	1.5
Saints Peter and Paul Catholic Elementary School	Lighting Retrofit	\$5,498	\$19,400	3.5
Saints Peter and Paul Catholic Elementary School	Install Ceiling Fans in Gym	\$859	\$6,766	7.9
Saints Peter and Paul Catholic Elementary School	Project, Construction Management and Commissioning	\$0	\$62,018	0.0
St. Ann (Ancaster) Catholic Elementary School	Replace Windows	-\$1,571	\$7,243	-4.6
St. Ann (Ancaster) Catholic Elementary School	Upgrade Control System	\$51,777	\$53,654	1.0
St. Ann (Ancaster) Catholic Elementary School	Demand Control Ventilation in Gym	\$11,018	\$75,452	6.8
St. Ann (Ancaster) Catholic Elementary School	Install Unit Ventilators in Classrooms	- \$117,595	\$83,835	-0.7
St. Augustine Catholic Elementary School	Lighting Upgrades	\$32,637	\$68,771	2.1
St. Augustine Catholic Elementary School	Water Conservation	\$3,502	\$20,338	5.8
St. Bernadette Catholic	Lighting Upgrades	\$11,020	\$75,530	6.9

Elementary School				
St. Bernadette Catholic Elementary School	Water Conservation	\$10,140	\$18,002	1.8
St. Brigid Catholic Elementary School	Lighting Retrofit	\$23,948	\$18,049	0.8
St. Brigid Catholic Elementary School	Replace Weather Stripping	\$223	\$216	1.0
St. Brigid Catholic Elementary School	Install Low Flow Water Fixtures	\$8,245	\$10,411	1.3
St. Brigid Catholic Elementary School	Replace Two Broken Exhaust Fans	\$0	\$2,349	0.0
St. Brigid Catholic Elementary School	Convert to 208V/3Phase	\$0	\$156,583	0.0
St. Brigid Catholic Elementary School	Replace Windows	\$29,196	\$124,879	4.3
St. Brigid Catholic Elementary School	Install Ceiling Fans in Gym	\$305	\$4,861	15.9
St. Brigid Catholic Elementary School	Project, Construction Management and Commissioning	\$0	\$144,161	0.0
St. Charles Mountain	Install Low Flow Water Fixtures	\$15,966	\$1,269	0.1
St. Charles Mountain	Replace Weather Stripping	\$2,052	\$429	0.2
St. Charles Mountain	Install Lighting Occupancy Sensors	\$63,823	\$19,902	0.3
St. Charles Mountain	Install Demand Control Ventilation	\$14,237	\$7,462	0.5
St. Charles Mountain	Control Exhaust Fans	\$429	\$281	0.7
St. Charles Mountain	Lighting Retrofit	\$30,912	\$46,189	1.5
St. Charles Mountain	Replace Windows	\$6,248	\$45,673	7.3
St. Charles Mountain	Project, Construction Management and Commissioning	\$0	\$68,247	0.0
St. Clare of Assisi Catholic Elementary School	Water Conservation	\$9,012	\$10,396	1.2
St. Daniel Catholic Elementary School	Lighting Upgrades	\$17,789	\$38,572	2.2
St. Daniel Catholic Elementary School	Water Conservation	\$3,197	\$20,986	6.6
St. David Catholic Elementary School	Install Occupancy Sensors	\$33,774	\$15,959	0.5
St. David Catholic Elementary School	Install Polarizing Air Filters	\$15,003	\$29,885	2.0
St. David Catholic Elementary School	Schedule DHW Recirc Pump	\$472	\$830	1.8
St. David Catholic Elementary School	Replace Weather Stripping	\$180	\$330	1.8
St. David Catholic Elementary School	Replace Windows	\$4,290	\$10,375	2.4
St. David Catholic	Project, Construction Management	\$0	\$74,890	0.0

Elementary School	and Commissioning			
St. Eugene Catholic Elementary School	Replace Weather Stripping	\$1,992	\$188	0.1
St. Eugene Catholic Elementary School	Install Low Flow Water Fixtures	\$15,181	\$1,904	0.1
St. Eugene Catholic Elementary School	Install Occupancy Sensors	\$22,435	\$18,775	0.8
St. Eugene Catholic Elementary School	Lighting Retrofit	\$14,686	\$20,636	1.4
St. Eugene Catholic Elementary School	Install Ceiling Fans in Gym	\$1,739	\$8,803	5.1
St. Eugene Catholic Elementary School	Upgrade Control System	\$6,966	\$86,203	12.4
St. Eugene Catholic Elementary School	Project, Construction Management and Commissioning	\$0	\$71,425	0.0
St. Francis Xavier Catholic Elementary School	Lighting Upgrades	\$10,960	\$94,865	8.7
St. Francis Xavier Catholic Elementary School	Water Conservation	\$1,182	\$16,634	14.1
St. Francis Xavier Catholic Elementary School	Replace Electric Heaters and Gym Unit Heaters	\$33,923	\$491,038	14.5
St. Francis Xavier Catholic Elementary School	Replace Weather Stripping	\$17,655	\$5,344	0.3
St. James the Apostle Catholic Elementary School	Replace Weather stripping and Windows	\$17,017	\$75,301	4.4
St. James the Apostle Catholic Elementary School	Water Conservation	\$8,560	\$18,915	2.2
St. James the Apostle Catholic Elementary School	Replace HVAC Equipment	\$129,572	\$340,370	2.6
St. James the Apostle Catholic Elementary School	Install Ceiling Fans in Gym	\$1,202	\$8,601	7.2
St. Jean de Brébeuf Catholic Secondary School	Replace Weather Stripping	\$7,656	\$517	0.1
St. Jean de Brébeuf Catholic Secondary School	Install Vending Machine Timers	\$5,751	\$1,484	0.3
St. Jean de Brébeuf Catholic Secondary	Install Lighting Occupancy Sensors	\$90,124	\$49,942	0.6

School				
St. Jean de Brébeuf Catholic Secondary School	Lighting Retrofit	\$85,773	\$121,701	1.4
St. Jean de Brébeuf Catholic Secondary School	Recommission and Control Exhaust Fans	\$0	\$23,803	0.0
St. Jean de Brébeuf Catholic Secondary School	Replace Doors	\$14,339	\$42,349	3.0
St. Jean de Brébeuf Catholic Secondary School	Replace Windows	\$67,408	\$935,706	13.9
St. Jean de Brébeuf Catholic Secondary School	Project, Construction Management and Commissioning	\$0	\$354,225	0.0
St. Joachim Catholic Elementary School	Water Conservation	\$10,154	\$14,059	1.4
St. Joachim Catholic Elementary School	Replace Industrial Arts Unit Ventilator	-\$16,960	\$17,605	-1.0
St. John the Baptist Catholic Elementary School	Install Lighting Occupancy Sensors	\$14,140	\$8,637	0.6
St. John the Baptist Catholic Elementary School	Lighting Retrofit	\$22,075	\$22,921	1.0
St. John the Baptist Catholic Elementary School	Replace Weather Stripping	\$97	\$188	1.9
St. John the Baptist Catholic Elementary School	Install Low Flow Water Fixtures	\$4,317	\$11,152	2.6
St. John the Baptist Catholic Elementary School	Replace Windows	\$5,918	\$23,079	3.9
St. John the Baptist Catholic Elementary School	Install Heat Pump DHW Heater	\$781	\$5,234	6.7
St. John the Baptist Catholic Elementary School	Project, Construction Management and Commissioning	\$0	\$59,122	0.0
St. Joseph Catholic Elementary School	Lighting Upgrades	\$18,584	\$75,435	4.1
St. Margaret Mary Catholic Elementary School	Install Vending Machine Timer	\$2,000	\$297	0.1
St. Margaret Mary	Insulate DHW Pipe	\$326	\$71	0.2

Catholic Elementary School				
St. Margaret Mary Catholic Elementary School	Insulate HHW Pipe	\$2,789	\$943	0.3
St. Margaret Mary Catholic Elementary School	Control Exhaust Fans	\$39,439	\$15,546	0.4
St. Margaret Mary Catholic Elementary School	Install Lighting Occupancy Sensors	\$15,627	\$8,637	0.6
St. Margaret Mary Catholic Elementary School	Lighting Retrofit	\$33,982	\$16,657	0.5
St. Margaret Mary Catholic Elementary School	Install High Efficiency DHW Heater	\$7,538	\$19,335	2.6
St. Margaret Mary Catholic Elementary School	Convert to 208V/3 Phase	\$0	\$157,786	0.0
St. Margaret Mary Catholic Elementary School	Replace Unit Ventilators	-\$6,119	\$166,845	-27.3
St. Margaret Mary Catholic Elementary School	Install Ceiling Fans in Gym	\$1,296	\$3,908	3.0
St. Margaret Mary Catholic Elementary School	Replace Interior Air Handling Unit	\$5,502	\$19,215	3.5
St. Margaret Mary Catholic Elementary School	Install Low Flow Water Fixtures	\$8,341	\$63,693	7.6
St. Margaret Mary Catholic Elementary School	Project, Construction Management and Commissioning	\$0	\$187,784	0.0
St. Marguerite d'Youville Catholic Elementary School	Install Lighting Occupancy Sensors	\$8,430	\$5,633	0.7
St. Marguerite d'Youville Catholic Elementary School	Day Lighting with Photo Sensors	\$632	\$488	0.8
St. Marguerite d'Youville Catholic Elementary School	Install Demand Control Ventilation	\$43,084	\$56,720	1.3
St. Marguerite d'Youville Catholic Elementary School	Replace Water Source Heat Pumps	\$18,054	\$160,886	8.9

St. Marguerite d'Youville Catholic Elementary School	Project, Construction Management and Commissioning	\$0	\$98,369	0.0
St. Martin of Tours Catholic Elementary School	Lighting Upgrades	\$11,248	\$55,231	4.9
St. Martin of Tours Catholic Elementary School	Water Conservation	\$5,116	\$12,370	2.4
St. Martin of Tours Catholic Elementary School	Install Ceiling Fans in Gym	\$1,777	\$8,601	4.8
St. Mary Catholic Secondary School	Heat Pump Variable Flow	\$76,729	\$39,101	0.5
St. Mary Catholic Secondary School	Water Conservation	\$38,792	\$39,189	1.0
St. Michael Catholic Elementary School	Lighting Upgrades	\$21,742	\$101,812	4.7
St. Michael Catholic Elementary School	Unit Ventilators Upgrades	\$24,129	\$145,819	6.0
St. Patrick Catholic Elementary School	Verify Demand Control Ventilation is Operational	\$9,650	\$2,037	0.2
St. Patrick Catholic Elementary School	Install Lighting Occupancy Sensors	\$13,203	\$6,947	0.5
St. Patrick Catholic Elementary School	Lighting Retrofit	\$4,569	\$10,018	2.2
St. Patrick Catholic Elementary School	Install Ceiling Fans in Gym	\$1,060	\$4,861	4.6
St. Patrick Catholic Elementary School	Project, Construction Management and Commissioning	\$0	\$52,682	0.0
St. Paul Catholic Elementary School	Lighting Upgrades	\$10,939	\$53,232	4.9
St. Paul Catholic Elementary School	Water Conservation	\$8,390	\$19,838	2.4
St. Paul Catholic Elementary School	Install Ceiling Fans in Gym	\$944	\$7,495	7.9
St. Teresa of Avila Catholic Elementary School	Lighting Upgrades	\$10,957	\$34,765	3.2
St. Teresa of Avila Catholic Elementary School	Water Conservation	\$5,034	\$8,957	1.8
St. Teresa of Avila Catholic Elementary School	Turndown Electric Heaters	\$26,813	\$1,744	0.1
St. Teresa of Avila Catholic Elementary	Install Ceiling Fans in Gym	\$766	\$7,887	10.3

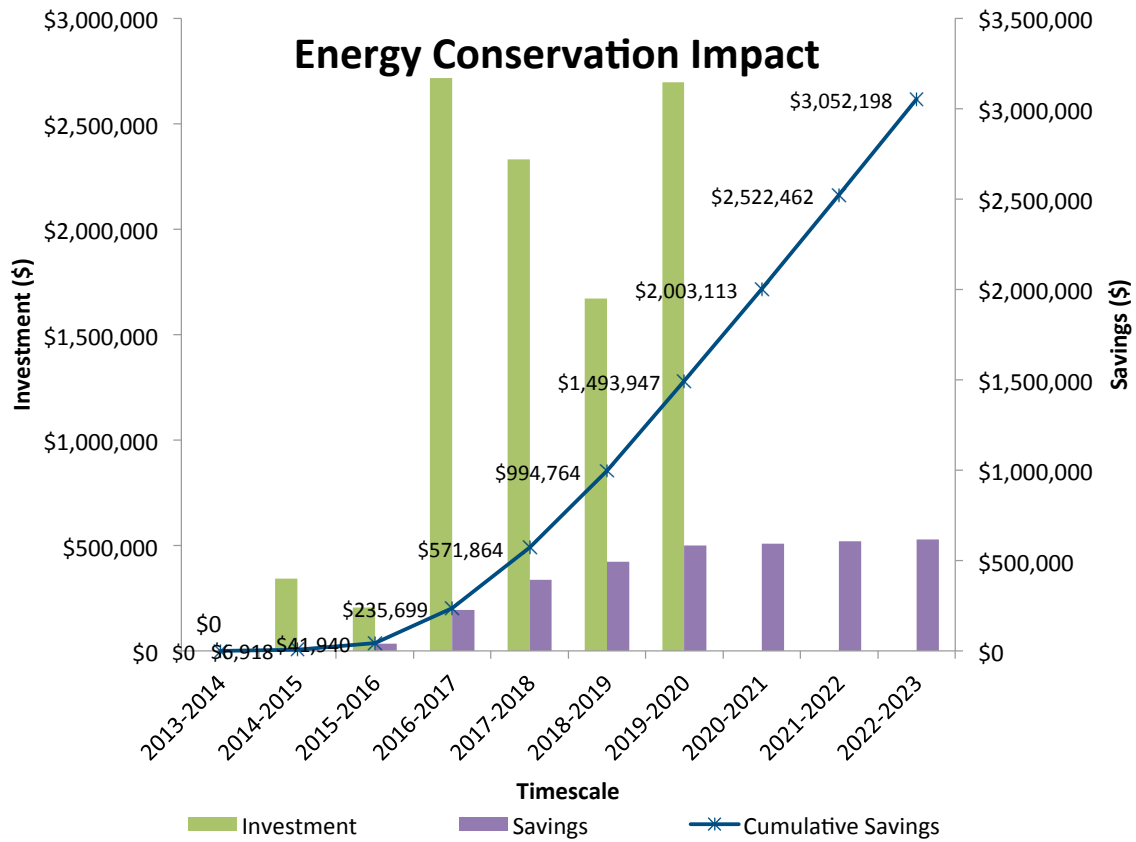
School				
St. Thomas the Apostle Catholic Elementary School	Lighting Upgrades	\$111,036	\$349,268	3.1
St. Thomas the Apostle Catholic Elementary School	Water Conservation	\$33,168	\$85,651	2.6
St. Thomas the Apostle Catholic Elementary School	Heat Pump Variable Flow	\$48,507	\$37,927	0.8
St. Vincent de Paul Catholic Elementary School	Water Conservation	\$10,282	\$21,778	2.1
Thomas J. Mahony Building	Lighting Upgrades	\$22,302	\$77,116	3.5
Thomas J. Mahony Building	Water Conservation	\$8,126	\$16,559	2.0

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 these 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, HWCDSB will consult with utility representatives and/or energy consultants, allowing HWCDSB 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, HWCDSB 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 HWCDSB's objectives and are appropriate to be pursued at that time.

As HWCDSB 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 HWCDSB's internal capacity to complete the proposed initiatives. Recognizing the need to develop HWCDSB'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 HWCDSB'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 HWCDSB were evaluated prior to the development of the CDM Plan. HWCDSB 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 HWCDSB grows and energy management practices improve, these actions will be reassessed.

Future Energy Reduction Projects Summary		
Year	Facility	Action Planned
2014	St. Brigid Catholic Elementary School	Lighting Retrofit
2014	St. Brigid Catholic Elementary School	Convert to 208V/3Phase
2014	St. Brigid Catholic Elementary School	Replace Windows
2014	St. Jean de Brébeuf Catholic Secondary School	Replace Doors
2015	Blessed Sacrament Catholic Elementary School	Replace Weather Stripping
2015	Canadian Martyrs Catholic Elementary School	Lighting Retrofit
2015	Cardinal Newman Catholic Secondary School	Water Conservation
2015	Cardinal Newman Catholic Secondary School	Demand Control Ventilation in Gym
2015	St. Brigid Catholic Elementary School	Replace Weather Stripping
2015	St. Brigid Catholic Elementary School	Replace Two Broken Exhaust Fans
2015	St. Charles Mountain	Control Exhaust Fans
2015	St. Clare of Assisi Catholic Elementary School	Water Conservation
2015	St. David Catholic Elementary School	Schedule DHW Recirc Pump
2015	St. David Catholic Elementary School	Replace Weather Stripping
2015	St. Francis Xavier Catholic Elementary School	Replace Weather Stripping
2015	St. James the Apostle Catholic Elementary School	Install Ceiling Fans in Gym
2015	St. Jean de Brébeuf Catholic Secondary School	Replace Weather Stripping
2015	St. Jean de Brébeuf Catholic Secondary School	Install Vending Machine Timers
2015	St. Joachim Catholic Elementary School	Water Conservation
2015	St. Joachim Catholic Elementary School	Replace Industrial Arts Unit Ventilator
2015	St. John the Baptist Catholic Elementary School	Lighting Retrofit
2015	St. John the Baptist Catholic Elementary School	Install Low Flow Water Fixtures
2015	St. John the Baptist Catholic Elementary School	Install Heat Pump DHW Heater
2015	St. Margaret Mary Catholic Elementary School	Install Vending Machine Timer
2015	St. Margaret Mary Catholic Elementary School	Insulate DHW Pipe
2015	St. Margaret Mary Catholic Elementary School	Insulate HHW Pipe
2015	St. Margaret Mary Catholic Elementary School	Install Ceiling Fans in Gym
2015	St. Margaret Mary Catholic Elementary School	Replace Interior Air Handling Unit
2015	St. Teresa of Avila Catholic Elementary School	Turndown Electric Heaters
2016	Blessed Sacrament Catholic Elementary School	Install Demand Control Ventilation
2016	Blessed Sacrament Catholic Elementary School	Lighting Retrofit
2016	Blessed Sacrament Catholic Elementary School	Replace Existing Exhaust Fans
2016	Canadian Martyrs Catholic Elementary School	Install Lighting Occupancy Sensors
2016	Canadian Martyrs Catholic Elementary School	Replace Weather Stripping
2016	Cathedral Catholic Secondary School	Lighting Upgrades
2016	Cathedral Catholic Secondary School	Demand Control Ventilation in Gym

Future Energy Reduction Projects Summary		
Year	Facility	Action Planned
2016	Cathedral Catholic Secondary School	Vending Misers
2016	Corpus Christi	Demand Control Ventilation
2016	Guardian Angels Catholic Elementary School	Install Lighting Occupancy Sensors
2016	Holy Name of Mary Catholic Elementary School	Water Conservation
2016	Our Lady of Mount Carmel	Install VFD and schedule HRU-1
2016	Our Lady of Mount Carmel	Install 10kW PV Panels
2016	Our Lady of Mount Carmel	Upgrade Control System
2016	Our Lady of Peace	Replace RTUs and Electric Heaters
2016	Our Lady of Peace	Vending Machine Controls
2016	Regina Mundi Catholic Elementary School	Replace Unit Ventilators
2016	Sacred Heart of Jesus Catholic Elementary School	Water Conservation
2016	Saints Peter and Paul Catholic Elementary School	Install Low Flow Water Fixtures
2016	Saints Peter and Paul Catholic Elementary School	Install Lighting Occupancy Sensors
2016	St. Ann (Ancaster) Catholic Elementary School	Demand Control Ventilation in Gym
2016	St. Ann (Ancaster) Catholic Elementary School	Install Unit Ventilators in Classrooms
2016	St. Augustine Catholic Elementary School	Lighting Upgrades
2016	St. Augustine Catholic Elementary School	Water Conservation
2016	St. Bernadette Catholic Elementary School	Water Conservation
2016	St. Brigid Catholic Elementary School	Install Low Flow Water Fixtures
2016	St. Charles Mountain	Replace Weather Stripping
2016	St. Charles Mountain	Install Lighting Occupancy Sensors
2016	St. Charles Mountain	Install Demand Control Ventilation
2016	St. Daniel Catholic Elementary School	Water Conservation
2016	St. David Catholic Elementary School	Install Occupancy Sensors
2016	St. David Catholic Elementary School	Replace Windows
2016	St. Eugene Catholic Elementary School	Replace Weather Stripping
2016	St. Eugene Catholic Elementary School	Install Low Flow Water Fixtures
2016	St. Francis Xavier Catholic Elementary School	Water Conservation
2016	St. Francis Xavier Catholic Elementary School	Replace Electric Heaters and Gym Unit Heaters
2016	St. James the Apostle Catholic Elementary School	Replace Weather stripping and Windows
2016	St. James the Apostle Catholic Elementary School	Replace HVAC Equipment
2016	St. Jean de Brébeuf Catholic Secondary School	Recommission and Control Exhaust Fans
2016	St. John the Baptist Catholic Elementary School	Install Lighting Occupancy Sensors
2016	St. John the Baptist Catholic Elementary School	Replace Weather Stripping
2016	St. John the Baptist Catholic Elementary School	Replace Windows
2016	St. Margaret Mary Catholic Elementary School	Control Exhaust Fans

Future Energy Reduction Projects Summary		
Year	Facility	Action Planned
2016	St. Margaret Mary Catholic Elementary School	Install Lighting Occupancy Sensors
2016	St. Margaret Mary Catholic Elementary School	Lighting Retrofit
2016	St. Margaret Mary Catholic Elementary School	Install Low Flow Water Fixtures
2016	St. Marguerite d'Youville Catholic Elementary School	Install Lighting Occupancy Sensors
2016	St. Marguerite d'Youville Catholic Elementary School	Day Lighting with Photo Sensors
2016	St. Martin of Tours Catholic Elementary School	Lighting Upgrades
2016	St. Martin of Tours Catholic Elementary School	Install Ceiling Fans in Gym
2016	St. Mary Catholic Secondary School	Heat Pump Variable Flow
2016	St. Mary Catholic Secondary School	Water Conservation
2016	St. Patrick Catholic Elementary School	Verify Demand Control Ventilation is Operational
2016	St. Patrick Catholic Elementary School	Install Lighting Occupancy Sensors
2016	St. Paul Catholic Elementary School	Install Ceiling Fans in Gym
2016	St. Teresa of Avila Catholic Elementary School	Install Ceiling Fans in Gym
2016	St. Vincent de Paul Catholic Elementary School	Water Conservation
2016	Thomas J. Mahony Building	Water Conservation
2017	Blessed Teresa of Calcutta	Install Demand Control Ventilation
2017	Cardinal Newman Catholic Secondary School	Chilled Water Variable Flow
2017	Corpus Christi	Re-Cx Exhaust Fans
2017	Father Kryan Kennedy Catholic Education Centre	Replace HVAC Equipment
2017	Guardian Angels Catholic Elementary School	Install Demand Control Ventilation
2017	Guardian Angels Catholic Elementary School	install VFD and Schedule MUA-1
2017	Guardian Angels Catholic Elementary School	Upgrade Control System
2017	Nicholas Mancini Centre	Lighting Upgrades
2017	Nicholas Mancini Centre	Water Conservation
2017	Our Lady of Lourdes Catholic Elementary School	Lighting Upgrades
2017	Our Lady of Mount Carmel	Install Occupancy Sensors
2017	Our Lady of Mount Carmel	Install Solar Hot Air System
2017	St. Ann (Ancaster) Catholic Elementary School	Replace Windows
2017	St. Ann (Ancaster) Catholic Elementary School	Upgrade Control System
2017	St. Bernadette Catholic Elementary School	Lighting Upgrades
2017	St. Charles Mountain	Install Low Flow Water Fixtures
2017	St. Daniel Catholic Elementary School	Lighting Upgrades
2017	St. James the Apostle Catholic Elementary School	Water Conservation
2017	St. Jean de Brébeuf Catholic Secondary School	Install Lighting Occupancy Sensors

Future Energy Reduction Projects Summary		
Year	Facility	Action Planned
2017	St. Margaret Mary Catholic Elementary School	Install High Efficiency DHW Heater
2017	St. Margaret Mary Catholic Elementary School	Replace Unit Ventilators
2017	St. Marguerite d'Youville Catholic Elementary School	Install Demand Control Ventilation
2017	St. Marguerite d'Youville Catholic Elementary School	Replace Water Source Heat Pumps
2017	St. Martin of Tours Catholic Elementary School	Water Conservation
2017	St. Michael Catholic Elementary School	Unit Ventilators Upgrades
2017	St. Patrick Catholic Elementary School	Install Ceiling Fans in Gym
2017	St. Paul Catholic Elementary School	Water Conservation
2017	St. Teresa of Avila Catholic Elementary School	Lighting Upgrades
2017	St. Teresa of Avila Catholic Elementary School	Water Conservation
2017	St. Thomas the Apostle Catholic Elementary School	Lighting Upgrades
2017	St. Thomas the Apostle Catholic Elementary School	Water Conservation
2018	Blessed Sacrament Catholic Elementary School	Replace In-Ceiling Radiant Heating with Perimeter Radiators
2018	Blessed Teresa of Calcutta	Water Conservation
2018	Cathedral Catholic Secondary School	Water Source Heat Pumps Variable Flow
2018	Corpus Christi	Install Occupancy Sensors
2018	Regina Mundi Catholic Elementary School	Lighting Upgrades
2018	Regina Mundi Catholic Elementary School	Water Conservation
2018	Saints Peter and Paul Catholic Elementary School	Install Demand Control Ventilation
2018	Saints Peter and Paul Catholic Elementary School	Install Ceiling Fans in Gym
2018	St. Charles Mountain	Lighting Retrofit
2018	St. Eugene Catholic Elementary School	Install Occupancy Sensors
2018	St. Eugene Catholic Elementary School	Lighting Retrofit
2018	St. Francis Xavier Catholic Elementary School	Lighting Upgrades
2018	St. Jean de Brébeuf Catholic Secondary School	Lighting Retrofit
2018	St. Jean de Brébeuf Catholic Secondary School	Replace Windows
2018	St. Michael Catholic Elementary School	Lighting Upgrades
2018	St. Patrick Catholic Elementary School	Lighting Retrofit
2018	St. Paul Catholic Elementary School	Lighting Upgrades
2018	St. Thomas the Apostle Catholic Elementary School	Heat Pump Variable Flow
2019	Blessed Sacrament Catholic Elementary School	Install Lighting Occupancy Sensors
2019	Blessed Sacrament Catholic Elementary School	Replace Windows

Future Energy Reduction Projects Summary		
Year	Facility	Action Planned
2019	Blessed Sacrament Catholic Elementary School	Project, Construction Management and Commissioning
2019	Canadian Martyrs Catholic Elementary School	Install Low Flow Water Fixtures
2019	Canadian Martyrs Catholic Elementary School	Install Demand Control Ventilation
2019	Canadian Martyrs Catholic Elementary School	Project, Construction Management and Commissioning
2019	Cardinal Newman Catholic Secondary School	Lighting Upgrades
2019	Cardinal Newman Catholic Secondary School	High Efficiency Motors
2019	Corpus Christi	Lighting Retrofit
2019	Corpus Christi	Upgrade Control System
2019	Corpus Christi	Project, Construction Management and Commissioning
2019	Father Kryan Kennedy Catholic Education Centre	Install a BAS
2019	Guardian Angels Catholic Elementary School	Project, Construction Management and Commissioning
2019	Our Lady of Mount Carmel	Project, Construction Management and Commissioning
2019	Our Lady of Peace	Water Conservation
2019	Regina Mundi Catholic Elementary School	Replace Windows
2019	Saints Peter and Paul Catholic Elementary School	Lighting Retrofit
2019	Saints Peter and Paul Catholic Elementary School	Project, Construction Management and Commissioning
2019	St. Brigid Catholic Elementary School	Install Ceiling Fans in Gym
2019	St. Brigid Catholic Elementary School	Project, Construction Management and Commissioning
2019	St. Charles Mountain	Replace Windows
2019	St. Charles Mountain	Project, Construction Management and Commissioning
2019	St. David Catholic Elementary School	Install Polarizing Air Filters
2019	St. David Catholic Elementary School	Project, Construction Management and Commissioning
2019	St. Eugene Catholic Elementary School	Install Ceiling Fans in Gym
2019	St. Eugene Catholic Elementary School	Upgrade Control System
2019	St. Eugene Catholic Elementary School	Project, Construction Management and Commissioning
2019	St. Jean de Brébeuf Catholic Secondary School	Project, Construction Management and Commissioning
2019	St. John the Baptist Catholic Elementary School	Project, Construction Management and Commissioning
2019	St. Joseph Catholic Elementary School	Lighting Upgrades

Future Energy Reduction Projects Summary		
Year	Facility	Action Planned
2019	St. Margaret Mary Catholic Elementary School	Convert to 208V/3 Phase
2019	St. Margaret Mary Catholic Elementary School	Project, Construction Management and Commissioning
2019	St. Marguerite d'Youville Catholic Elementary School	Project, Construction Management and Commissioning
2019	St. Patrick Catholic Elementary School	Project, Construction Management and Commissioning
2019	Thomas J. Mahony Building	Lighting Upgrades

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. Currently, the Board has implemented Solar Panels at the Benbrook School and has three turbines at Board high schools. A study of solar installations at other Board facilities was undertaken but no other projects were deemed feasible at this time.

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%. (Ref: 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.

A one-time, comprehensive metering solution allows for a much more cost effective view, while enabling accountability to 90% of the planned projects budgeted to date. Reporting can be the most essential part of this plan as multiple portions of the organization rely on this data to make periodic decisions. The Finance Team can use this information to verify billing accuracy and other potential costs, such as construction back-charges. Energy Conservation Managers generally look at this data for building performance, future opportunity and functional trending. Project Managers rely on this information to ensure that vendors are supplying and meeting contractual obligations. 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. The following figure illustrates how the School Board could use an EMIS system and the associated data collected in an efficient manner, thereby maximizing the impact of the EMIS system. These systems can be as simple as an online Data Storage, Retrieval and Reporting System using billing data to form the basis and baselines for future comparison.

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.

Current practices in re-commissioning indicate that the cost to complete these initiatives is between \$2.90 and \$4.50/m². Expected savings from the projects are typically between \$1.00 and \$4.00/m², depending upon the starting efficiency of the building, thus creating very attractive paybacks in this area.

Energy and Resource Awareness (ERA) Programs

Independent studies done by organizations such as Natural Resources Canada (NRCan) 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 typical ERA Program would include features such as:

- A detailed ERA Program written plan including a GANTT chart,
- The creation of a program email address for suggestions and concerns and access to ERA experts to answer questions,
- A customized identity and marketing program ,
- Training and support for an Energy Steward Team,
- ERA displays with various relevant conservation themes, and
- Annual Marketing Effectiveness Reports and Feedback system.

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

Hamilton-Wentworth Catholic District School Board – Energy Consumption				
Building Name	2011 Electricity (kWh)	2011 Natural Gas (m ³)	2012 Electricity (kWh)	2012 Natural Gas (m ³)
Annunciation of Our Lord (Gemini)	349,502	59,735	497,607	58,525
Annunciation of Our Lord (Limeridge)	200,801	18,273	44,498	17,574
Bay Street North Offices	8,134	3,514	6,170	4,319
Bishop Ryan Catholic Secondary School	3,381,785	22,532	3,352,622	273,011
Bishop Tonnos Catholic Secondary School	1,495,189	107,582	1,756,790	130,042
St. John Paul II Catholic Elementary School	387,853	29,704	416,141	56,317
St. Kateri Tekakwitha	196,762	59,878	303,895	45,291
Blessed Sacrament Catholic Elementary School	523,491	52,103	218,474	65,639
Blessed Teresa of Calcutta	220,471	41,415	472,762	44,179
Canadian Martyrs Catholic Elementary School	2,049,698	126,271	222,320	46,767
Cardinal Newman Catholic Secondary School	2,969,219	245,991	1,957,033	154,524
Cathedral Catholic Secondary School	28,600	24,712	3,087,787	347,128
Corpus Christi	432,598	38,617	303,110	30,894
Father Kryan Kennedy Catholic Education Centre	470,013	39,735	338,618	51,637
Guardian Angels Catholic Elementary School	207,075	54,406	433,180	36,939
Holy Family Catholic Elementary School	225,541	30,286	204,380	59,689
Holy Name of Jesus	540,174	52,907	528,518	34,051
Holy Name of Mary Catholic Elementary School	108,847	61,550	638,468	73,669
Holy Spirit Catholic Elementary School	254,381	53,876	97,717	76,246
Immaculate Conception	900,391	27,010	285,404	48,149
Immaculate Heart of Mary Catholic Elementary School	660,545	52,625	893,426	42,132
Nicholas Mancini Centre	204,508	40,644	663,964	67,094
Our Lady of the Assumption Catholic Elementary School	290,149	53,085	225,246	58,358
Our Lady of Lourdes Catholic Elementary School	570,079	71,214	276,424	69,585
Our Lady of Mount Carmel	363,916	9,512	709,864	77,431
Our Lady of Peace	9,218	3,175	397,683	12,569
Pastoral Services	146,018	52,297	6,355	3,822
Regina Mundi Catholic Elementary School	188,054	40,691	132,288	49,822
Sacred Heart of Jesus Catholic Elementary School	321,674	39,167	190,445	50,886

Hamilton-Wentworth Catholic District School Board – Energy Consumption

Building Name	2011 Electricity (kWh)	2011 Natural Gas (m ³)	2012 Electricity (kWh)	2012 Natural Gas (m ³)
Saints Peter and Paul Catholic Elementary School	323,275	24,834	295,693	70,515
St. Agnes	22,644	40,663	321,608	30,065
St. Ann (Ancaster) Catholic Elementary School	97,807	34,191	222,565	48,211
St. Ann (Hamilton) Catholic Elementary School	187,484	51,466	98,000	34,000
St. Augustine Catholic Elementary School	407,685	16,824	221,636	69,440
St. Bernadette Catholic Elementary School	189,064	77,066	511,286	25,011
St. Brigid Catholic Elementary School	249,699	19,082	192,081	91,072
St. Charles Adult Education Centre	103,428	29,250	213,578	21,228
St. Charles Centre	478,212	53,032	110,478	36,604
St. Charles Mountain	343,189	22,857	516,338	60,306
St. Clare of Assisi Catholic Elementary School	228,023	15,424	303,836	43,887
St. Columba Catholic Elementary School	197,627	55,751	212,739	30,674
St. Daniel Catholic Elementary School	1,042,243	89,882	191,504	62,852
St. David Catholic Elementary School	235,918	69,170	1,040,290	102,797
St. Eugene Catholic Elementary School	267,971	64,144	238,627	87,279
St. Francis Xavier Catholic Elementary School	218,667	45,821	276,068	68,911
St. Helen Catholic Elementary School	431,031	32,195	201,124	60,902
St. James the Apostle Catholic Elementary School	1,641,619	314,173	432,409	34,734
St. Jean de Brébeuf Catholic Secondary School	794,641	14,013	1,743,257	346,567
St. Joachim Catholic Elementary School	419,334	39,604	543,916	17,386
St. John the Baptist Catholic Elementary School	302,817	41,592	365,774	43,882
St. Joseph Catholic Elementary School	354,200	57,550	281,529	50,957
St. Lawrence Catholic Elementary School	529,132	51,209	342,072	58,000
St. Luke Catholic Elementary School	188,683	73,286	498,953	68,689
St. Margaret Mary Catholic Elementary School	694,846	35,748	185,111	74,958
St. Marguerite d'Youville Catholic Elementary School	557,946	27,087	787,264	102,658
St. Mark Catholic Elementary School	164,549	25,206	631,110	36,022
St. Martin of Tours Catholic Elementary School	219,238	93,749	171,243	33,065
St. Mary Catholic Elementary School	2,246,427	164,705	212,916	93,748
St. Mary Catholic Secondary School	259,717	51,384	2,319,444	305,154
St. Matthew Catholic Elementary School	287,473	48,515	427,383	64,865
St. Michael Catholic Elementary School	340,879	36,880	304,949	57,818

Hamilton-Wentworth Catholic District School Board – Energy Consumption				
Building Name	2011 Electricity (kWh)	2011 Natural Gas (m ³)	2012 Electricity (kWh)	2012 Natural Gas (m ³)
St. Patrick Catholic Elementary School	304,141	16,412	342,348	45,146
St. Paul Catholic Elementary School	297,054	14,102	314,160	17,529
St. Teresa of Avila Catholic Elementary School	595,575	46,859	268,998	18,220
St. Thérèse of Lisieux Catholic Elementary School	2,469,972	244,116	684,330	53,577
St. Thomas the Apostle Catholic Elementary School	226,496	19,327	204,963	22,762
St. Thomas More Catholic Secondary School	355,308	13,127	2,665,102	255,286
St. Vincent de Paul Catholic Elementary School	316,523	70,487	339,060	26,099
Thomas J. Mahony Building	61,642	17,665	65,280	14,295
Wilma's Place	237,346	79,862	238,000	80,000
TOTAL	36,594,210	3,850,816	38,198,211	4,951,460

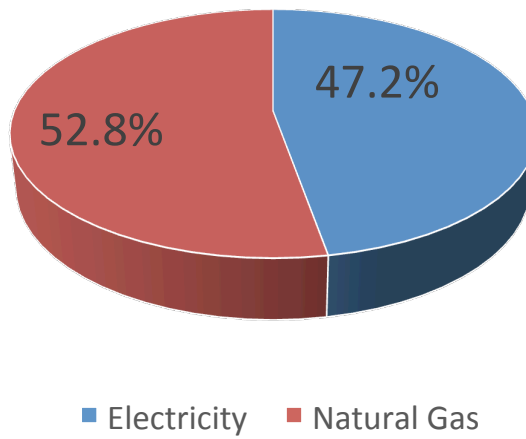
APPENDIX B

Energy Use Breakdown

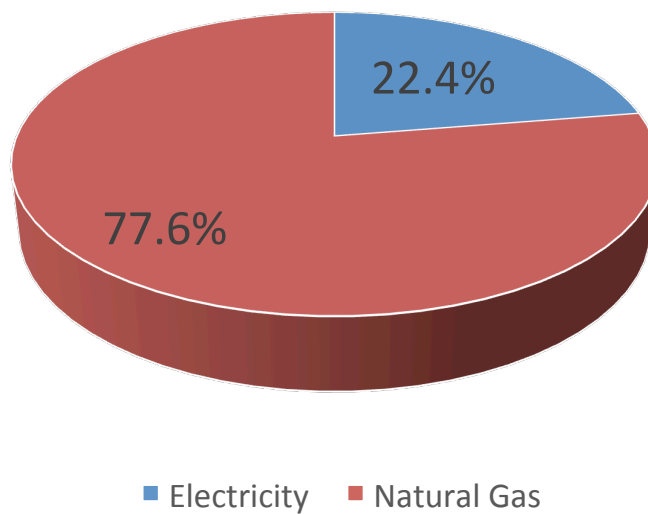


ENERGY USE BREAKDOWN

2011 Energy Breakdown



2012 Energy Breakdown



APPENDIX C

Energy Conservation Measure Schedules

School	Opportunity Savings (\$)	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Blessed Sacrament Catholic Elementary School	Install Lighting Occupancy Sensors						
Blessed Sacrament Catholic Elementary School	Replace Weather Strippling			\$69	\$70	\$72	\$73
Blessed Sacrament Catholic Elementary School	Install Demand Control Ventilation				\$401	\$409	\$417
Blessed Sacrament Catholic Elementary School	Lighting Retrofit				\$2,372	\$2,419	\$2,468
Blessed Sacrament Catholic Elementary School	Replace Existing Exhaust Fans				\$0	\$0	\$0
Blessed Sacrament Catholic Elementary School	Replace Windows						
Blessed Sacrament Catholic Elementary School	Replace In-Ceiling Radiant Heating with Perimeter Radiators						\$2,166
Blessed Sacrament Catholic Elementary School	Project, Construction Management and Commissioning						
Blessed Teresa of Calcutta	Water Conservation						\$3,490
Blessed Teresa of Calcutta	Install Demand Control Ventilation					\$3,199	\$3,263
Canadian Martyrs Catholic Elementary School	Install Lighting Occupancy Sensors				\$4,476	\$4,566	\$4,657
Canadian Martyrs Catholic Elementary School	Replace Weather Strippling				\$66	\$67	\$69
Canadian Martyrs Catholic Elementary School	Lighting Retrofit			\$1,895	\$1,933	\$1,972	\$2,011
Canadian Martyrs Catholic Elementary School	Install Low Flow Water Fixtures						
Canadian Martyrs Catholic Elementary School	Install Demand Control Ventilation						
Canadian Martyrs Catholic Elementary School	Project, Construction Management and Commissioning						
Cardinal Newman Catholic Elementary School	Lighting Upgrades						

Cardinal Newman Catholic Secondary School	Chilled Water Variable Flow							\$9,668	\$9,861
Cardinal Newman Catholic Secondary School	Water Conservation				\$3,350	\$3,417	\$3,485	\$3,555	
Cardinal Newman Catholic Secondary School	Demand Control Ventilation in Gym				\$10,806	\$11,022	\$11,243	\$11,467	
Cardinal Newman Catholic Secondary School	High Efficiency Motors								
Cathedral Catholic Secondary School	Lighting Upgrades					\$30,034	\$30,635	\$31,247	
Cathedral Catholic Secondary School	Demand Control Ventilation in Gym					\$16,672	\$17,005	\$17,346	
Cathedral Catholic Secondary School	Water Source Heat Pumps Variable Flow							\$7,347	
Cathedral Catholic Secondary School	Vending Misers					\$728	\$743	\$757	
Corpus Christi	Install Occupancy Sensors							\$1,309	
Corpus Christi	Re-Cx Exhaust Fans						\$0	\$0	
Corpus Christi	Demand Control Ventilation					\$527	\$538	\$548	
Corpus Christi	Lighting Retrofit								
Corpus Christi	Upgrade Control System								
Corpus Christi	Project, Construction Management and Commissioning								
Father Kryan Kennedy Catholic Education Centre	Replace HVAC Equipment						\$30,560	\$31,171	
Father Kryan Kennedy Catholic Education Centre	Install a BAS								
Guardian Angels Catholic Elementary School	Install Lighting Occupancy Sensors					\$1,901	\$1,939	\$1,978	
Guardian Angels Catholic Elementary School	Install Demand Control Ventilation						\$2,208	\$2,252	
Guardian Angels Catholic	Install VFD and Schedule								

Guardian Angels Catholic Elementary School	Upgrade Control System							\$2,097	\$2,139
Guardian Angels Catholic Elementary School	Project, Construction Management and Commissioning								
Holy Name of Mary Catholic Elementary School	Water Conservation					\$1,325	\$1,352	\$1,379	
Nicholas Mancini Centre	Lighting Upgrades						\$7,641	\$7,794	
Nicholas Mancini Centre	Water Conservation						\$339	\$346	
Our Lady of Lourdes Catholic Elementary School	Lighting Upgrades						\$4,500	\$4,590	
Our Lady of Mount Carmel	Install Occupancy Sensors						\$3,968	\$4,047	
Our Lady of Mount Carmel	Install VFD and schedule HRU-1					\$4,552	\$4,643	\$4,736	
Our Lady of Mount Carmel	Install Solar Hot Air System						\$50	\$51	
Our Lady of Mount Carmel	Install 10KW PV Panels					\$9,907	\$10,105	\$10,307	
Our Lady of Mount Carmel	Upgrade Control System					\$2,655	\$2,708	\$2,762	
Our Lady of Mount Carmel	Project, Construction Management and Commissioning								
Our Lady of Peace	Water Conservation								
Our Lady of Peace	Replace RTUs and Electric Heaters					\$1,882	\$1,920	\$1,958	
Our Lady of Peace	Vending Machine Controls					\$353	\$360	\$367	
Regina Mundi Catholic Elementary School	Lighting Upgrades							\$3,668	
Regina Mundi Catholic Elementary School	Replace Unit Ventilators					\$1,748	\$1,783	\$1,819	
Regina Mundi Catholic Elementary School	Water Conservation							\$446	

Sacred Heart of Jesus Catholic Elementary School	Water Conservation					\$241	\$246	\$251
Saints Peter and Paul Catholic Elementary School	Install Low Flow Water Fixtures					\$422	\$430	\$439
Saints Peter and Paul Catholic Elementary School	Install Lighting Occupancy Sensors					\$1,599	\$1,631	\$1,664
Saints Peter and Paul Catholic Elementary School	Install Demand Control Ventilation							\$328
Saints Peter and Paul Catholic Elementary School	Lighting Retrofit							
Saints Peter and Paul Catholic Elementary School	Install Ceiling Fans in Gym							\$165
Saints Peter and Paul Catholic Elementary School	Project, Construction Management and Commissioning							
St. Ann (Ancaster) Catholic Elementary School	Replace Windows						-\$249	-\$254
St. Ann (Ancaster) Catholic Elementary School	Upgrade Control System						\$8,208	\$8,372
St. Ann (Ancaster) Catholic Elementary School	Demand Control Ventilation in Gym					\$1,482	\$1,512	\$1,542
St. Ann (Ancaster) Catholic Elementary School	Install Unit Ventilators in Classrooms					-\$15,818	-\$16,134	-\$16,457
St. Augustine Catholic Elementary School	Lighting Upgrades					\$4,390	\$4,478	\$4,567
St. Augustine Catholic Elementary School	Water Conservation					\$471	\$480	\$490
St. Bernadette Catholic Elementary School	Lighting Upgrades						\$1,747	\$1,782
St. Bernadette Catholic Elementary School	Water Conservation					\$1,364	\$1,391	\$1,419
St. Brigid Catholic Elementary School	Lighting Retrofit		\$2,455		\$2,504	\$2,554	\$2,605	\$2,657
St. Brigid Catholic Elementary School	Replace Weather Striping				\$26	\$27	\$27	\$28
St. Brigid Catholic Elementary School	Install Low Flow Water Fixtures					\$1,109	\$1,131	\$1,154
St. Brigid Catholic	Replace Two Broken							

St. Brigid Catholic Elementary School	Convert to 208V/3Phase			\$0	\$0	\$0	\$0	\$0
St. Brigid Catholic Elementary School	Replace Windows			\$2,993	\$3,053	\$3,114	\$3,176	\$3,240
St. Brigid Catholic Elementary School	Install Ceiling Fans in Gym							
St. Brigid Catholic Elementary School	Project, Construction Management and Commissioning							
St. Charles Mountain	Install Low Flow Water Fixtures						\$2,531	\$2,582
St. Charles Mountain	Replace Weather Stripping					\$276	\$282	\$287
St. Charles Mountain	Install Lighting Occupancy Sensors					\$8,585	\$8,757	\$8,932
St. Charles Mountain	Install Demand Control Ventilation					\$1,915	\$1,953	\$1,992
St. Charles Mountain	Control Exhaust Fans			\$50	\$51	\$52		\$53
St. Charles Mountain	Lighting Retrofit							\$5,940
St. Charles Mountain	Replace Windows							
St. Charles Mountain	Project, Construction Management and Commissioning							
St. Clare of Assisi Catholic Elementary School	Water Conservation			\$1,050	\$1,071	\$1,092		\$1,114
St. Daniel Catholic Elementary School	Lighting Upgrades						\$2,820	\$2,876
St. Daniel Catholic Elementary School	Water Conservation					\$430	\$439	\$447
St. David Catholic Elementary School	Install Occupancy Sensors					\$4,543	\$4,634	\$4,727
St. David Catholic Elementary School	Install Polarizing Air Filters							
St. David Catholic Elementary School	Schedule DHW Recirc Pump			\$55	\$56	\$57		\$58

St. David Catholic Elementary School	Replace Windows					\$577	\$589	\$600
St. David Catholic Elementary School	Project, Construction Management and Commissioning							
St. Eugene Catholic Elementary School	Replace Weather Striping					\$268	\$273	\$279
St. Eugene Catholic Elementary School	Install Low Flow Water Fixtures					\$2,042	\$2,083	\$2,124
St. Eugene Catholic Elementary School	Install Occupancy Sensors							\$4,311
St. Eugene Catholic Elementary School	Lighting Retrofit							\$2,822
St. Eugene Catholic Elementary School	Install Ceiling Fans in Gym							
St. Eugene Catholic Elementary School	Upgrade Control System							
St. Eugene Catholic Elementary School	Project, Construction Management and Commissioning							
St. Francis Xavier Catholic Elementary School	Lighting Upgrades							\$2,106
St. Francis Xavier Catholic Elementary School	Water Conservation					\$159	\$162	\$165
St. Francis Xavier Catholic Elementary School	Replace Electric Heaters and Gym Unit Heaters					\$4,563	\$4,654	\$4,747
St. Francis Xavier Catholic Elementary School	Replace Weather Striping				\$2,057	\$2,098	\$2,140	\$2,183
St. James the Apostle Catholic Elementary School	Replace Weather striping and Windows					\$2,289	\$2,335	\$2,381
St. James the Apostle Catholic Elementary School	Water Conservation						\$1,357	\$1,384
St. James the Apostle Catholic Elementary School	Replace HVAC Equipment					\$17,429	\$17,778	\$18,133
St. James the Apostle Catholic Elementary School	Install Ceiling Fans in Gym				\$140	\$143	\$146	\$149
St. Jean de Brébeuf Catholic Secondary School	Replace Weather Striping				\$892	\$910	\$928	\$947

St. Jean de Brébeuf Catholic Secondary School	Install Lighting Occupancy Sensors						\$14,287	\$14,573
St. Jean de Brébeuf Catholic Secondary School	Lighting Retrofit							\$16,482
St. Jean de Brébeuf Catholic Secondary School	Recommission and Control Exhaust Fans					\$0	\$0	\$0
St. Jean de Brébeuf Catholic Secondary School	Replace Doors		\$1,470	\$1,499	\$1,529	\$1,560	\$1,591	
St. Jean de Brébeuf Catholic Secondary School	Replace Windows							\$12,953
St. Jean de Brébeuf Catholic Secondary School	Project, Construction Management and Commissioning							
St. Joachim Catholic Elementary School	Water Conservation			\$1,183	\$1,207	\$1,231	\$1,255	
St. Joachim Catholic Elementary School	Replace Industrial Arts Unit Ventilator			-\$1,976	-\$2,016	-\$2,056	-\$2,097	
St. John the Baptist Catholic Elementary School	Install Lighting Occupancy Sensors				\$1,902	\$1,940	\$1,979	
St. John the Baptist Catholic Elementary School	Lighting Retrofit			\$2,572	\$2,623	\$2,676	\$2,729	
St. John the Baptist Catholic Elementary School	Replace Weather Stripping				\$13	\$13	\$14	
St. John the Baptist Catholic Elementary School	Install Low Flow Water Fixtures			\$503	\$513	\$523	\$534	
St. John the Baptist Catholic Elementary School	Replace Windows				\$796	\$812	\$828	
St. John the Baptist Catholic Elementary School	Install Heat Pump DHW Heater			\$91	\$93	\$95	\$97	
St. John the Baptist Catholic Elementary School	Project, Construction Management and Commissioning							
St. Joseph Catholic Elementary School	Lighting Upgrades							
St. Margaret Mary Catholic Elementary School	Install Vending Machine Timer			\$233	\$238	\$242	\$247	
St. Margaret Mary Catholic Elementary School	Insulate DHW Pipe			\$38	\$39	\$40	\$40	

St. Margaret Mary Catholic Elementary School	Control Exhaust Fans					\$5,305	\$5,411	\$5,519
St. Margaret Mary Catholic Elementary School	Install Lighting Occupancy Sensors					\$2,102	\$2,144	\$2,187
St. Margaret Mary Catholic Elementary School	Lighting Retrofit					\$4,571	\$4,662	\$4,756
St. Margaret Mary Catholic Elementary School	Install High Efficiency DHW Heater						\$1,195	\$1,219
St. Margaret Mary Catholic Elementary School	Convert to 208V/3 Phase							
St. Margaret Mary Catholic Elementary School	Replace Unit Ventilators						-\$970	-\$989
St. Margaret Mary Catholic Elementary School	Install Ceiling Fans in Gym				\$151	\$154	\$157	\$160
St. Margaret Mary Catholic Elementary School	Replace Interior Air Handling Unit				\$641	\$654	\$667	\$680
St. Margaret Mary Catholic Elementary School	Install Low Flow Water Fixtures					\$1,122	\$1,144	\$1,167
St. Margaret Mary Catholic Elementary School	Project, Construction Management and Commissioning							
St. Marguerite d'Youville Catholic Elementary School	Install Lighting Occupancy Sensors					\$1,134	\$1,157	\$1,180
St. Marguerite d'Youville Catholic Elementary School	Day Lighting with Photo Sensors					\$85	\$87	\$88
St. Marguerite d'Youville Catholic Elementary School	Install Demand Control Ventilation						\$6,830	\$6,967
St. Marguerite d'Youville Catholic Elementary School	Replace Water Source Heat Pumps						\$2,862	\$2,919
St. Marguerite d'Youville Catholic Elementary School	Project, Construction Management and Commissioning							
St. Martin of Tours Catholic Elementary School	Lighting Upgrades					\$1,513	\$1,543	\$1,574
St. Martin of Tours Catholic Elementary School	Water Conservation						\$811	\$827
St. Martin of Tours Catholic Elementary School	Install Ceiling Fans in Gym					\$239	\$244	\$249

St. Mary Catholic Secondary School	Water Conservation					\$5,218	\$5,322	\$5,429
St. Michael Catholic Elementary School	Lighting Upgrades							\$4,178
St. Michael Catholic Elementary School	Unit Ventilators Upgrades						\$3,825	\$3,902
St. Patrick Catholic Elementary School	Verify Demand Control Ventilation is Operational					\$1,298	\$1,324	\$1,350
St. Patrick Catholic Elementary School	Install Lighting Occupancy Sensors					\$1,776	\$1,812	\$1,848
St. Patrick Catholic Elementary School	Lighting Retrofit							\$878
St. Patrick Catholic Elementary School	Install Ceiling Fans in Gym						\$168	\$171
St. Patrick Catholic Elementary School	Project, Construction Management and Commissioning							
St. Paul Catholic Elementary School	Lighting Upgrades							\$2,102
St. Paul Catholic Elementary School	Water Conservation						\$1,330	\$1,357
St. Paul Catholic Elementary School	Install Ceiling Fans in Gym					\$127	\$130	\$132
St. Teresa of Avila Catholic Elementary School	Lighting Upgrades						\$1,737	\$1,772
St. Teresa of Avila Catholic Elementary School	Water Conservation						\$798	\$814
St. Teresa of Avila Catholic Elementary School	Turndown Electric Heaters				\$3,124	\$3,186	\$3,250	\$3,315
St. Teresa of Avila Catholic Elementary School	Install Ceiling Fans in Gym					\$103	\$105	\$107
St. Thomas the Apostle Catholic Elementary School	Lighting Upgrades						\$17,602	\$17,954
St. Thomas the Apostle Catholic Elementary School	Water Conservation						\$5,258	\$5,363
St. Thomas the Apostle Catholic Elementary School	Heat Pump Variable Flow							\$9,321
St. Vincent de Paul Catholic								

Thomas J. Mahony Building	Lighting Upgrades						
Thomas J. Mahony Building	Water Conservation					\$1,093	\$1,137
Total Savings		\$0	\$6,918	\$35,022	\$193,759	\$336,165	\$422,900

Blessed Sacrament Catholic Elementary School	Install Lighting Occupancy Sensors							
Blessed Sacrament Catholic Elementary School	Replace Weather Striping				\$401	\$0	\$0	\$0
Blessed Sacrament Catholic Elementary School	Install Demand Control Ventilation					\$2,487	\$0	\$0
Blessed Sacrament Catholic Elementary School	Lighting Retrofit					\$20,850	\$0	\$0
Blessed Sacrament Catholic Elementary School	Replace Existing Exhaust Fans				\$45,401	\$0	\$0	\$0
Blessed Sacrament Catholic Elementary School	Replace Windows							
Blessed Sacrament Catholic Elementary School	Replace In-Ceiling Radiant Heating with Perimeter Radiators							\$85,163
Blessed Sacrament Catholic Elementary School	Project, Construction Management and Commissioning							
Blessed Teresa of Calcutta	Water Conservation							\$12,509
Blessed Teresa of Calcutta	Install Demand Control Ventilation						\$5,868	\$0
Canadian Martyrs Catholic Elementary School	Install Lighting Occupancy Sensors					\$12,392	\$0	\$0
Canadian Martyrs Catholic Elementary School	Replace Weather Striping					\$330	\$0	\$0
Canadian Martyrs Catholic Elementary School	Lighting Retrofit				\$14,956	\$0	\$0	\$0
Canadian Martyrs Catholic Elementary School	Install Low Flow Water Fixtures							
Canadian Martyrs Catholic Elementary School	Install Demand Control Ventilation							
Canadian Martyrs Catholic Elementary School	Project, Construction Management and Commissioning							
Cardinal Newman Catholic Secondary School	Lighting Upgrades							
Cardinal Newman Catholic Secondary School	Chilled Water Variable Flow						\$36,753	\$0

Cardinal Newman Catholic Secondary School	Water Conservation				\$43,805	\$0	\$0	\$0
Cardinal Newman Catholic Secondary School	Demand Control Ventilation in Gym				\$17,605	\$0	\$0	\$0
Cardinal Newman Catholic Secondary School	High Efficiency Motors							
Cathedral Catholic Secondary School	Lighting Upgrades					\$309,633	\$0	\$0
Cathedral Catholic Secondary School	Demand Control Ventilation in Gym					\$12,575	\$0	\$0
Cathedral Catholic Secondary School	Water Source Heat Pumps Variable Flow							\$41,280
Cathedral Catholic Secondary School	Vending Misers					\$3,018	\$0	\$0
Corpus Christi	Install Occupancy Sensors							\$6,008
Corpus Christi	Re-Cx Exhaust Fans						\$758	\$0
Corpus Christi	Demand Control Ventilation					\$7,462	\$0	\$0
Corpus Christi	Lighting Retrofit							
Corpus Christi	Upgrade Control System							
Corpus Christi	Project, Construction Management and Commissioning							
Father Kryan Kennedy Catholic Education Centre	Replace HVAC Equipment						\$608,474	\$0
Father Kryan Kennedy Catholic Education Centre	Install a BAS							
Guardian Angels Catholic Elementary School	Install Lighting Occupancy Sensors					\$9,388	\$0	\$0
Guardian Angels Catholic Elementary School	Install Demand Control Ventilation						\$16,066	\$0
Guardian Angels Catholic Elementary School	install VFD and Schedule MUA-1						\$22,077	\$0
Guardian Angeels Catholic								

Guardian Angels Catholic Elementary School	Project, Construction Management and Commissioning							
Holy Name of Mary Catholic Elementary School	Water Conservation					\$15,694	\$0	\$0
Nicholas Mancini Centre	Lighting Upgrades						\$90,563	\$0
Nicholas Mancini Centre	Water Conservation						\$5,676	\$0
Our Lady of Lourdes Catholic Elementary School	Lighting Upgrades						\$98,196	\$0
Our Lady of Mount Carmel	Install Occupancy Sensors						\$12,767	\$0
Our Lady of Mount Carmel	Install VFD and schedule HRU-1					\$27,021	\$0	\$0
Our Lady of Mount Carmel	Install Solar Hot Air System						\$449	\$0
Our Lady of Mount Carmel	Install 10kW PV Panels					\$129,192	\$0	\$0
Our Lady of Mount Carmel	Upgrade Control System					\$97,383	\$0	\$0
Our Lady of Mount Carmel	Project, Construction Management and Commissioning							
Our Lady of Peace	Water Conservation							
Our Lady of Peace	Replace RTUs and Electric Heaters					\$107,795	\$0	\$0
Our Lady of Peace	Vending Machine Controls					\$1,509	\$0	\$0
Regina Mundi Catholic Elementary School	Lighting Upgrades							\$58,083
Regina Mundi Catholic Elementary School	Replace Unit Ventilators					\$247,899	\$0	\$0
Regina Mundi Catholic Elementary School	Water Conservation							\$17,209
Regina Mundi Catholic Elementary School	Replace Windows							

Saints Peter and Paul Catholic Elementary School	Install Low Flow Water Fixtures					\$1,058	\$0	\$0
Saints Peter and Paul Catholic Elementary School	Install Lighting Occupancy Sensors					\$7,135	\$0	\$0
Saints Peter and Paul Catholic Elementary School	Install Demand Control Ventilation							\$2,487
Saints Peter and Paul Catholic Elementary School	Lighting Retrofit							
Saints Peter and Paul Catholic Elementary School	Install Ceiling Fans in Gym							\$6,766
Saints Peter and Paul Catholic Elementary School	Project, Construction Management and Commissioning							
St. Ann (Ancaster) Catholic Elementary School	Replace Windows						\$7,243	\$0
St. Ann (Ancaster) Catholic Elementary School	Upgrade Control System						\$53,654	\$0
St. Ann (Ancaster) Catholic Elementary School	Demand Control Ventilation in Gym					\$75,452	\$0	\$0
St. Ann (Ancaster) Catholic Elementary School	Install Unit Ventilators in Classrooms					\$83,835	\$0	\$0
St. Augustine Catholic Elementary School	Lighting Upgrades					\$68,771	\$0	\$0
St. Augustine Catholic Elementary School	Water Conservation					\$20,338	\$0	\$0
St. Bernadette Catholic Elementary School	Lighting Upgrades						\$75,530	\$0
St. Bernadette Catholic Elementary School	Water Conservation					\$18,002	\$0	\$0
St. Brigid Catholic Elementary School	Lighting Retrofit			\$18,049	\$0	\$0	\$0	\$0
St. Brigid Catholic Elementary School	Replace Weather Striping				\$216	\$0	\$0	\$0
St. Brigid Catholic Elementary School	Install Low Flow Water Fixtures					\$10,411	\$0	\$0
St. Brigid Catholic Elementary School	Replace Two Broken Exhaust Fans				\$2,349	\$0	\$0	\$0
St. Briedid Catholic								

St. Brigid Catholic Elementary School	Replace Windows			\$124,879	\$0	\$0	\$0	\$0
St. Brigid Catholic Elementary School	Install Ceiling Fans in Gym							
St. Brigid Catholic Elementary School	Project, Construction Management and Commissioning							
St. Charles Mountain	Install Low Flow Water Fixtures					\$1,269		\$0
St. Charles Mountain	Replace Weather Stripping				\$429	\$0		\$0
St. Charles Mountain	Install Lighting Occupancy Sensors				\$19,902	\$0		\$0
St. Charles Mountain	Install Demand Control Ventilation				\$7,462	\$0		\$0
St. Charles Mountain	Control Exhaust Fans			\$281	\$0	\$0		\$0
St. Charles Mountain	Lighting Retrofit							\$46,189
St. Charles Mountain	Replace Windows							
St. Charles Mountain	Project, Construction Management and Commissioning							
St. Clare of Assisi Catholic Elementary School	Water Conservation			\$10,396	\$0	\$0		\$0
St. Daniel Catholic Elementary School	Lighting Upgrades					\$38,572		\$0
St. Daniel Catholic Elementary School	Water Conservation				\$20,986	\$0		\$0
St. David Catholic Elementary School	Install Occupancy Sensors				\$15,959	\$0		\$0
St. David Catholic Elementary School	Install Polarizing Air Filters							
St. David Catholic Elementary School	Schedule DHW Recirc Pump			\$830	\$0	\$0		\$0
St. David Catholic Elementary School	Replace Weather Stripping			\$330	\$0	\$0		\$0

St. David Catholic Elementary School	Project, Construction Management and Commissioning							
St. Eugene Catholic Elementary School	Replace Weather Striping					\$188	\$0	\$0
St. Eugene Catholic Elementary School	Install Low Flow Water Fixtures					\$1,904	\$0	\$0
St. Eugene Catholic Elementary School	Install Occupancy Sensors							\$18,775
St. Eugene Catholic Elementary School	Lighting Retrofit							\$20,636
St. Eugene Catholic Elementary School	Install Ceiling Fans in Gym							
St. Eugene Catholic Elementary School	Upgrade Control System							
St. Eugene Catholic Elementary School	Project, Construction Management and Commissioning							
St. Francis Xavier Catholic Elementary School	Lighting Upgrades							\$94,865
St. Francis Xavier Catholic Elementary School	Water Conservation					\$16,634	\$0	\$0
St. Francis Xavier Catholic Elementary School	Replace Electric Heaters and Gym Unit Heaters					\$491,038	\$0	\$0
St. Francis Xavier Catholic Elementary School	Replace Weather Striping					\$5,344	\$0	\$0
St. James the Apostle Catholic Elementary School	Replace Weather stripping and Windows					\$75,301	\$0	\$0
St. James the Apostle Catholic Elementary School	Water Conservation						\$18,915	\$0
St. James the Apostle Catholic Elementary School	Replace HVAC Equipment					\$340,370	\$0	\$0
St. James the Apostle Catholic Elementary School	Install Ceiling Fans in Gym					\$8,601	\$0	\$0
St. Jean de Brebeuf Catholic Secondary School	Replace Weather Striping					\$517	\$0	\$0
St. Jean de Brébeuf Catholic Secondary School	Install Vending Machine Timers					\$1,484	\$0	\$0

St. Jean de Brébeuf Catholic Secondary School	Lighting Retrofit								\$121,701
St. Jean de Brébeuf Catholic Secondary School	Recommission and Control Exhaust Fans					\$23,803	\$0	\$0	\$0
St. Jean de Brébeuf Catholic Secondary School	Replace Doors		\$42,349	\$0	\$0	\$0	\$0	\$0	\$0
St. Jean de Brébeuf Catholic Secondary School	Replace Windows								\$935,706
St. Jean de Brébeuf Catholic Secondary School	Project, Construction Management and Commissioning								
St. Joachim Catholic Elementary School	Water Conservation			\$14,059	\$0	\$0	\$0	\$0	\$0
St. Joachim Catholic Elementary School	Replace Industrial Arts Unit Ventilator			\$17,605	\$0	\$0	\$0	\$0	\$0
St. John the Baptist Catholic Elementary School	Install Lighting Occupancy Sensors				\$8,637	\$0	\$0	\$0	\$0
St. John the Baptist Catholic Elementary School	Lighting Retrofit			\$22,921	\$0	\$0	\$0	\$0	\$0
St. John the Baptist Catholic Elementary School	Replace Weather Striping				\$188	\$0	\$0	\$0	\$0
St. John the Baptist Catholic Elementary School	Install Low Flow Water Fixtures			\$11,152	\$0	\$0	\$0	\$0	\$0
St. John the Baptist Catholic Elementary School	Replace Windows				\$23,079	\$0	\$0	\$0	\$0
St. John the Baptist Catholic Elementary School	Install Heat Pump DHW Heater			\$5,234	\$0	\$0	\$0	\$0	\$0
St. John the Baptist Catholic Elementary School	Project, Construction Management and Commissioning								
St. Joseph Catholic Elementary School	Lighting Upgrades								
St. Margaret Mary Catholic Elementary School	Install Vending Machine Timer			\$297	\$0	\$0	\$0	\$0	\$0
St. Margaret Mary Catholic Elementary School	Insulate DHW Pipe			\$71	\$0	\$0	\$0	\$0	\$0
St. Margaret Mary Catholic Elementary School	Insulate HHW Pipe			\$943	\$0	\$0	\$0	\$0	\$0

St. Margaret Mary Catholic Elementary School	Install Lighting Occupancy Sensors					\$8,637	\$0	\$0
St. Margaret Mary Catholic Elementary School	Lighting Retrofit					\$16,657	\$0	\$0
St. Margaret Mary Catholic Elementary School	Install High Efficiency DHW Heater						\$19,335	\$0
St. Margaret Mary Catholic Elementary School	Convert to 208V/3 Phase							
St. Margaret Mary Catholic Elementary School	Replace Unit Ventilators						\$166,845	\$0
St. Margaret Mary Catholic Elementary School	Install Ceiling Fans in Gym				\$3,908	\$0	\$0	\$0
St. Margaret Mary Catholic Elementary School	Replace Interior Air Handling Unit				\$19,215	\$0	\$0	\$0
St. Margaret Mary Catholic Elementary School	Install Low Flow Water Fixtures					\$63,693	\$0	\$0
St. Margaret Mary Catholic Elementary School	Project, Construction Management and Commissioning							
St. Marguerite d'Youville Catholic Elementary School	Install Lighting Occupancy Sensors					\$5,633	\$0	\$0
St. Marguerite d'Youville Catholic Elementary School	Day Lighting with Photo Sensors					\$488	\$0	\$0
St. Marguerite d'Youville Catholic Elementary School	Install Demand Control Ventilation						\$56,720	\$0
St. Marguerite d'Youville Catholic Elementary School	Replace Water Source Heat Pumps						\$160,886	\$0
St. Marguerite d'Youville Catholic Elementary School	Project, Construction Management and Commissioning							
St. Martin of Tours Catholic Elementary School	Lighting Upgrades					\$55,231	\$0	\$0
St. Martin of Tours Catholic Elementary School	Water Conservation						\$12,370	\$0
St. Martin of Tours Catholic Elementary School	Install Ceiling Fans in Gym					\$8,601	\$0	\$0
St. Mary Catholic Secondary School	Heat Pump Variable Flow					\$39,101	\$0	\$0

St. Michael Catholic Elementary School	Lighting Upgrades							\$101,812
St. Michael Catholic Elementary School	Unit Ventilators Upgrades						\$145,819	\$0
St. Patrick Catholic Elementary School	Verify Demand Control Ventilation is Operational					\$2,037	\$0	\$0
St. Patrick Catholic Elementary School	Install Lighting Occupancy Sensors					\$6,947	\$0	\$0
St. Patrick Catholic Elementary School	Lighting Retrofit							\$10,018
St. Patrick Catholic Elementary School	Install Ceiling Fans in Gym						\$4,861	\$0
St. Patrick Catholic Elementary School	Project, Construction Management and Commissioning							
St. Paul Catholic Elementary School	Lighting Upgrades							\$53,232
St. Paul Catholic Elementary School	Water Conservation						\$19,838	\$0
St. Paul Catholic Elementary School	Install Ceiling Fans in Gym					\$7,495	\$0	\$0
St. Teresa of Avila Catholic Elementary School	Lighting Upgrades						\$34,765	\$0
St. Teresa of Avila Catholic Elementary School	Water Conservation						\$8,957	\$0
St. Teresa of Avila Catholic Elementary School	Turndown Electric Heaters				\$1,744	\$0	\$0	\$0
St. Teresa of Avila Catholic Elementary School	Install Ceiling Fans in Gym					\$7,887	\$0	\$0
St. Thomas the Apostle Catholic Elementary School	Lighting Upgrades						\$349,268	\$0
St. Thomas the Apostle Catholic Elementary School	Water Conservation						\$85,651	\$0
St. Thomas the Apostle Catholic Elementary School	Heat Pump Variable Flow							\$37,927
St. Vincent de Paul Catholic Elementary School	Water Conservation					\$21,778	\$0	\$0

Thomas J. Mahony Building	Water Conservation								
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Total Cost (Investment)	\$0	\$341,860	\$204,264	\$2,717,265	\$2,331,393	\$1,670,366
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