Five Year Conservation and Demand Management Plan

September 1, 2013 – August 31, 2018

KENORA CATHOLIC DISTRICT SCHOOL BOARD

Prepared June 2014

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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 Kenora Catholic District School Board (KCDSB) energy Conservation and Demand Management Plan is to develop a framework for Kenora 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, for both corporate and community based assets. This included the development of a GHG emissions inventory, benchmarking the Kenora Catholic District School Board's existing energy intensity performance relative to other schools; identifying potential energy efficiency projects, and, establishing a GHG emissions reduction target.

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 Kenora District Catholic 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 KCDSB 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 the experiences with energy conservation can be used as a springboard to further the KCDSB'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 the School Board's 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. KCDSB 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 KCDSB's CDM Plan and will help KCDSB to meet all of its mandatory reporting requirements.

Key Factors and Constraints

It is important to both KCDSB'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 to 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, KCDSB has addressed Energy Conservation and Demand Management on a project-by -project basis through the activities of the Operational Services 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 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 an integral components of the business reporting systems.

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 2014, KCDSB 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 KCDSB in aligning the CDM Plan with the School Board's Business Plan.

Historical Energy Reduction Projects Summary		
Year	**Facility**	**Action Taken**
2011 2012	St. Thomas Aquinas HS	Lighting Upgrade T12 to T8
2012 2013	St. John School	Lighting Upgrade T12 to T8

4 CURRENT STATE OF CORPORATE ENERGY

Energy Data Management

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

Energy Supply Management

KCDSB has currently adopted a strategy of procuring its electricity from two sources. The School Board has chosen to contract its natural gas through Union Gas Ltd. This strategy is reviewed annually during the Budgeting process.

Energy Supply		
Location	**Electricity**	**Natural Gas**
Catholic Education Centre	City of Kenora	Union Gas Ltd.
École Ste. Marguerite Bourgeoys	City of Kenora	Union Gas Ltd.
Pope John Paul II School	City of Kenora	Union Gas Ltd.
St. John School	Hydro One Networks Inc.	N/A
St. Louis School	City of Kenora	N/A
St. Thomas Aquinas High School	Hydro One Networks Inc.	Union Gas Ltd.

Energy Use in Facilities

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

KCDSB has pursued many measures to improve the energy efficiency of the School Board's equipment and the pursuit of solar thermal and solar photovoltaic applications at KCDSB facilities. As the understanding of corporate energy consumption improves, KCDSB Staff will be equipped with the knowledge necessary to make informed decisions. This improved understanding will also reveal how simple actions like commissioning and maintenance procedures can improve existing equipment efficiencies.

Organizational Integration

Day to day management of energy has been primarily the responsibility of the KCDSB Facility Managers. 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 KCDSB's energy management practices. This was completed by speaking to KCDSB Staff and reviewing relevant School Board material. Upon completion of this review, VIP determined that KCDSB had provided Staff Members with a mandate to pursue proper energy management, and through KCDSB Staff ingenuity, KCDSB was able to direct resources to energy management. However, VIP also noted that if the KCDSB is to achieve the Ministry's mandate, it will require the development of this CDM Plan that will address KCDSB'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, KCDSB is currently in a declining, or static, enrollment situation. It is anticipated that the enrollment will stabilize in the next few years and be relatively constant for a period of time. As KCDSB stabilizes its student capacity, so will the School Board's environmental, societal and fiscal energy concerns. KCDSB recognizes that proper energy management must be pursued if these concerns are to be addressed.

Kenora Catholic District School Board – Enrollment Projections					
Elementary	**2013-14**	**2014-15**	**2015-16**	**20165-17**	**2017-18**
JK	112	82	85	88	94
SK	123	110	82	85	88
Gr 1	125	112	110	82	85
Gr 2	126	122	112	110	82
Gr 3	116	121	122	112	110
Gr 4	122	111	121	122	112
Gr 5	95	124	111	121	122
Gr 6	100	84	124	111	121
Gr 7	145	100	84	124	111
Gr 8	101	140	100	84	124
Sub-Total	1165	1106	1051	1039	1049
Secondary	**2013-14**	**2014-15**	**2015-16**	**20165-17**	**2017-18**
Gr 9-12	404	384	396	398	395
Total	**1569**	**1490**	**1447**	**1437**	**1444**

6 SCOPE OF THE CDM PLAN

Ste. Marguerite Bourgeoys

École Ste. Marguerite Bourgeoys, located at 20 Gunne Crescent, Kenora, Ontario is a 2,911 m^2 (31,334 ft^2) single storey elementary school with a second storey mechanical mezzanine above the gym change rooms.

St. Louis

St. Louis School, located at 420 8th Street, Keewatin, is a 1,324 m^2 (14,251 ft^2) split double storey elementary school with a mechanical mezzanine above the gym change rooms.

St. John

St. John School, located at 54 Discovery Road, Red Lake, is a 2,779 m^2 (29,908 ft^2) single storey elementary school with a second storey mechanical mezzanine near the gym.

Pope John Paul II

Pope John Paul II School, located at 1290 Heenan Place, Kenora, is a 4,209 m^2 (45,305 ft^2) partial two storey elementary school.

Catholic Education Centre

The Kenora Catholic Education Centre, located at 1292 Heenan Place, Kenora, is an 844 m^2 (9.084 ft^2) single storey office building and daycare.

Kenora Catholic District School Board Facilities - General Information					
Building Name	Operation Type	Address	City	Postal Code	Total Floor Area (m^2)
Catholic Education Centre	Administrative Offices and related Facilities	1292 Heenan Place	Kenora	P9N2Y8	985.33
École Ste. Marguerite Bourgeoys	School	20 Gunne Crescent	Kenora	P9N 3N5	3,053.70
Pope John Paul II School	School	1290 Heenan Place	Kenora	P9N2Y8	4,209.16
St. John School	School	54 Discovery Road	Red Lake	P0V2M0	1,858.06
St. Louis School	School	Eighth St.	Keewatin	P0X 1C0	1,395.35
St. Thomas Aquinas High School	School	1 Poirier Dr	Kenora	P9N 4G8	7,192.55
					18,694.15

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

Audits Performed in 2013 by VIP Energy Services, Inc.:

- École Ste. Marguerite Bourgeoys
- Pope John Paul II School
- Catholic Education Centre
- St. Louis School
- St. John School

Audits Performed in 2014 by LBE Group Inc.:

- St. Thomas Aquinas High School

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

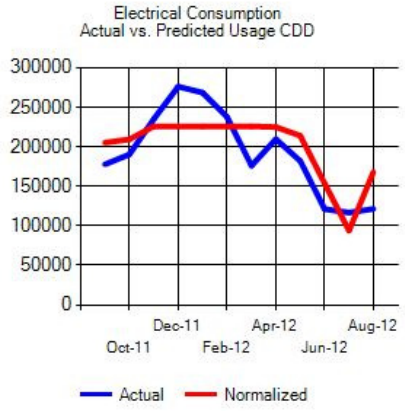
KCDSB BASELINE PERFORMANCE (2011)

KCDSB has elected to utilize the consumption data from 2011 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.

Kenora Catholic District School Board Facilities -2011/2012 Energy					
Building Name	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m^3)	GHG Emissions (kg CO_2e)	Energy Intensity ($ekWh/ft^2$)	Energy Intensity (GJ/m^2)
Catholic Education Centre	141,290	10,309	30,794	24	0.92
École Ste. Marguerite Bourgeoys	240,517	35,128	85,655	19	0.72
Pope John Paul II School	312,649	11,547	46,843	10	0.37
St. John School	384,266	-	30,741	19	0.74
St. Louis School	244,102	-	19,528	16	0.63
St. Thomas Aquinas High School	990,450	52,731	178,931	20	0.78
	2,313,274	109,715	392,492	17	0.67

Normalization Analysis for All Accounts

Kenora Catholic District School Board, The



Electrial Account [621269-605236] at Catholic Education Centre = Predicted Consumption y = 4.68*kWh/CDD + 11647.49 [R^2=5.0 %]
Electrial Account [607229-607816] at St. Louis School = Predicted Consumption y = -0.11*kWh/CDD + 8.59 [R^2=10.9 %]
Electrial Account [607309-607872] at St. Louis School = Predicted Consumption y = -157.42*kWh/CDD + 24826.02 [R^2=39.6 %]
Electrial Account [631783-613730] at St. Louis School = Predicted Consumption y = -4.18*kWh/CDD + 877.70 [R^2=8.8 %]
Electrial Account [79820-36034] at St. Thomas Aquinas High School = Predicted Consumption y = -323.17*kWh/CDD + 91159.87 [R^2=65.2 %]
Electrial Account [08247-31017] at St. John School = [R^2=0.0 %]
Electrial Account [73420-34894] at St. John School = Predicted Consumption y = -361.29*kWh/CDD + 45124.70 [R^2=58.1 %]
Electrial Account [628889-613530] at École Ste. Marguerite Bourgeoys = Predicted Consumption y = -10.48*kWh/CDD + 1123.58 [R^2=41.5 %]
Electrial Account [628735-613404] at École Ste. Marguerite Bourgeoys = Predicted Consumption y = -9.32*kWh/CDD + 1096.04 [R^2=38.9 %]
Electrial Account [613533-605186] at École Ste. Marguerite Bourgeoys = Predicted Consumption y = -64.35*kWh/CDD + 20073.41 [R^2=45.0 %]
Electrial Account [54820-34921] at Red Lake Area = Predicted Consumption y = -0.97*kWh/CDD + 414.94 [R^2=1.6 %]
Electrial Account [626777-613460] at Pope John Paul II School = Predicted Consumption y = -51.73*kWh/CDD + 29576.10 [R^2=30.5 %]

CURRENT PERFORMANCE (2012)

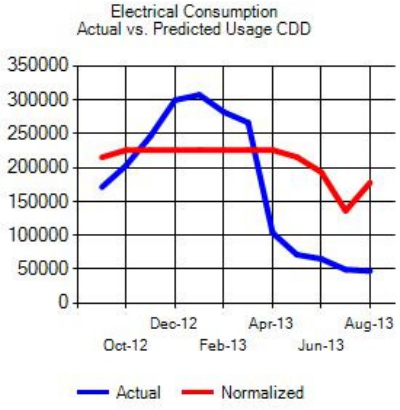
It is imperative to understand the energy characteristics of each facility. By understanding these values, baselines can be established and future retrofits and improvements to the buildings can be monitored and tracked to ensure that the intended benefits are fully realized. KCDSB's most recent energy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

natural gas, was 3,818,359 equivalent kilowatt hours (ekWh). This total consisted of 1,565,090 kWh of electricity and 212,017 m^3 of natural gas, which is equivalent to 2,253,269 ekWh. The 2012 combined total cost of electricity and natural gas, was $428,807.

Kenora 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)
Catholic Education Centre	142,265	21,592	52,204	35	1.36
École Ste. Marguerite Bourgeoys	244,175	59,286	131,622	27	1.03
Pope John Paul II School	314,422	28,285	78,630	14	0.53
St. John School	571,279	-	45,702	29	1.11
St. Louis School	292,856	-	23,428	19	0.76
St. Thomas Aquinas High School	1,012,444	102,854	275,454	27	1.05
	2,577,441	212,017	607,040	24	0.93

Normalization Analysis for All Accounts

Kenora Catholic District School Board, The



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In all, KCDSB has increased its energy intensity from 2011 to 2012 indicating a degradation in energy utilization from 0.67 GJ/m^2 to 0.93 GJ/m^2. Current consumption patterns are not tracking well with the baseline performance.

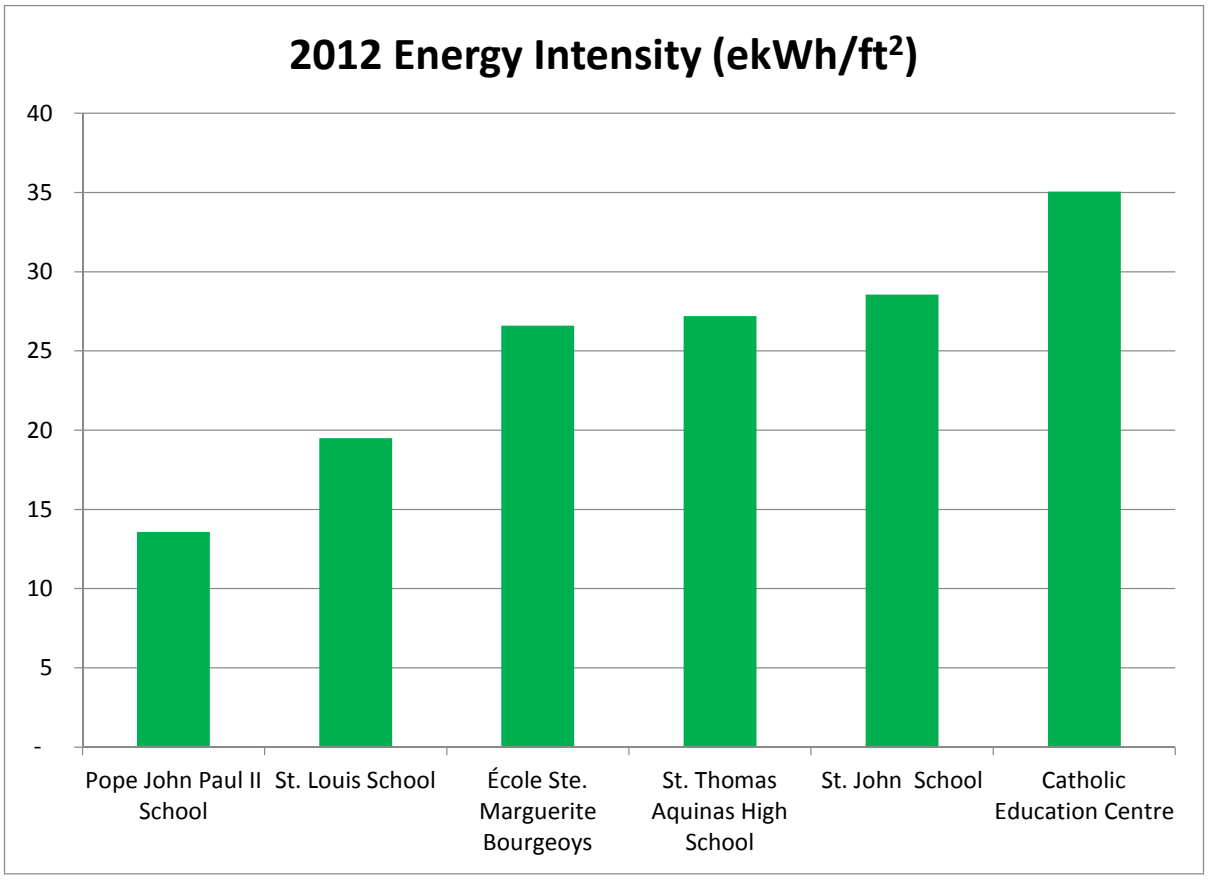
BENCHMARKING

Market Sector

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

KCDSB's facilities have an average 19 ekWh/ft^2 energy intensity, equal to the industry average based on the Ministry of Energy's 2011 Public Sector Energy Consumption Data. KCDSB ranks 30th amongst all School Boards in Ontario for energy intensity.

KCDSB Facilities



8 MISSION AND VISION

Mission Statement:

> ***The Kenora Catholic District School Board is a Roman Catholic School System dedicated to excellence in education, the Christian formation of youth, and meaningful partnerships with family, community and the Church.***

Vision Statement:

> ***The Kenora Catholic District School Board is a Catholic School system that is faith driven and Christ centered. We celebrate the Spirit within each of us through prayer, reflection, and our daily living. We share the gifts that each of us has been given. We support and uphold Catholic Christian values for each person in our community. We share the joy that is found in learning together through academics, the arts and athletics. We applaud effort and ability and encourage innovative thinking. We invite all to share in our mission. We are called to deliver our programs in light of the message of the Gospel.***

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

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

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

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

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

- Increasing Student Achievement;
- Fostering Our Catholic Environment of Respect, Acceptance and Responsibility; and,
- Using Our Resources Wisely.

The primary objective of this Plan is to improve the management of KCDSB's energy consumption. Part of this objective is setting a conservation target that will see KCDSB reduce its 2011 energy consumption by 3% by the end of the 2018/2019 school year. Recognizing that KCDSB is experiencing a static student enrollment, KCDSB's energy conservation target will be intensity based. It is also the objective of this Plan to improve KCDSB's understanding of energy consumption which is essential for KCDSB 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 KCDSB's capital and operations decision making process.

Reporting Standards

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

10 ENERGY MANAGEMENT TEAM

Historically, KCDSB addressed Energy Conservation and Demand Management on a project-by-project basis through the activities of the Operational Services Department. Strategic directives have been provided by the School Board's Executive Council. Currently, the Manager of Operational Services is leading the effort for energy conservation.

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:

Catholic Education Centre			
Opportunity	**Total Annual Savings ($)**	**Estimated Installation Cost ($)**	**Payback Period (years)**
T8 / CFL / Incandescent - Lamp Replacement	$462	$10	0.0
MH 250W Fixture Replacement with LED	$514	$4,000	7.8
Water Cooler - Energy Star Replacement	$1,169	$600	0.5
Variable Frequency Drives for the RTUs	$13,533	$29,000	2.1
PC - Desktop, replace with Laptops	$212	$2,000	9.4
Replace NON-Energy Star Appliances	$62	$1,500	24.2
Replace Electric with Gas Domestic Water Heater	$571	$10,000	17.5
Add Aerators to Taps	$37	$50	1.4
Energy and Resource Awareness	$747	$3,413	4.6
GRAND TOTAL	**$17,307**	**$57,586**	**3.3**

Pope John Paul II

Opportunity	Total Annual Savings ($)	Estimated Installation Cost ($)	Payback Period (years)
T8 / CFL - Lamp Replacement	$2,971	$0	0.0
MH 400W Fixture Replacement with LED	$839	$6,500	7.7
Water Cooler - Energy Star Replacement	$1,163	$600	0.5
VFD for the Heating System Supply Pumps	$199	$4,500	22.6
Re-Balance Air System	$20,251	$45,250	2.2
Replace NON-Energy Star Appliances	$700	$8,200	11.7
Energy and Resource Awareness	$1,457	$7,180	4.9
GRAND TOTAL	**$27,580**	**$41,643**	**1.5**

St. John

Opportunity	Total Annual Savings ($)	Estimated Installation Cost ($)	Payback Period (years)
T8 / CFL / Incandescent - Lamp Replacement	$1,680	$0	0.0
MH 250W Fixture Replacement with LED	$463	$4,000	8.6
Install Motion Sensors	$935	$15,000	16.0
Water Cooler - Energy Star Replacement	$669	$400	0.6
PC - Desktops, Replace with Laptops	$487	$700	1.4
Replace NON-Energy Star Appliances	$225	$3,450	15.3
Replace Electric with Gas Domestic Water Heater	$365	$5,000	13.7
Duct Insulation in Crawl Spaces	$1,015	$10,000	9.9
Re-Balance Air System	$2,678	$30,000	11.2
Replace Multi Hand Washing Stations	$177	$1,000	5.6
Energy and Resource Awareness	$1,490	$9,018	6.1
GRAND TOTAL	**$10,184**	**$72,904**	**7.2**

St. Louis

Opportunity	Total Annual Savings ($)	Estimated Installation Cost ($)	Payback Period (years)
T8 / CFL / Incandescent - Lamp Replacement	$1,775	$0	0.0
MH 250W Fixture Replacement with LED	$386	$2,500	6.5
Install Motion Sensors	$1,059	$10,000	9.4
Direct Digital Control BAS System	$3,685	$100,000	27.1
Re-Balance Air System	$5,261	$30,000	5.7
PC - Desktops, Replace with Laptops	$263	$700	2.7
Replace NON-Energy Star Appliances	$219	$4,500	20.5
Replace Electric with Gas Domestic Water Heater	$702	$8,000	11.4
Run around Loop Maintenance	$136	$1,500	11.0
Window Replacement	$935	$11,700	12.5
Replace High Flow W/C with Dual Flush W/C	$1,615	$6,000	3.7
Energy and Resource Awareness	$1,385	$5,871	4.2
GRAND TOTAL	**$16.036**	**$137,540**	**8.6**

École Ste. Marguerite Bourgeoys

Opportunity	Total Annual Savings ($)	Estimated Installation Cost ($)	Payback Period (years)
T8 / CFL / Incandescent - Lamp Replacement	$1,717	$70	0.0
MH 250W Fixture Replacement with LED	$528	$3,500	6.6
Water Cooler - Energy Star Replacement	$909	$400	0.4
Re-Balance Air System	$6,772	$12,250	1.8
Replace NON-Energy Star Appliances	$75	$1,000	13.3
Replace Electric with Gas Domestic Water Heater	$573	$10,000	17.5
Energy and Resource Awareness	$1,499	$6,148	4.1
Updated As-Built Drawings	$500	$9,500	19.0
GRAND TOTAL	**$12,573**	**$39,131**	**3.1**

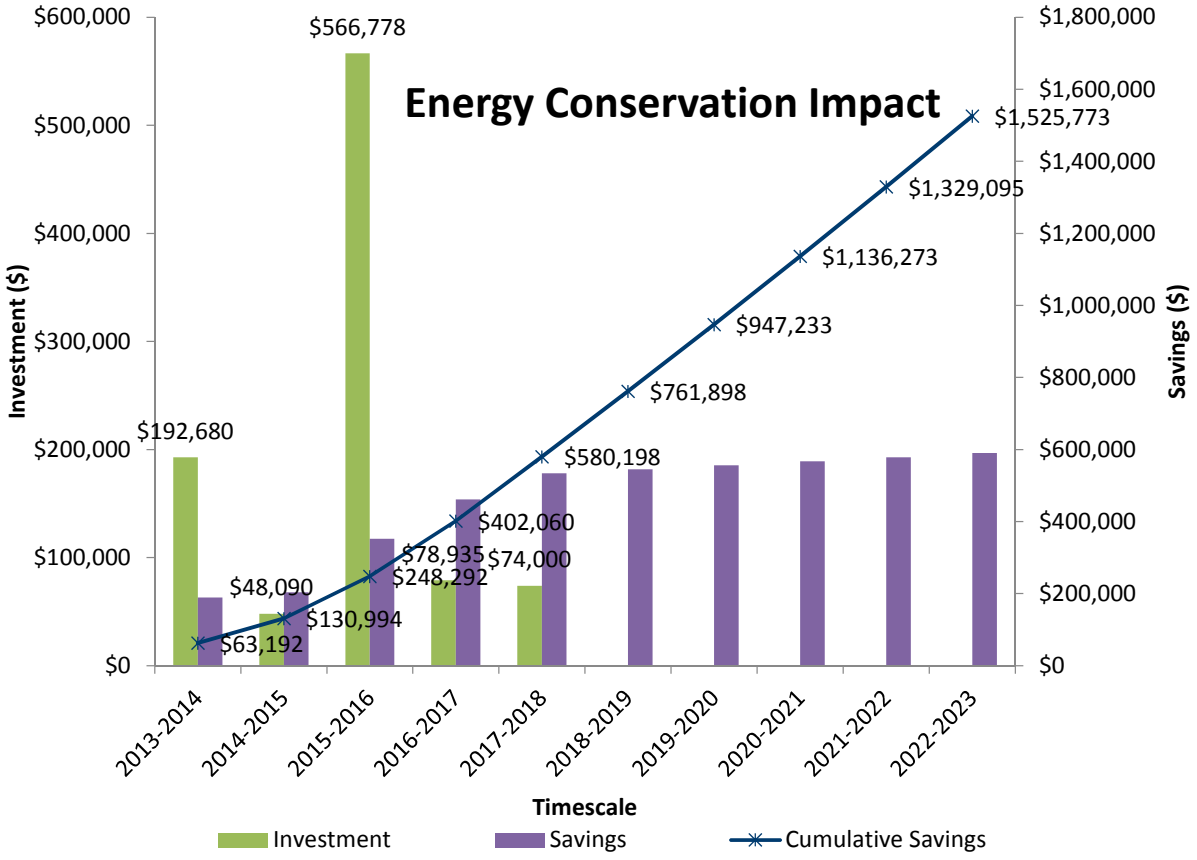
St. Thomas Aquinas High School			
Opportunity	**Total Annual Savings ($)**	**Estimated Installation Cost ($)**	**Payback Period (years)**
Lighting Upgrades	$19,310	$92,820	4.8
Makeup Air Heater	$7,500	$100,000	13.3
Makeup Air VFD	$12,000	$20,000	1.7
Makeup Air CO_2 Controls	$4,000	$20,000	5.0
Eliminate Heat Pumps	$26,391	$425,000	16.1
Circulating Pumps VFD	$11,000	$15,000	1.4
Replace Duct Heaters with Hydronic Coil	$7,700	$25,000	3.2
GRAND TOTAL	**$87,901**	**$697,820**	**7.9**

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, KCDSB will consult with utility representatives and/or energy consultants, allowing KCDSB 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, KCDSB will not make significant alterations to the Plan in a quest for incentive funding. This is not a prudent approach to planning. Actions will be pursued only when they coincide with the KCDSB's objectives and are appropriate to be pursued at that time.

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

Future Energy Reduction Projects Summary		
Year	**Facility**	**Planned Activity**
2013 2014	Kenora Catholic Education Centre	Add Aerators to Taps Energy and Resource Awareness MH 250W Fixture Replacement with LED
	Pope John Paul II	Energy and Resource Awareness MH 400W Fixture Replacement with LED
	St. John	Energy and Resource Awareness MH 250W Fixture Replacement with LED T8 / CFL / Incandescent - Lamp Replacement
	St. Louis	Energy and Resource Awareness
	St. Thomas Aquinas	Circulating Pumps VFD Lighting Upgrades Makeup Air CO2 Controls Makeup Air VFD Replace Duct Heaters with Hydronic Coil Energy and Resource Awareness MH 250W Fixture Replacement with LED
2014 2015	Kenora Catholic Education Centre	T8 / CFL / Incandescent - Lamp Replacement
	St. John	Duct Insulation in Crawl Spaces Install Motion Sensors Replace Electric with Gas Domestic Water Heater
	École Ste. Marguerite Bourgeoys	Replace Electric with Gas Domestic Water Heater Updated As-Built Drawings Water Cooler - Energy Star Replacement
2015 2016	Kenora Catholic Education Centre	Water Cooler - Energy Star Replacement
	Pope John Paul II	T8 / CFL - Lamp Replacement
	St. John	Replace Multi Hand Washing Stations Replace NON-Energy Star Appliances Water Cooler - Energy Star Replacement
	St. Louis	Direct Digital Control BAS System Install Motion Sensors MH 250W Fixture Replacement with LED PC - Desktops, Replace with Laptops Re-Balance Air System Replace Electric with Gas Domestic Water Heater Replace High Flow W/C with Dual Flush W/C T8 / CFL / Incandescent - Lamp Replacement
	St. Thomas Aquinas	Eliminate Heat Pumps
	École Ste. Marguerite Bourgeoys	Replace NON-Energy Star Appliances T8 / CFL / Incandescent - Lamp Replacement

Future Energy Reduction Projects Summary		
Year	**Facility**	**Planned Activity**
2016 2017	Kenora Catholic Education Centre	PC - Desktop, replace with Laptops Replace Electric with Gas Domestic Water Heater
	Pope John Paul II	Re-Balance Air System Replace NON-Energy Star Appliances Water Cooler - Energy Star Replacement
	St. John	PC - Desktops, Replace with Laptops Re-Balance Air System
	St. Louis	Replace NON-Energy Star Appliances Run around Loop Maintenance Window Replacement
	École Ste. Marguerite Bourgeoys	Re-Balance Air System
2017 2018	Kenora Catholic Education Centre	Replace NON-Energy Star Appliances Variable Frequency Drives for the RTUs
	Pope John Paul II	VFD for the Heating System Supply Pumps
	St. Thomas Aquinas	Makeup Air Heater

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.

KCDSB currently operates five (5) solar photovoltaic systems connected to the electricity grid. Each system has 40 photovoltaic modules with a rating of 10 kW. Since their installation in 2012, KCDSB's solar voltaic systems have produced 85.9 MW of power.

Purchasing Practices

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

The practice of 'low bidder wins' purchasing limits the Staff when trying to make the right environmental decision. Making a specific amount of money available to include the conservation upgrades allows the

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

Energy Management and Information Systems

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

- Early detection of poor performance,
- Support for optimal decision making,
- Effective performance reporting,
- Auditing of historical performance,
- Identification and justification of energy projects,
- Evidence of implementation success,
- Support for energy budgeting and accounting, and
- Provision of energy data to other systems (such as Building Automation Systems, BAS).

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

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. 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 $4.50/$m^2$. Expected savings from the projects are typically between $1.00 and $4.00/$m^2$, 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) show that initiatives directed at Staff and facility users, in particular ERA Programs, can lead to significant savings on their own. In fact, the OHA 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.

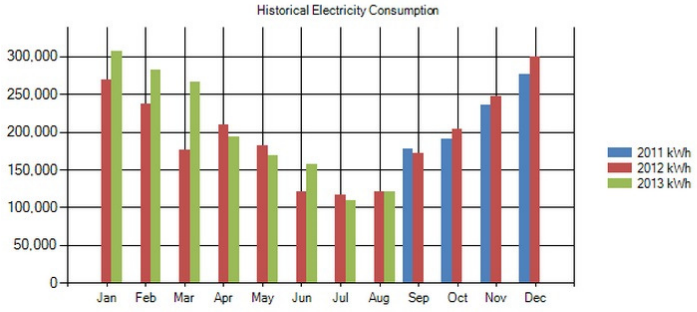
APPENDIX A
Energy Data

ENERGY CONSUMPTION

Kenora Catholic District School Board, The - Summary

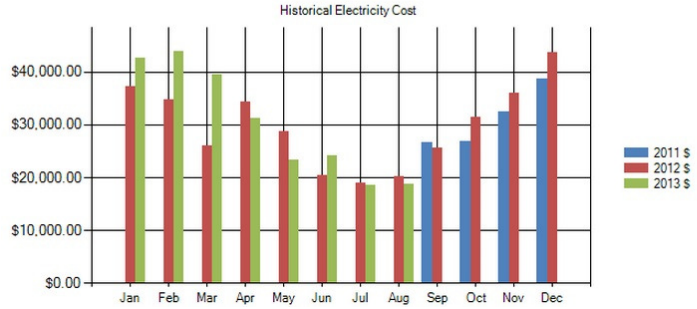
Historical Electricity Consumption Sep 11 - Aug 13

Summary



Historical Electricity Consumption

Month	2011	2012	2013
January	-	268,490	307,469
February	-	237,709	282,113
March	-	176,139	266,504
April	-	209,762	193,149
May	-	182,098	168,966
June	-	121,216	157,369
July	-	116,776	109,558
August	-	121,468	120,340
September	177,827	171,018	-
October	190,368	203,392	-
November	235,215	246,864	-
December	276,212	299,654	-
Total	**879,621**	**2,354,585**	**1,605,469**

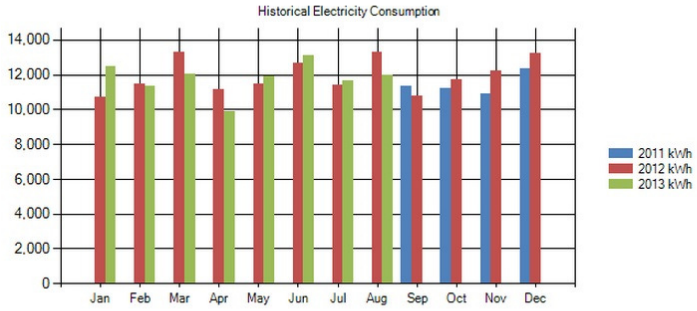


Historical Electricity Cost

Month	2011	2012	2013
January	-	$37,154.24	$42,719.91
February	-	$34,819.61	$43,972.80
March	-	$26,007.99	$39,414.05
April	-	$34,280.35	$31,166.63
May	-	$28,713.01	$23,411.11
June	-	$20,477.84	$24,119.31
July	-	$18,926.69	$18,472.03
August	-	$20,228.30	$18,828.94
September	$26,536.36	$25,574.16	-
October	$26,830.74	$31,484.70	-
November	$32,348.94	$35,994.79	-
December	$38,766.12	$43,604.14	-
Total	**$124,482.16**	**$357,265.82**	**$242,104.78**

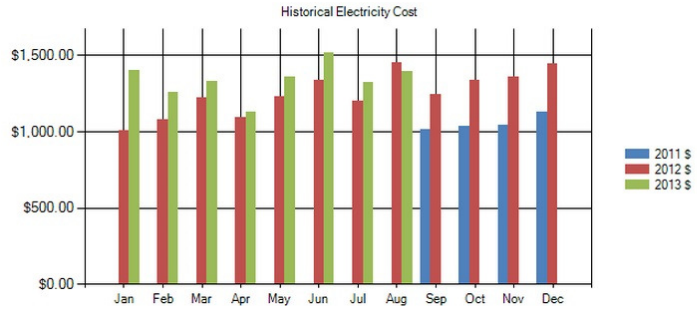
Kenora Catholic District School Board Catholic Education Centre

Historical Electricity Consumption Sep 11 - Aug 13



Historical Electricity Consumption

Month	2011	2012	2013
January	-	10,721	12,472
February	-	11,448	11,340
March	-	13,281	12,060
April	-	11,160	9,870
May	-	11,485	11,880
June	-	12,681	13,110
July	-	11,384	11,640
August	-	13,321	11,940
September	11,358	10,792	-
October	11,214	11,702	-
November	10,893	12,204	-
December	12,344	13,255	-
Total	**45,809**	**143,437**	**94,311**

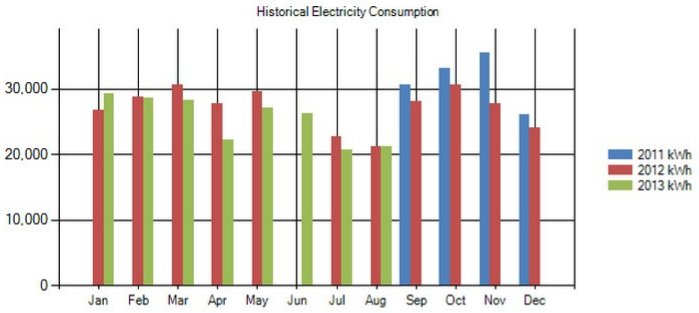


Historical Electricity Cost

Month	2011	2012	2013
January	-	$1,010.62	$1,405.09
February	-	$1,078.45	$1,261.01
March	-	$1,225.11	$1,331.57
April	-	$1,090.53	$1,131.54
May	-	$1,228.20	$1,360.95
June	-	$1,334.46	$1,520.22
July	-	$1,199.17	$1,321.02
August	-	$1,452.21	$1,396.00
September	$1,010.94	$1,240.72	-
October	$1,035.75	$1,339.74	-
November	$1,040.09	$1,358.87	-
December	$1,130.68	$1,443.65	-
Total	**$4,217.46**	**$15,001.73**	**$10,727.40**

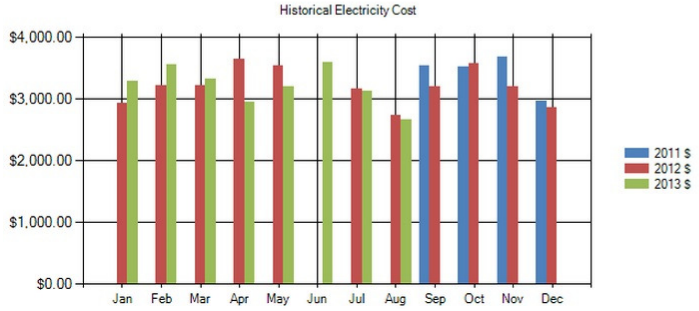
Pope John Paul II School

Historical Electricity Consumption Sep 11 - Aug 13



Historical Electricity Consumption

Month	2011	2012	2013
January	-	26,784	29,287
February	-	28,787	28,536
March	-	30,539	28,286
April	-	27,786	22,278
May	-	29,538	27,035
June	-	-	26,284
July	-	22,779	20,777
August	-	21,277	21,277
September	30,539	28,036	-
October	33,042	30,539	-
November	35,545	27,786	-
December	26,033	24,031	-
Total	**125,160**	**297,881**	**203,760**

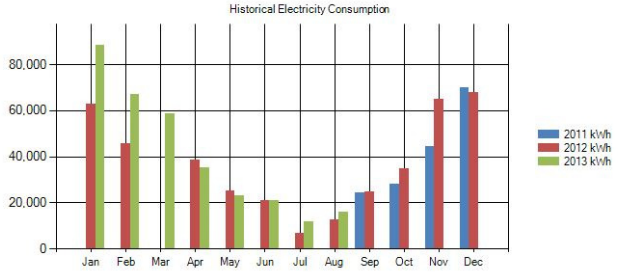


Historical Electricity Cost

Month	2011	2012	2013
January	-	$2,933.22	$3,288.56
February	-	$3,215.26	$3,555.12
March	-	$3,226.44	$3,335.48
April	-	$3,647.36	$2,944.24
May	-	$3,550.06	$3,207.72
June	-	-	$3,593.59
July	-	$3,162.13	$3,125.41
August	-	$2,735.51	$2,660.75
September	$3,549.04	$3,204.59	-
October	$3,525.83	$3,572.15	-
November	$3,689.52	$3,193.73	-
December	$2,972.03	$2,863.90	-
Total	**$13,736.42**	**$35,304.35**	**$25,710.87**

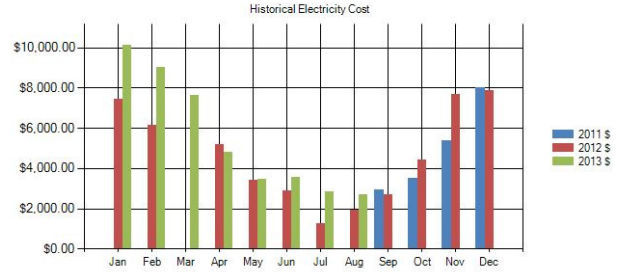
St. John School

Historical Electricity Consumption Sep 11 - Aug 13



Historical Electricity Consumption

Month	2011	2012	2013
January	-	62,896	88,542
February	-	45,581	67,225
March	-	-	58,567
April	-	38,541	35,395
May	-	25,209	22,918
June	-	21,135	21,135
July	-	6,875	11,959
August	-	12,732	16,042
September	24,445	24,700	-
October	28,265	34,886	-
November	44,307	64,933	-
December	70,026	67,843	-
Total	**167,043**	**405,331**	**321,783**

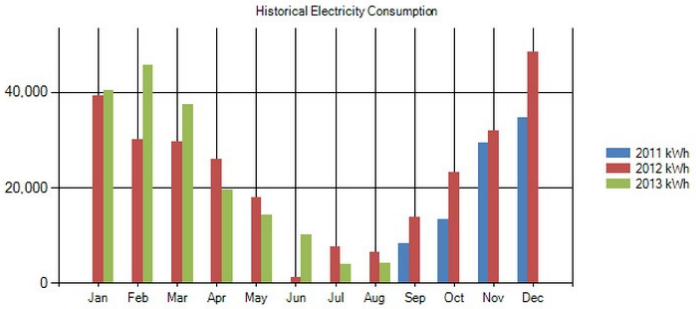


Historical Electricity Cost

Month	2011	2012	2013
January	-	$7,422.11	$10,145.03
February	-	$6,167.73	$9,012.82
March	-	-	$7,614.09
April	-	$5,211.46	$4,785.53
May	-	$3,402.35	$3,449.28
June	-	$2,890.92	$3,580.28
July	-	$1,235.31	$2,825.85
August	-	$1,951.45	$2,705.59
September	$2,951.93	$2,718.12	-
October	$3,521.36	$4,405.77	-
November	$5,370.66	$7,682.53	-
December	$7,999.44	$7,861.19	-
Total	**$19,843.39**	**$50,948.94**	**$44,118.47**

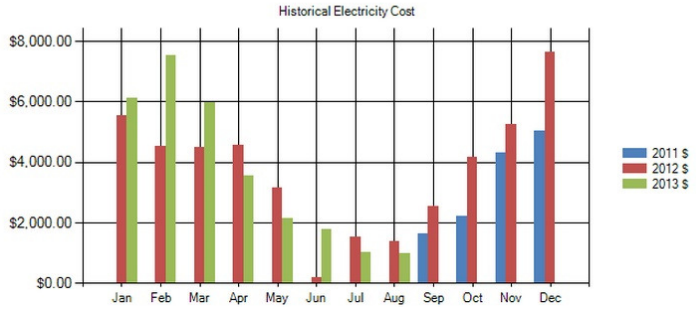
St. Louis School

Historical Electricity Consumption Sep 11 - Aug 13



Historical Electricity Consumption

Month	2011	2012	2013
January	-	39,348	40,292
February	-	30,111	45,608
March	-	29,616	37,424
April	-	26,038	19,532
May	-	18,049	14,362
June	-	1,125	10,082
July	-	7,539	3,923
August	-	6,516	4,277
September	8,305	13,804	-
October	13,357	23,199	-
November	29,413	31,816	-
December	34,685	48,537	-
Total	85,760	275,698	175,499

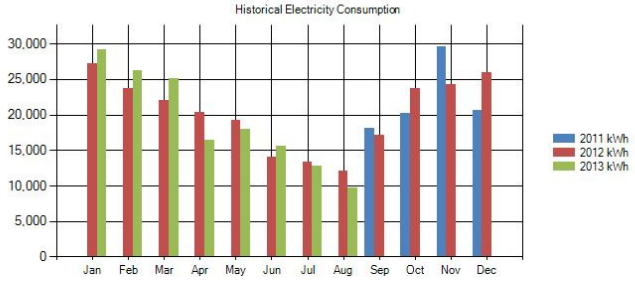


Historical Electricity Cost

Month	2011	2012	2013
January	-	$5,537.41	$6,119.17
February	-	$4,525.54	$7,536.68
March	-	$4,483.50	$5,978.15
April	-	$4,546.72	$3,550.75
May	-	$3,167.37	$2,158.52
June	-	$187.84	$1,772.75
July	-	$1,538.98	$1,034.30
August	-	$1,396.69	$1,001.11
September	$1,626.66	$2,552.87	-
October	$2,223.32	$4,175.83	-
November	$4,310.97	$5,236.27	-
December	$5,050.00	$7,651.42	-
Total	$13,210.95	$45,000.44	$29,151.43

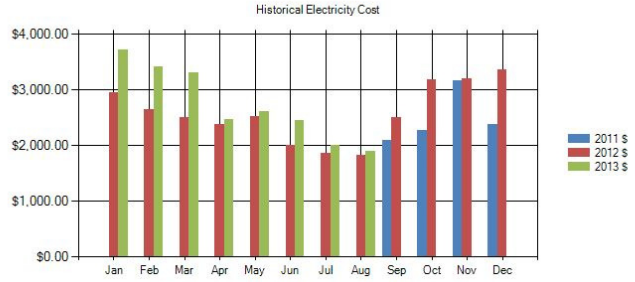
École Ste. Marguerite Bourgeoys

Historical Electricity Consumption Sep 11 - Aug 13



Historical Electricity Consumption

Month	2011	2012	2013
January	-	27,196	29,212
February	-	23,676	26,266
March	-	22,048	25,118
April	-	20,313	16,434
May	-	19,289	18,019
June	-	14,030	15,533
July	-	13,335	12,850
August	-	12,058	9,740
September	18,116	17,124	-
October	20,149	23,723	-
November	29,663	24,222	-
December	20,644	25,934	-
Total	88,573	242,950	153,171

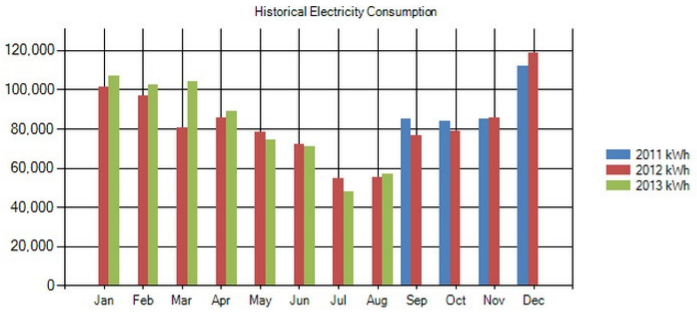


Historical Electricity Cost

Month	2011	2012	2013
January	-	$2,946.94	$3,711.51
February	-	$2,639.50	$3,419.97
March	-	$2,504.97	$3,298.37
April	-	$2,382.23	$2,461.33
May	-	$2,518.89	$2,617.08
June	-	$2,008.75	$2,455.29
July	-	$1,865.45	$1,999.01
August	-	$1,833.58	$1,895.05
September	$2,085.67	$2,509.72	-
October	$2,279.61	$3,186.72	-
November	$3,156.71	$3,200.27	-
December	$2,382.00	$3,361.15	-
Total	$9,903.99	$30,958.17	$21,857.61

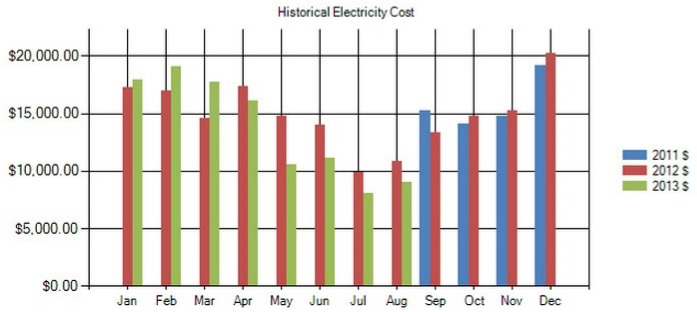
St. Thomas Aquinas High School

Historical Electricity Consumption Sep 11 - Aug 13



Historical Electricity Consumption

Month	2011	2012	2013
January	-	101,308	106,860
February	-	96,723	102,343
March	-	80,654	104,177
April	-	85,552	88,868
May	-	78,235	74,572
June	-	71,980	70,765
July	-	54,486	48,116
August	-	55,334	56,685
September	84,955	76,357	-
October	83,716	79,119	-
November	85,234	85,356	-
December	112,273	119,046	-
Total	**366,178**	**984,150**	**652,386**



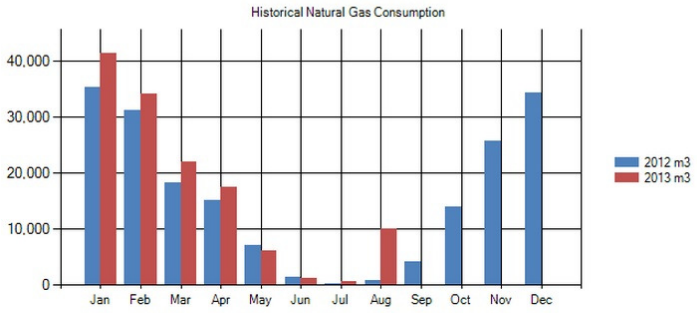
Historical Electricity Cost

Month	2011	2012	2013
January	-	$17,239.00	$17,913.80
February	-	$16,995.97	$19,051.97
March	-	$14,567.97	$17,714.93
April	-	$17,319.22	$16,143.05
May	-	$14,724.07	$10,547.92
June	-	$13,985.35	$11,091.59
July	-	$9,841.42	$8,081.81
August	-	$10,794.13	$9,042.69
September	$15,263.78	$13,286.99	-
October	$14,137.78	$14,741.50	-
November	$14,725.50	$15,221.00	-
December	$19,171.08	$20,266.77	-
Total	**$63,298.14**	**$178,983.39**	**$109,587.76**

Kenora Catholic District School Board, The - Summary

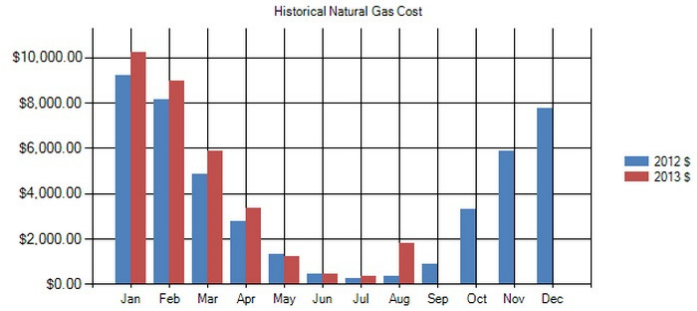
Historical Natural Gas Consumption Sep 11 - Aug 13

Summary



Historical Natural Gas Consumption

Month	2011	2012	2013
January	-	35,451	41,527
February	-	31,293	34,176
March	-	18,315	22,014
April	-	15,069	17,595
May	-	7,099	6,189
June	-	1,410	1,294
July	-	325	623
August	-	754	10,143
September	-	4,232	-
October	-	13,970	-
November	-	25,796	-
December	-	34,457	-
Total	**0**	**188,171**	**133,562**

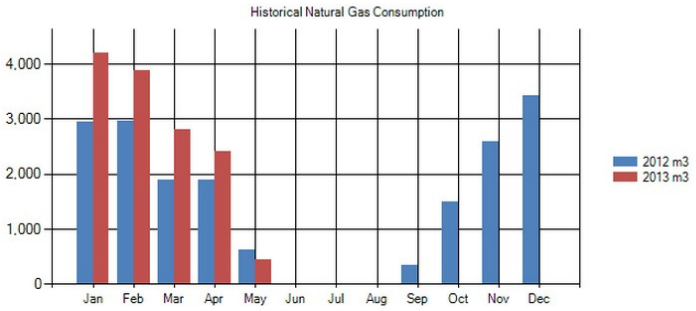


Historical Natural Gas Cost

Month	2011	2012	2013
January	-	$9,190.42	$10,247.88
February	-	$8,155.28	$8,970.09
March	-	$4,870.86	$5,856.02
April	-	$2,781.55	$3,335.38
May	-	$1,330.60	$1,245.02
June	-	$441.79	$434.14
July	-	$272.60	$341.49
August	-	$336.81	$1,795.22
September	-	$905.40	-
October	-	$3,295.50	-
November	-	$5,873.11	-
December	-	$7,744.77	-
Total	**$0.00**	**$45,198.69**	**$32,225.24**

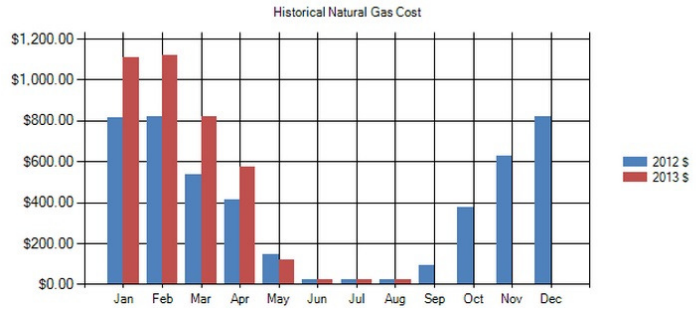
Kenora Catholic District School Board Catholic Education Centre

Historical Natural Gas Consumption Sep 11 - Aug 13



Historical Natural Gas Consumption

Month	2011	2012	2013
January	-	2,940	4,206
February	-	2,971	3,886
March	-	1,900	2,804
April	-	1,886	2,409
May	-	612	442
June	-	-	-
July	-	-	-
August	-	-	-
September	-	342	-
October	-	1,502	-
November	-	2,579	-
December	-	3,422	-
Total	0	18,154	13,748

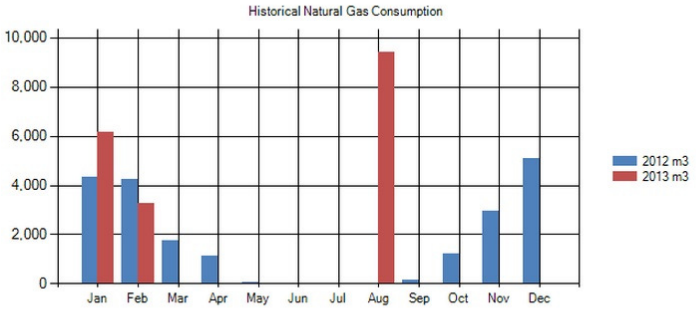


Historical Natural Gas Cost

Month	2011	2012	2013
January	-	$814.36	$1,108.24
February	-	$820.18	$1,118.98
March	-	$534.25	$820.49
April	-	$412.52	$573.11
May	-	$146.72	$121.87
June	-	$21.00	$21.00
July	-	$21.00	$21.00
August	-	$21.00	$21.00
September	-	$92.58	-
October	-	$376.00	-
November	-	$626.85	-
December	-	$822.93	-
Total	$0.00	$4,709.39	$3,805.69

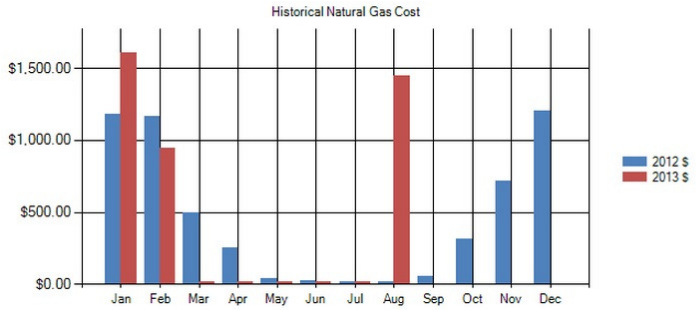
Pope John Paul II School

Historical Natural Gas Consumption Sep 11 - Aug 13



Historical Natural Gas Consumption

Month	2011	2012	2013
January	-	4,323	6,162
February	-	4,262	3,260
March	-	1,758	-
April	-	1,110	-
May	-	75	-
June	-	19	-
July	-	-	-
August	-	-	9,425
September	-	161	-
October	-	1,232	-
November	-	2,974	-
December	-	5,071	-
Total	0	20,986	18,847

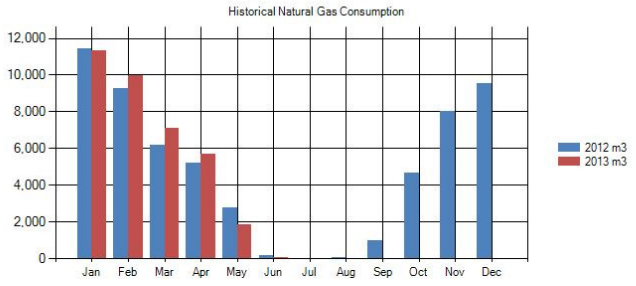


Historical Natural Gas Cost

Month	2011	2012	2013
January	-	$1,184.57	$1,610.97
February	-	$1,164.78	$943.14
March	-	$496.39	$21.00
April	-	$253.88	$21.00
May	-	$36.93	$21.00
June	-	$25.13	$21.00
July	-	$21.00	$21.00
August	-	$21.00	$1,449.38
September	-	$55.09	-
October	-	$313.30	-
November	-	$718.75	-
December	-	$1,206.63	-
Total	$0.00	$5,497.45	$4,108.49

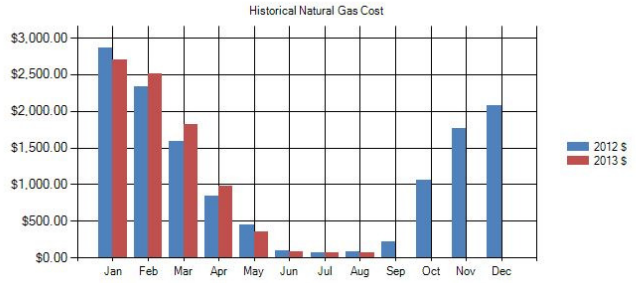
École Ste. Marguerite Bourgeoys

Historical Natural Gas Consumption Sep 11 - Aug 13



Historical Natural Gas Consumption

Month	2011	2012	2013
January	-	11,458	11,311
February	-	9,280	9,984
March	-	6,195	7,113
April	-	5,210	5,708
May	-	2,754	1,861
June	-	153	83
July	-	-	-
August	-	78	3
September	-	982	-
October	-	4,671	-
November	-	8,048	-
December	-	9,522	-
Total	0	58,351	36,063

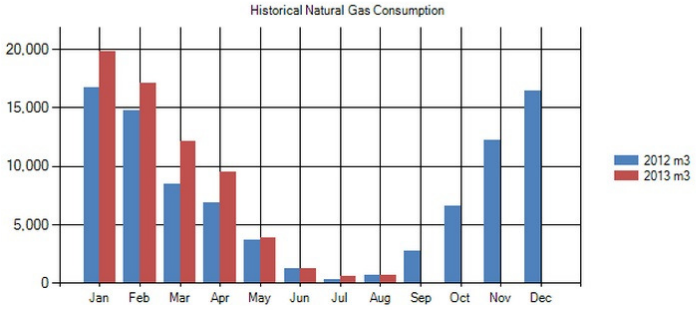


Historical Natural Gas Cost

Month	2011	2012	2013
January	-	$2,869.42	$2,701.76
February	-	$2,339.00	$2,514.95
March	-	$1,588.94	$1,823.66
April	-	$846.45	$984.13
May	-	$456.49	$358.59
June	-	$92.72	$83.47
July	-	$70.00	$70.00
August	-	$81.64	$70.53
September	-	$216.70	-
October	-	$1,055.88	-
November	-	$1,764.52	-
December	-	$2,072.64	-
Total	$0.00	$13,454.40	$8,607.09

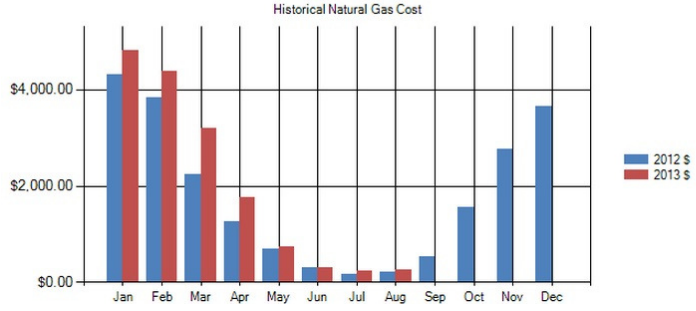
St. Thomas Aquinas High School

Historical Natural Gas Consumption Sep 11 - Aug 13



Historical Natural Gas Consumption

Month	2011	2012	2013
January	-	16,730	19,849
February	-	14,780	17,046
March	-	8,461	12,097
April	-	6,863	9,478
May	-	3,658	3,886
June	-	1,238	1,210
July	-	325	623
August	-	676	716
September	-	2,746	-
October	-	6,564	-
November	-	12,196	-
December	-	16,443	-
Total	0	90,681	64,904



Historical Natural Gas Cost

Month	2011	2012	2013
January	-	$4,322.07	$4,826.91
February	-	$3,831.32	$4,393.02
March	-	$2,251.28	$3,190.87
April	-	$1,268.70	$1,757.14
May	-	$690.46	$743.56
June	-	$302.94	$308.67
July	-	$160.60	$229.49
August	-	$213.17	$254.31
September	-	$541.03	-
October	-	$1,550.32	-
November	-	$2,762.99	-
December	-	$3,642.57	-
Total	$0.00	$21,537.45	$15,703.97

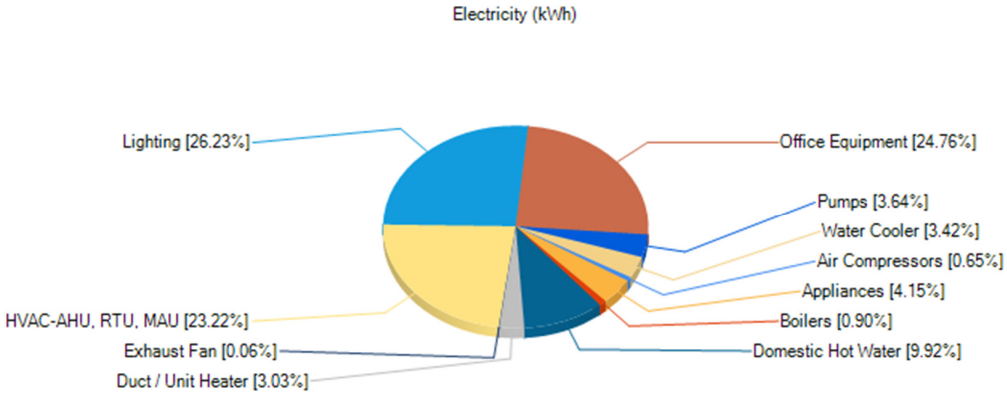
APPENDIX B

Energy Use Breakdown

École Ste. Marguerite Bourgeoys

Electricity

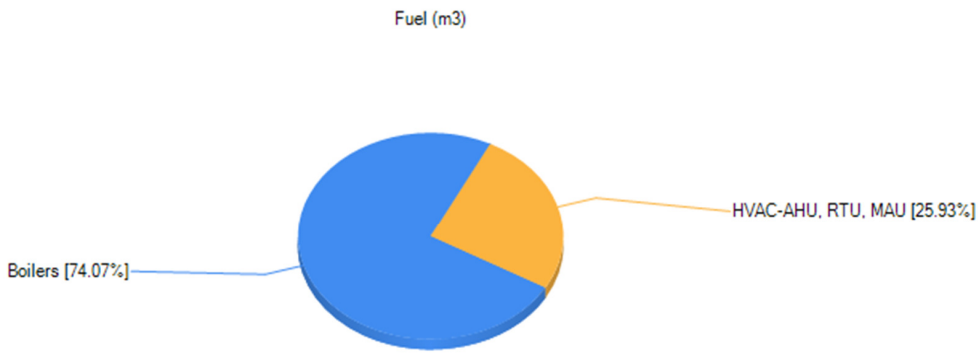
The total electricity use is split into quarters with HVAC, Lighting and Office Equipment each taking a quarter each. The remainder of electrical use is comprised of miscellaneous equipment, pumps and exhaust fans.



* Note: Total sum value of percentages may not be 100% due to rounding. See the appendix with listed equipment values for exact figures.

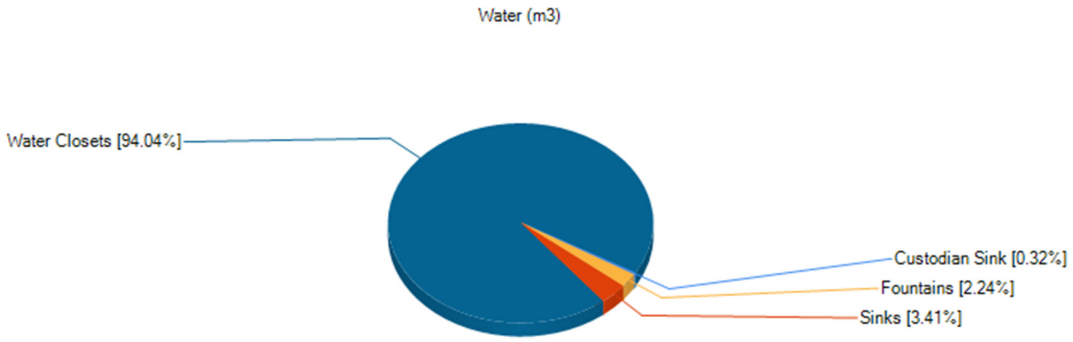
Natural Gas

The Boilers consume the majority of the natural gas. The remainder of the natural gas use is consumed by the HVAC equipment.



Water

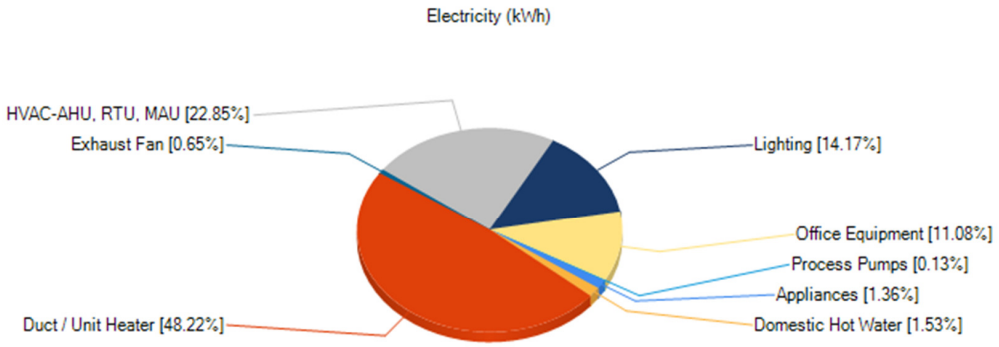
The water use is for domestic purposes. Water closets are by far the largest consumers of water, which may be due to the urinals being on a scheduled flush rather than controlled by a sensor or being of a waterless style. The sinks, custodial stations and water fountains use the remainder of the water.



St. Louis

Electricity

The duct heaters use the majority of the total electricity, at 48.2%. The HVAC follows at 22.8%. The lighting at 14.2% is a reasonable percentage of the overall electrical energy use for the building. The office equipment is close to the lighting use, accounting for 11.1%. The remaining electrical power consumption is comprised of miscellaneous equipment.



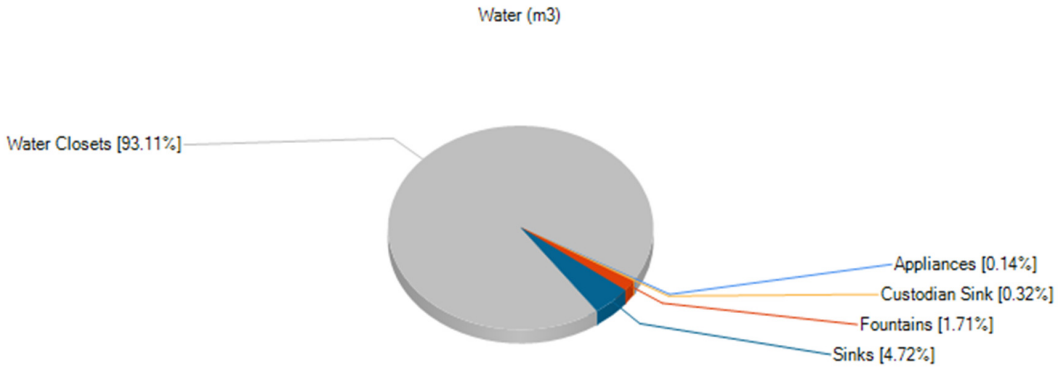
* Note: Total sum value of percentages may not be 100% due to rounding. See the appendix with listed equipment values for exact figures.

Natural Gas

There is no natural gas at this location at the time of the assessment.

Water

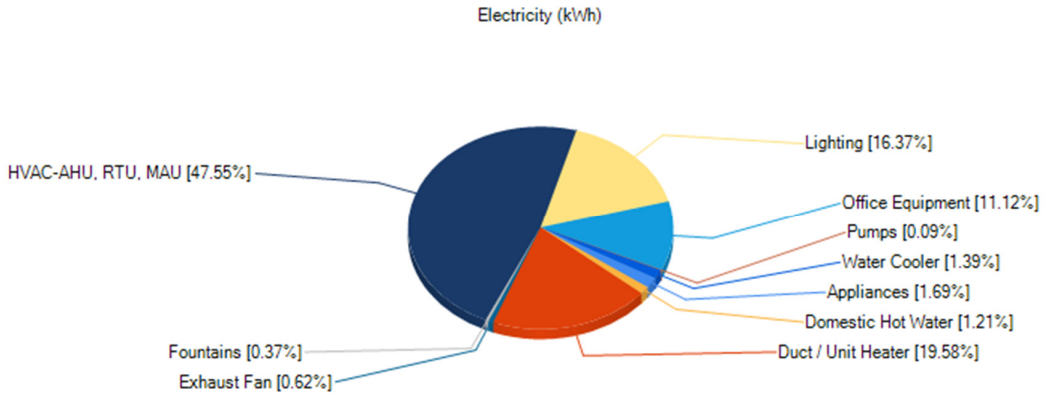
The water use is for domestic purposes. Water closets, including urinals, are the largest consumers of water, followed by sinks. The custodial stations, appliances and water fountains use the remainder of the water.



St. John

Electricity

The HVAC uses the majority of the total electricity, at 47.5%. The duct heaters follow at 19.6%. The lighting at 16.4% is a reasonable percentage of the overall electrical energy use for the building. The office equipment is close to the lighting use, accounting for 11.5%. The remaining electrical power consumption is comprised of miscellaneous equipment.

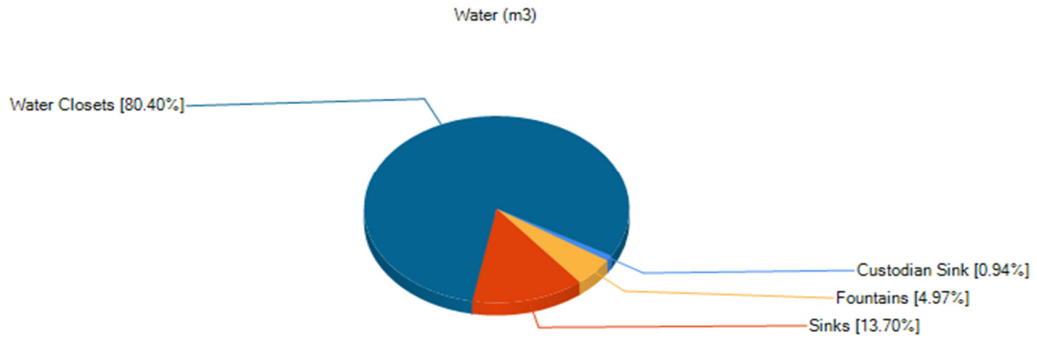


Natural Gas

There is no natural gas at this location at the time of the assessment.

Water

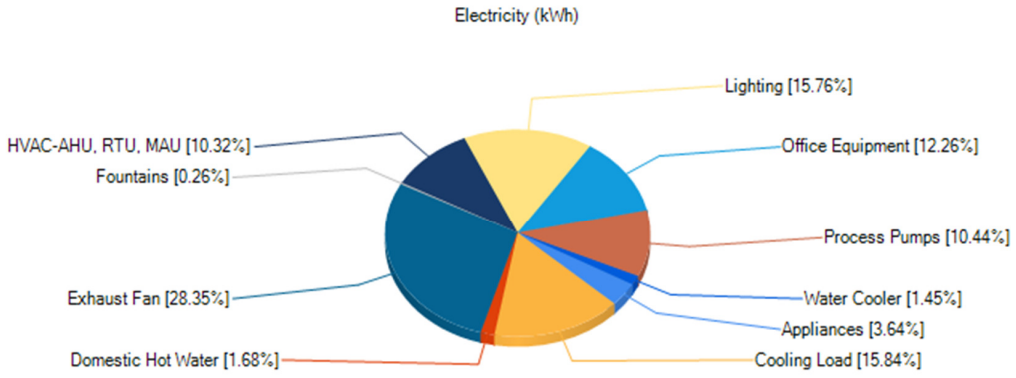
The water use is for domestic purposes. Water closets are the largest consumers of water, followed by sinks. The custodial stations and water fountains use the remainder of the water.



Pope John Paul II

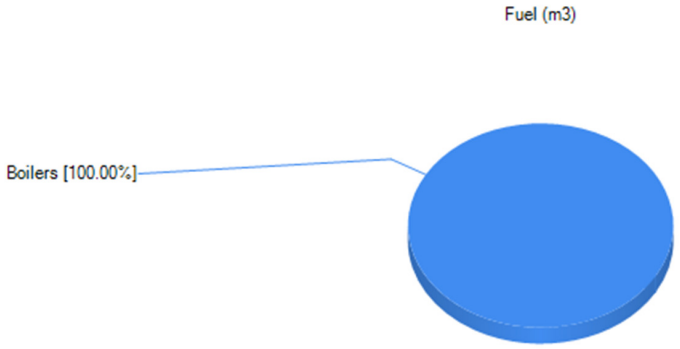
Electricity

The exhaust fans use the majority of the total electricity, at 28.4%. The lighting and cooling load each come second in usage, at 15.8% each. The cooling load is a reasonable percentage of the overall electrical energy use for the building. The office equipment is close to the lighting use, accounting for 12.3%. The HVAC is at 10.3% which is very low for a building of this size. The remaining electrical power consumption is comprised of miscellaneous equipment including the DWH.



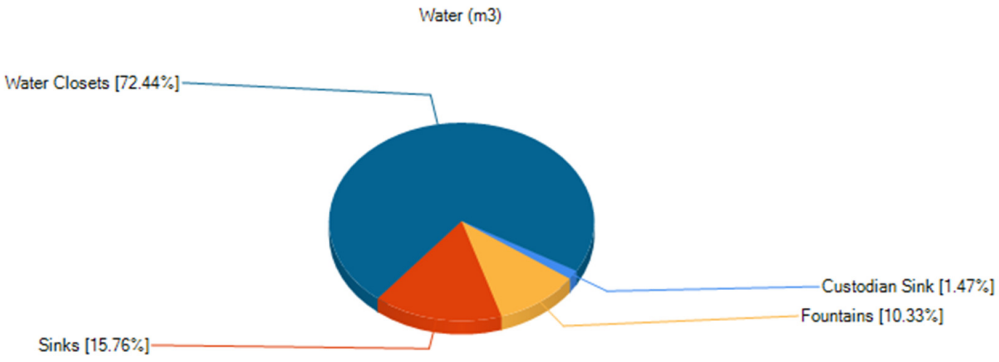
Natural Gas

The boilers are the only source of natural gas usage as the DWH is electrical.



Water

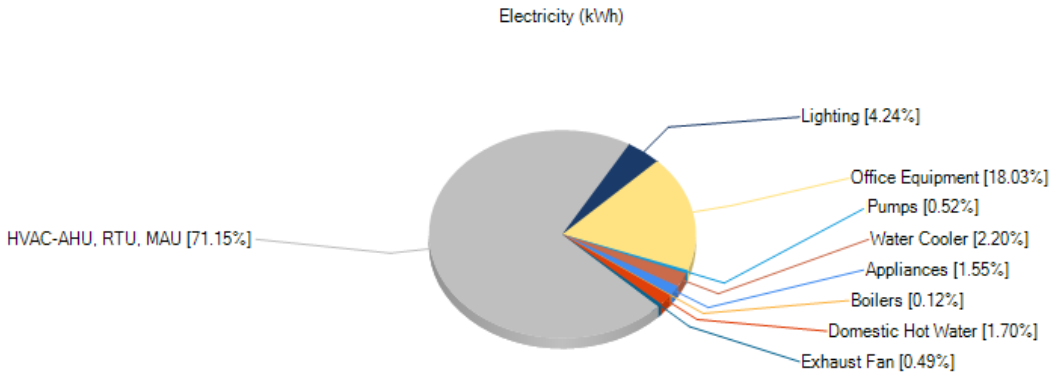
The water use is for domestic purposes. Water closets are the largest consumers of water followed by sinks. The custodial stations and water fountains use the remainder of the water.



Catholic Education Centre

Electricity

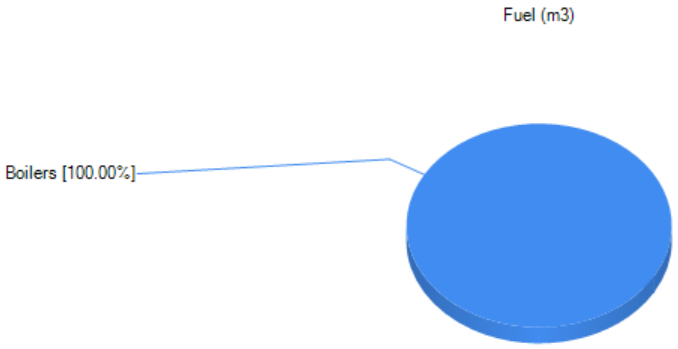
The HVAC system utilizes the majority of the electrical load at 71.2%. This is followed by the office equipment at 18% and the lighting at 4.2%. The remainder is comprised of miscellaneous equipment such as: domestic water heater tanks, pumps, exhaust fans, water coolers and appliances.



* Note: Total sum value of percentages may not be 100% due to rounding. See the appendix with listed equipment values for exact figures.

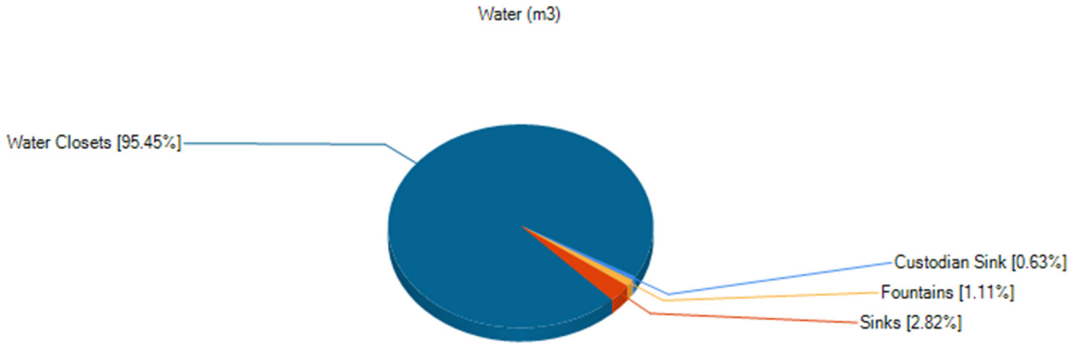
Natural Gas

The boilers are the only natural gas consuming equipment at the facility.



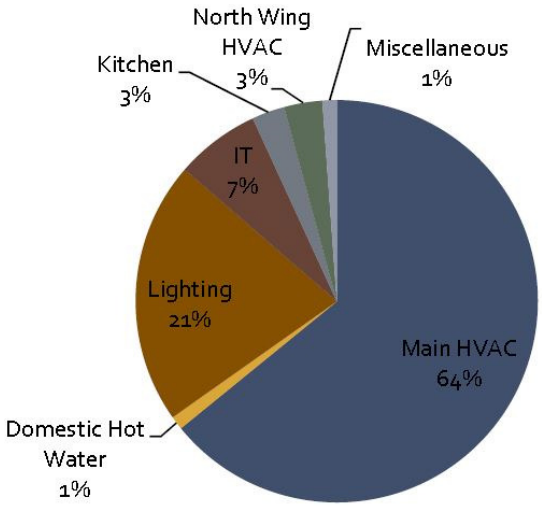
Water

The water use is for domestic purposes. Water closets are by far the largest consumers of water. The sinks, custodial stations and water fountains use the remainder of the water.

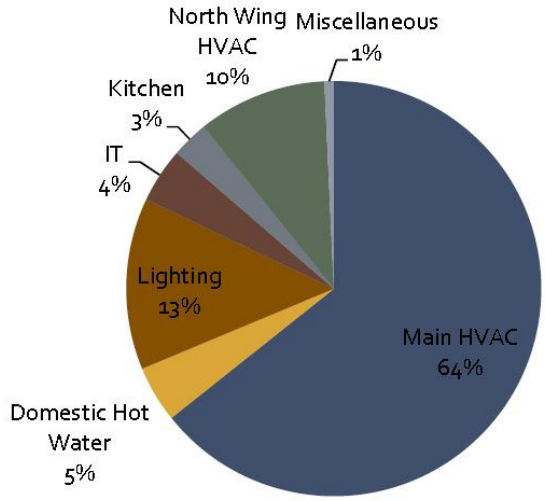


Catholic Education Centre

Energy Cost



Energy Usage



APPENDIX C

Energy Conservation Measure Schedules

École Ste. Marguerite Bourgeoys Energy Management Strategies

		Annual Energy Savings				Annual Cost Savings					Estimated Installation Costs					
EMS #	Opportunity	Electricity (kWh/yr)	Electricity Demand (kW/yr)	Natural Gas (m^3/yr)	Water (m^3/yr)	Electricity ($0.15/kWh)	Demand ($3.03/kW)	Natural Gas ($0.28/$m^3$)	Water ($2.02/$m^3$)	Total Savings	Cost	Incentives	Cost with Incentives	Payback Period with Incentives (years)	Total Energy Savings (GJ/yr)	tCO2e Savings
E01	T8 / CFL / Incandescent - Lamp Replacement	11,098	6.28	0	0	$1,698	$19	$0	$0	$1,717	$70	$0	$70	0.0	37.88	2.48
E02	MH 250W Fixture Replacement with LED	3,394	2.83	0	0	$519	$9	$0	$0	$528	$3,500	$238	$3,262	6.2	11.58	0.76
E03	Water Cooler - Energy Star Replacement	5,888	2.65	0	0	$901	$8	$0	$0	$909	$400	$200	$200	0.2	20.09	1.31
E04	Re-Balance Air System	2,101	1.05	23,327	0	$321	$3	$6,448	$0	$6,772	$12,250	$840	$11,410	1.7	20.26	64.04
E05	Replace NON-Energy Star Appliances	486	0.08	0	0	$74	$0	$0	$0	$75	$1,000	$0	$1,000	13.4	1.66	0.11
E06	Replace Electric with Gas Domestic Water Heater	7,088	5.33	-1,907	0	$1,084	$16	-$527	$0	$573	$10,000	$0	$10,000	17.4	23.12	-3.62
W01	Replace Urinals with Waterless	0	0.00	0	1,598	$0	$0	$0	$3,226	$3,226	$2,500	$0	$2,500	0.8	0.00	0.00
B01	Energy and Resource Awareness	6,595	1.97	1,751	0	$1,009	$6	$484	$0	$1,499	$6,148	$2,459	$3,689	2.5	23.49	6.24
B02	Updated As-Built Drawings	2,198	0.66	584	0	$336	$2	$161	$0	$500	$9,500	$0	$9,500	19.0	7.83	2.08
GRAND TOTAL		**38,847**	**21**	**23,754**	**1,598**	**$5,944**	**$63**	**$6,566**	**$3,226**	**$15,799**	**$45,368**	**$3,738**	**$41,631**	**2.64**	**145.92**	**73.39**

St. Louis Energy Management Strategies

		Annual Energy Savings				Annual Cost Savings					Estimated Installation Costs					
EMS #	Opportunity	Electricity (kWh/yr)	Electricity Demand (kW/yr)	Natural Gas (m^3/yr)	Water (m^3/yr)	Electricity ($0.16/kWh)	Demand ($3.44/kW)	Natural Gas ($0.4/$m^3$)	Water ($2.22/$m^3$)	Total Savings	Cost	Incentives	Cost with Incentives	Payback Period with Incentives (years)	Total Energy Savings (GJ/yr)	tCO2e Savings
E01	T8 / CFL / Incandescent - Lamp Replacement	11,216	5.61	0	0	$1,755	$19	$0	$0	$1,775	$0	$0	$10	0.0	38.28	2.50
E02	MH 250W Fixture Replacement with LED	2,424	2.02	0	0	$379	$7	$0	$0	$386	$2,500	$170	$2,330	6.0	8.27	0.54
E03	Install Motion Sensors	6,767	0.00	0	0	$1,059	$0	$0	$0	$1,059	$10,000	$800	$9,200	8.7	23.10	1.51
E04	Direct Digital Control BAS System	22,999	24.86	0	0	$3,599	$85	$0	$0	$3,685	$100,000	$19,892	$80,108	21.7	78.50	5.13
E05	Re-Balance Air System	33,608	0.34	0	0	$5,260	$1	$0	$0	$5,261	$30,000	$0	$30,000	5.7	114.70	7.49
E06	PC - Desktops, Replace with Laptops	1,604	3.34	0	0	$251	$11	$0	$0	$263	$700	$0	$700	2.7	5.47	0.36
E07	Replace NON-Energy Star Appliances	1,396	0.23	0	0	$218	$1	$0	$0	$219	$4,500	$0	$4,500	20.5	4.76	0.31
E08	Replace Electric with Gas Domestic Water Heater	5,832	6.48	-582	0	$913	$22	-$233	$0	$702	$8,000	$0	$8,000	11.4	19.58	-0.28
E09	Run around Loop Maintenance	838	1.37	0	0	$131	$5	$0	$0	$136	$1,500	$0	$1,500	11.0	2.86	0.19
E10	Window Replacement	5,904	3.07	0	0	$924	$11	$0	$0	$935	$11,700	$0	$11,700	12.5	20.15	1.32
W01	Replace High Flow W/C with Dual Flush W/C	0	0.00	0	729	$0	$0	$0	$1,615	$1,615	$6,000	$0	$6,000	3.7	0.00	0.00
W02	Replace Urinals with Waterless	0	0.00	0	426	$0	$0	$0	$944	$944	$2,000	$0	$2,000	2.1	0.00	0.00
B01	Energy and Resource Awareness	8,805	2.13	0	0	$1,378	$7	$0	$0	$1,385	$5,871	$2,349	$3,523	2.5	30.05	1.96
GRAND TOTAL		**101,393**	**49**	**-582**	**1,155**	**$15,868**	**$170**	**-$233**	**$2,559**	**$18,364**	**$182,771**	**$23,210**	**$159,561**	**8.69**	**345.73**	**21.03**

St. John Energy Management Strategies

		Annual Energy Savings				Annual Cost Savings					Estimated Installation Costs					
EMS #	Opportunity	Electricity (kWh/yr)	Electricity Demand (kW/yr)	Natural Gas (m^3/yr)	Water (m^3/yr)	Electricity ($0.11/kWh)	Demand ($14.58/kW)	Natural Gas ($0.4/$m^3$)	Water ($3.5/$m^3$)	Total Savings	Cost	Incentives	Cost with Incentives	Payback Period with Incentives (years)	Total Energy Savings (GJ/yr)	tCO2e Savings
E01	T8 / CFL / Incandescent - Lamp Replacement	14,665	7.49	0	0	$1,571	$109	$0	$0	$1,680	$15	$0	$15	0.0	50.05	3.27
E02	MH 250W Fixture Replacement with LED	3,878	3.23	0	0	$415	$47	$0	$0	$463	$4,000	$272	$3,728	8.1	13.24	0.86
E03	Install Motion Sensors	8,726	0.00	0	0	$935	$0	$0	$0	$935	$15,000	$1,600	$13,400	14.3	29.78	1.95
E04	Water Cooler - Energy Star Replacement	5,888	2.65	0	0	$631	$39	$0	$0	$669	$400	$200	$200	0.3	20.09	1.31
E05	Direct Digital Control BAS System	41,424	45.90	0	0	$4,437	$669	$0	$0	$5,106	$100,000	$36,722	$63,278	12.4	141.38	9.24
E06	PC - Desktops, Replace with Laptops	3,542	7.38	0	0	$379	$108	$0	$0	$487	$700	$0	$700	1.4	12.09	0.79
E07	Replace NON-Energy Star Appliances	2,058	0.34	0	0	$220	$5	$0	$0	$225	$3,450	$0	$3,450	15.3	7.02	0.46
E08	Replace Electric with Gas Domestic Water Heater	4,374	4.86	-436	0	$468	$71	-$174	$0	$365	$5,000	$0	$5,000	13.7	14.68	-0.21
E09	Duct Insulation in Crawl Spaces	9,473	0.00	0	0	$1,015	$0	$0	$0	$1,015	$10,000	$0	$10,000	9.9	32.33	2.11
E10	Re-Balance Air System	24,883	0.91	0	0	$2,665	$13	$0	$0	$2,678	$30,000	$0	$30,000	11.2	84.92	5.55
W01	Replace Multi Hand Washing Stations	0	0.00	0	51	$0	$0	$0	$177	$177	$1,000	$0	$1,000	5.6	0.00	0.00
B01	Energy and Resource Awareness	**13,524**	**2.86**	**0**	**0**	**$1,448**	**$42**	**$0**	**$0**	**$1,490**	**$9,018**	**$3,607**	**$5,411**	**3.6**	**46.16**	**3.02**
GRAND TOTAL		**132,435**	**76**	**-436**	**51**	**$14,184**	**$1,103**	**-$174**	**$177**	**$15,289**	**$178,583**	**$42,401**	**$136,182**	**8.91**	**451.75**	**28.34**

Pope John Paul II Energy Management Strategies

		Annual Energy Savings				Annual Cost Savings					Estimated Installation Costs					
EMS #	Opportunity	Electricity (kWh/yr)	Electricity Demand (kW/yr)	Natural Gas (m^3/yr)	Water (m^3/yr)	Electricity ($0.13/kWh)	Demand ($3.44/kW)	Natural Gas ($0.27/$m^3$)	Water ($4.09/$m^3$)	Total Savings	Cost	Incentives	Cost with Incentives	Payback Period with Incentives (years)	Total Energy Savings (GJ/yr)	tCO2e Savings
E01	T8 / CFL - Lamp Replacement	22,520	11.26	0	0	$2,932	$39	$0	$0	$2,971	$0	$0	$10	0.0	76.86	5.02
E02	MH 400W Fixture Replacement with LED	6,302	5.25	0	0	$821	$18	$0	$0	$839	$6,500	$442	$6,058	7.2	21.51	1.41
E03	Water Cooler - Energy Star Replacement	8,831	3.97	0	0	$1,150	$14	$0	$0	$1,163	$600	$300	$300	0.3	30.14	1.97
E04	VFD for the Heating System Supply Pumps	1,497	1.17	0	0	$195	$4	$0	$0	$199	$4,500	$50	$4,450	22.4	5.11	0.33
E05	Re-Balance Air System	117,260	58.63	17,816	0	$15,267	$201	$4,782	$0	$20,251	$45,250	$22,625	$22,625	1.1	410.21	74.70
E06	Replace NON-Energy Star Appliances	5,354	0.89	0	0	$697	$3	$0	$0	$700	$8,200	$0	$8,200	11.7	18.27	1.19
W01	Replace Urinals with Waterless	0	0.00	0	266	$0	$0	$0	$1,090	$1,090	$7,000	$0	$7,000	6.4	0.00	0.00
B01	Energy and Resource Awareness	9,823	2.78	630	0	$1,279	$10	$169	$0	$1,457	$7,180	$2,872	$4,308	3.0	33.88	3.91
GRAND TOTAL		**171,588**	**84**	**18,446**	**266**	**$22,341**	**$289**	**$4,951**	**$1,090**	**$28,670**	**$79,230**	**$26,289**	**$52,941**	**1.85**	**595.98**	**88.53**

Catholic Education Centre Energy Management Strategies

		Annual Energy Savings				Annual Cost Savings					Estimated Installation Costs					
EMS #	Opportunity	Electricity (kWh/yr)	Electricity Demand (kW/yr)	Natural Gas (m^3/yr)	Water (m^3/yr)	Electricity ($0.13/kWh)	Demand ($0/kW)	Natural Gas ($0.33/$m^3$)	Water ($4.63/$m^3$)	Total Savings	Cost	Incentives	Cost with Incentives	Payback Period with Incentives (years)	Total Energy Savings (GJ/yr)	tCO2e Savings
E01	T8 / CFL / Incandescent - Lamp Replacement	3,489	0.00	0	0	$462	$0	$0	$0	$462	$10	$0	$10	0.0	11.91	0.78
E02	MH 250W Fixture Replacement with LED	3,878	0.00	0	0	$514	$0	$0	$0	$514	$4,000	$272	$3,728	7.3	13.24	0.86
E03	Water Cooler - Energy Star Replacement	8,831	0.00	0	0	$1,169	$0	$0	$0	$1,169	$600	$300	$300	0.3	30.14	1.97
E04	Variable Frequency Drives for the RTUs	102,212	0.00	0	0	$13,533	$0	$0	$0	$13,533	$29,000	$50	$28,950	2.1	348.85	22.79
E05	PC - Desktop, replace with Laptops	1,604	0.00	0	0	$212	$0	$0	$0	$212	$2,000	$0	$2,000	9.4	5.47	0.36
E06	Replace NON-Energy Star Appliances	465	0.00	0	0	$62	$0	$0	$0	$62	$1,500	$0	$1,500	24.4	1.59	0.10
E07	Replace Electric with Gas Domestic Water Heater	5,832	0.00	-620	0	$772	$0	-$202	$0	$571	$10,000	$0	$10,000	17.5	19.56	-0.39
W01	Replace W/Cs with Dual Flush and Urinals with Waterless	0	0.00	0	675	$0	$0	$0	$3,129	$3,129	$9,000	$0	$9,000	2.9	0.00	0.00
W02	Add Aerators to Taps	0	0.00	0	8	$0	$0	$0	$37	$37	$50	$0	$50	1.3	0.00	0.00
B01	Energy and Resource Awareness	4,303	0.00	545	0	$570	$0	$177	$0	$747	$3,413	$1,365	$2,048	2.7	14.99	2.44
GRAND TOTAL		**130,616**	**0**	**-76**	**683**	**$17,293**	**$0**	**-$25**	**$3,166**	**$20,435**	**$59,573**	**$1,987**	**$57,586**	**2.82**	**445.75**	**28.92**

St. Thomas Aquinas High School Energy Management Strategies

		Annual Energy Savings				Annual Cost Savings					Estimated Installation Costs					
EMS #	Opportunity	Electricity (kWh/yr)	Electricity Demand (kW/yr)	Natural Gas (m^3/yr)	Water (m^3/yr)	Electricity ($0.13/kWh)	Demand ($0/kW)	Natural Gas ($0.33/$m^3$)	Water ($4.63/$m^3$)	Total Savings	Cost	Incentives	Cost with Incentives	Payback Period with Incentives (years)	Total Energy Savings (GJ/yr)	tCO2e Savings
1	Lighting Upgrades									$19,310			$92,820	4.8		
2	Makeup Air Heater									$7,500			$100,000	13.3		
3	Makeup Air VFD									$12,000			$20,000	1.7		
4	Makeup Air CO_2 Controls									$4,000			$20,000	5.0		
5	Eliminate Heat Pumps									$26,391			$425,000	16.1		
6	Circulating Pumps VFD									$11,000			$15,000	1.4		
7	Replace Boilers with High Efficiency Boilers									$1,950			$90,000	46.2		
8	Replace Duct Heaters with Hydronic Coil									$7,700			$25,000	3.2		
TOTALS										**$89,851**			**$787,820**	**8.8**		

École Ste. Marguerite Bourgeoys Energy Conservation Project Savings and Cost

EMS #	Savings	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
E01	T8 / CFL / Incandescent - Lamp Replacement			$1,717	$1,751	$1,786	$1,822	$1,859	$1,896	$1,934	$1,972	**$14,737**
E02	MH 250W Fixture Replacement with LED	$528	$539	$549	$560	$572	$583	$595	$607	$619	$631	**$5,781**
E03	Water Cooler - Energy Star Replacement		$909	$927	$946	$965	$984	$1,004	$1,024	$1,044	$1,065	**$8,867**
E04	Re-Balance Air System				$6,772	$6,907	$7,046	$7,187	$7,330	$7,477	$7,626	**$50,345**
E05	Replace NON-Energy Star Appliances			$75	$77	$78	$80	$81	$83	$84	$86	**$644**
E06	Replace Electric with Gas Domestic Water Heater		$573	$584	$596	$608	$620	$633	$645	$658	$671	**$5,589**
W01	Replace Urinals with Waterless											**$0**
B01	Energy and Resource Awareness	$1,499	$1,529	$1,560	$1,591	$1,623	$1,655	$1,688	$1,722	$1,756	$1,791	**$16,414**
B02	Updated As-Built Drawings		$500	$510	$520	$531	$541	$552	$563	$574	$586	**$4,877**
	Total Savings	**$2,027**	**$4,050**	**$5,923**	**$12,813**	**$13,069**	**$13,331**	**$13,597**	**$13,869**	**$14,147**	**$14,429**	**$107,254**

EMS #	Cost (Investment)	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
E01	T8 / CFL / Incandescent - Lamp Replacement			$70								**$70**
E02	MH 250W Fixture Replacement with LED	$3,262										**$3,262**
E03	Water Cooler - Energy Star Replacement		$200									**$200**
E04	Re-Balance Air System				$11,410							**$11,410**
E05	Replace NON-Energy Star Appliances			$1,000								**$1,000**
E06	Replace Electric with Gas Domestic Water Heater		$10,000									**$10,000**
W01	Replace Urinals with Waterless											**$2,500**
B01	Energy and Resource Awareness	$3,689										**$3,689**
B02	Updated As-Built Drawings		$9,500									**$9,500**
	Total Cost (Investment)	**$6,951**	**$19,700**	**$1,070**	**$11,410**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$41,631**

Energy Conservation Project Savings and Cost

St. Louis Energy Conservation Project Savings and Cost

EMS #	Savings	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
E01	T8 / CFL / Incandescent - Lamp Replacement			$1,775	$1,811	$1,847	$1,884	$1,921	$1,960	$1,999	$2,039	**$15,235**
E02	MH 250W Fixture Replacement with LED			$386	$394	$402	$410	$418	$426	$435	$443	**$3,313**
E03	Install Motion Sensors			$1,059	$1,080	$1,102	$1,124	$1,146	$1,169	$1,193	$1,216	**$9,089**
E04	Direct Digital Control BAS System			$3,685	$3,759	$3,834	$3,911	$3,989	$4,069	$4,150	$4,233	**$31,628**
E05	Re-Balance Air System			$5,261	$5,366	$5,474	$5,583	$5,695	$5,809	$5,925	$6,043	**$45,155**
E06	PC - Desktops, Replace with Laptops			$263	$268	$274	$279	$285	$290	$296	$302	**$2,257**
E07	Replace NON-Energy Star Appliances				$219	$223	$228	$232	$237	$242	$247	**$1,628**
E08	Replace Electric with Gas Domestic Water Heater			$702	$716	$730	$745	$760	$775	$791	$806	**$6,025**
E09	Run around Loop Maintenance				$136	$139	$141	$144	$147	$150	$153	**$1,011**
E10	Window Replacement				$935	$954	$973	$992	$1,012	$1,032	$1,053	**$6,951**
W01	Replace High Flow W/C with Dual Flush W/C			$1,615	$1,647	$1,680	$1,714	$1,748	$1,783	$1,819	$1,855	**$13,861**
W02	Replace Urinals with Waterless											**$0**
B01	Energy and Resource Awareness	$1,385										**$1,385**
	Total Savings	**$1,385**	**$0**	**$14,746**	**$16,331**	**$16,658**	**$16,991**	**$17,331**	**$17,677**	**$18,031**	**$18,391**	**$137,540**

EMS #	Cost (Investment)	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
E01	T8 / CFL / Incandescent - Lamp Replacement			$10								**$10**
E02	MH 250W Fixture Replacement with LED			$2,330								**$2,330**
E03	Install Motion Sensors			$9,200								**$9,200**
E04	Direct Digital Control BAS System			$80,108								**$80,108**
E05	Re-Balance Air System			$30,000								**$30,000**
E06	PC - Desktops, Replace with Laptops			$700								**$700**
E07	Replace NON-Energy Star Appliances				$4,500							**$4,500**
E08	Replace Electric with Gas Domestic Water Heater			$8,000								**$8,000**
E09	Run around Loop Maintenance				$1,500							**$1,500**
E10	Window Replacement				$11,700							**$11,700**
W01	Replace High Flow W/C with Dual Flush W/C			$6,000								**$6,000**
W02	Replace Urinals with Waterless											**$0**
B01	Energy and Resource Awareness	$3,523										**$3,523**
	Total Cost (Investment)	**$3,523**	**$0**	**$136,348**	**$17,700**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$157,571**

Pope John Paul II Energy Conservation Project Savings and Cost

EMS #	Savings	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
E01	T8 / CFL - Lamp Replacement			$2,971	$3,030	$3,091	$3,153	$3,216	$3,280	$3,346	$3,413	**$25,500**
E02	MH 400W Fixture Replacement with LED	$839	$856	$873	$890	$908	$926	$945	$964	$983	$1,003	**$9,187**
E03	Water Cooler - Energy Star Replacement				$1,163	$1,186	$1,210	$1,234	$1,259	$1,284	$1,310	**$8,646**
E04	VFD for the Heating System Supply Pumps					$199	$203	$207	$211	$215	$220	**$1,255**
E05	Re-Balance Air System				$20,251	$20,656	$21,069	$21,491	$21,920	$22,359	$22,806	**$150,552**
E06	Replace NON-Energy Star Appliances				$700	$714	$728	$743	$758	$773	$788	**$5,204**
W01	Replace Urinals with Waterless											**$0**
B01	Energy and Resource Awareness	$1,457	$1,486	$1,516	$1,546	$1,577	$1,609	$1,641	$1,674	$1,707	$1,741	**$15,954**
	Total Savings	**$839**	**$856**	**$3,844**	**$26,035**	**$26,754**	**$27,290**	**$27,835**	**$28,392**	**$28,960**	**$29,539**	**$200,344**

EMS #	Cost (Investment)	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
E01	T8 / CFL - Lamp Replacement			$10								**$10**
E02	MH 400W Fixture Replacement with LED	$6,058										**$6,058**
E03	Water Cooler - Energy Star Replacement				$300							**$300**
E04	VFD for the Heating System Supply Pumps					$4,450						**$4,450**
E05	Re-Balance Air System				$22,625							**$22,625**
E06	Replace NON-Energy Star Appliances				$8,200							**$8,200**
W01	Replace Urinals with Waterless											**$0**
B01	Energy and Resource Awareness	$4,308										**$4,308**
	Total Cost (Investment)	**$6,058**	**$0**	**$10**	**$31,125**	**$4,450**	**$0**	**$0**	**$0**	**$0**	**$0**	**$41,643**

Catholic Education Centre Energy Conservation Project Savings and Cost

EMS #	Savings	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
E01	T8 / CFL / Incandescent - Lamp Replacement		$462	$471	$481	$490	$500	$510	$520	$531	$541	**$4,507**
E02	MH 250W Fixture Replacement with LED	$514	$524	$535	$545	$556	$567	$579	$590	$602	$614	**$5,628**
E03	Water Cooler - Energy Star Replacement			$1,169	$1,192	$1,216	$1,241	$1,265	$1,291	$1,316	$1,343	**$10,033**
E04	Variable Frequency Drives for the RTUs					$13,533	$13,804	$14,080	$14,361	$14,649	$14,942	**$85,368**
E05	PC - Desktop, replace with Laptops				$212	$216	$221	$225	$229	$234	$239	**$1,576**
E06	Replace NON-Energy Star Appliances					$62	$63	$65	$66	$67	$68	**$391**
E07	Replace Electric with Gas Domestic Water Heater				$571	$582	$594	$606	$618	$630	$643	**$4,245**
W01	Replace W/Cs with Dual Flush and Urinals with Waterless											**$0**
W02	Add Aerators to Taps	$37	$38	$38	$39	$40	$41	$42	$43	$43	$44	**$405**
B01	Energy and Resource Awareness	$747	$762	$777	$793	$809	$825	$841	$858	$875	$893	**$8,179**
	Total Savings	**$1,298**	**$1,786**	**$2,991**	**$3,833**	**$17,505**	**$17,855**	**$18,212**	**$18,577**	**$18,948**	**$19,327**	**$120,333**

EMS #	Cost (Investment)	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
E01	T8 / CFL / Incandescent - Lamp Replacement		$10									**$10**
E02	MH 250W Fixture Replacement with LED	$3,728										**$3,728**
E03	Water Cooler - Energy Star Replacement			$300								**$300**
E04	Variable Frequency Drives for the RTUs					$28,950						**$28,950**
E05	PC - Desktop, replace with Laptops				$2,000							**$2,000**
E06	Replace NON-Energy Star Appliances					$1,500						**$1,500**
E07	Replace Electric with Gas Domestic Water Heater				$10,000							**$10,000**
W01	Replace W/Cs with Dual Flush and Urinals with Waterless											**$9,000**
W02	Add Aerators to Taps	$50										**$50**
B01	Energy and Resource Awareness	$2,048										**$2,048**
	Total Cost (Investment)	**$5,826**	**$10**	**$300**	**$12,000**	**$30,450**	**$0**	**$0**	**$0**	**$0**	**$0**	**$57,586**

St. Thomas Aquinas High School Energy Conservation Project Savings and Cost

EMS #	Savings	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
1	Lighting Upgrades	$19,310	$18,924	$18,545	$18,174	$17,811	$17,455	$17,106	$16,764	$16,428	$16,100	**$176,616**
2	Makeup Air Heater	$7,500	$7,350	$7,203	$7,059	$6,918	$6,779	$6,644	$6,511	$6,381	$6,253	**$68,598**
3	Makeup Air VFD	$12,000	$11,760	$11,525	$11,294	$11,068	$10,847	$10,630	$10,418	$10,209	$10,005	**$109,756**
4	Makeup Air CO2 Controls	$4,000	$3,920	$3,842	$3,765	$3,689	$3,616	$3,543	$3,473	$3,403	$3,335	**$36,585**
5	Eliminate Heat Pumps	$26,391	$25,863	$25,346	$24,839	$24,342	$23,855	$23,378	$22,911	$22,452	$22,003	**$241,382**
6	Circulating Pumps VFD	$11,000	$10,780	$10,564	$10,353	$10,146	$9,943	$9,744	$9,549	$9,358	$9,171	**$100,610**
7	Replace Boilers with High Efficiency Boilers	$1,950	$1,911	$1,873	$1,835	$1,799	$1,763	$1,727	$1,693	$1,659	$1,626	**$17,835**
8	Replace Duct Heaters with Hydronic Coil	$7,700	$7,546	$7,395	$7,247	$7,102	$6,960	$6,821	$6,685	$6,551	$6,420	**$70,427**
	TOTAL	**$89,851**	**$88,054**	**$86,293**	**$84,567**	**$82,876**	**$81,218**	**$79,594**	**$78,002**	**$76,442**	**$74,913**	**$821,810**

EMS #	Cost (Investment)	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
1	Lighting Upgrades	$92,820	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$92,820**
2	Makeup Air Heater	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$100,000**
3	Makeup Air VFD	$20,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$20,000**
4	Makeup Air CO2 Controls	$20,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$20,000**
5	Eliminate Heat Pumps	$425,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$425,000**
6	Circulating Pumps VFD	$15,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$15,000**
7	Replace Boilers with High Efficiency Boilers	$90,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$90,000**
8	Replace Duct Heaters with Hydronic Coil	$25,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$25,000**
	TOTAL	**$787,820**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$787,820**