


Energy Management and Environmental Plan




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E – Ontario Regulation 102/94 – Waste Audits and Waste Reduction Work Plans

F – Active Transportation Charter



Mission Statement

This document was created with our Mission and Vision in mind.

Our Mission

“As disciples of Christ, we educate and nurture hope in all learners to realize their full potential to transform God’s world.”



Our Vision

“Our Catholic Schools: heart of the community -- success for each, a place for all.”

With the help of these guiding statements, the Waterloo Catholic District School Board has taken on the responsibility to help transform God's world in such a way that all future generations can enjoy its beauty and splendor.

We hope this document will serve to spread the word on what we have already accomplished and act as a guidepost in our on-going efforts to continue reducing our carbon footprint and ensure that the earth's precious resources are conserved for the future.

The technology and innovation put in place under these initiatives will lead the way and educate our community in the important new frontier of Energy and Environmental Management practices. We will not only foster this culture but help shape it as it takes form.

1. Introduction

Today, the ecological crisis has assumed such proportions as to be the responsibility of everyone.... I wish to repeat that the ecological crisis is a moral issue.... As a result [Christians] are conscious of a vast field of ecumenical and interreligious cooperation opening up before them.

-Pope John Paul II, 1990 World Day of Peace Statement

The Waterloo Catholic District School Board (WCDSB) has a long history of environmental protection and awareness, and of innovative action toward sustainable operations. Our collective dedication stems from a deep appreciation of God's world.



We have stimulated staff and students to live sustainably in balance with Nature. We understand that climate change is a real threat to earth's biodiversity. We accept that humans are largely responsible for global warming as a result of our use of non-renewable energy, depletion of natural resources, and the emission of greenhouse gases. As

disciples of Christ, we encourage people to lessen their ecological footprint on the earth, and strive to be an example of how that can be done so that we may transform God's world.

Our conservation measures to date are a broad sweep of inspired ideas. The way in which these initiatives have been adopted and supported across the Board is a direct result of our enlightened history and our optimism for the future. While these efforts represent solid steps toward environmental stewardship, and have provided excellent resources for our staff, if we are to truly "live our mission" then green thinking must be woven throughout all future planning and day-to-day operations. An action-based, goal-oriented Energy Management and



Environmental Plan is needed to transform our inspired ideas into a strategy for all future operations and policies.

The WCDSB Energy Management and Environmental Plan is intended to be a guiding reference document for all initiatives and policies undertaken by WCDSB staff.

The timing of the Energy Management and Environmental Plan is aligned with budget cycles, progressive initiatives and goals stemming from other organizations and jurisdictions, and a willingness from all levels of the organization to take action. The Plan is intended to guide sustainable operations management over the long term but includes short term action steps that will catalyze the process.

A comprehensive Energy Management and Environmental Plan clearly articulates the measures that are or will be deployed to reduce energy consumption. It documents answers to questions such as:

- What type(s) of energy is used and how much is consumed?
- Where, how, and why is the energy being consumed?
- What specific measures are required to reduce consumption, and how will they be implemented in the short, medium, and longer terms?
- How will the measures be resourced?
- What are the benefits and what are the associated risks?
- How will the consumption reduction measures impact on service delivery?
- What roles and responsibilities will employees have within the Board?
- How will relevant information and data be recorded and reported?



This Energy Management and Environmental Plan begins with a study of the energy consumed at each school as determined by their Energy Performance Cards, a system established by the WCDSB to regularly report on the consumption of water, natural gas, and electricity. Using this information, we have

been able to estimate the carbon footprint for the WCDSB as a whole.

This information is only useful to us when put into context. As such, the next section in this Energy Management and Environmental Plan examines benchmarks set by school Boards in Canada, the United States, and abroad, as well as a method for benchmarking schools within the Board itself. As a further analysis, top performing jurisdictions and schools across Canada are summarized with applicable lessons learned that may be transferable to the WCDSB, within a Resources section at the end of this document.

This Plan then documents all of the myriad conservation measures completed by the WCDSB to date. Opportunities for further success are then introduced for consideration, including operational improvements and policies, as well as methods for the integration of energy conservation and environmental stewardship into the curriculum.

Energy savings best practices are also reviewed here, along with an outline for cost/benefit analyses of new initiatives and possible sources of incentives to fund them. Finally, this exhaustive study concludes with a Sustainability Plan, providing immediate steps for action as well as a plan for the medium and long term future.

The WCDSB has approached this strategic plan with consideration for the “triple bottom line” of economic, environmental, and social responsibility.

1.1 The Waterloo Catholic District School Board Today

The Waterloo Catholic District School Board – the corporate body overseeing Waterloo Region’s Catholic Schools – protects and promotes a tradition of education excellence first begun in a one-room schoolhouse 1836. Today, we are the eighth-largest Catholic school system in Ontario:

- 46 elementary schools (Junior Kindergarten to Grade 8)
- 5 secondary schools (Grade 9 to Grade 12)
- 5 adult education facilities
- 2.5 million sq. ft. of floor space in schools -- on more than 400 acres of land
- 40,000 elementary, secondary and adult/continuing education students

- Students from more than 114 countries – speaking more than 68 languages
- 3,500 full & part-time staff
- 100,000 Catholic ratepayers
- 27% of area students attend Catholic schools
- 17% of residential taxpayers support Catholic schools
- 30% of local schools are Catholic schools

Floor Area	September 2010
School	Building Area (ft²)
Blessed Kateri	40,160
Blessed Sacrament	37,114
Canadian Martyrs	28,707
Christ the King	26,296
Holy Family	25,381
Holy Rosary	50,246
Holy Spirit	44,337
John Sweeney	49,062
Monsignor Gleason	22,184
Monsignor Haller	23,293
Mother Teresa	44,186
Notre Dame	25,973
Our Lady of Fatima	38,933
Our Lady of Grace	22,206
Our Lady of Lourdes	33,788
Pope John Paul II	52,065
Sir E.A. Bauer	47,211
St. Agatha	17,943
St. Agnes	26,006
St. Aloysius	26,285
St. Ambrose	30,214
St. Anne (Cam)	27,965
St. Anne (K)	45,919
St. Augustine	39,407
St. Bernadette	27,803
St. Boniface	22,357
St. Brigid	16,609
St. Clement (SC)	27,039
St. Daniel	27,362
St. Dominic Savio	44,380
St. Elizabeth	39,590
St. Francis	26,555
St. Gregory	25,231
St. John	36,328
St. Joseph (Cam)	22,206
St. Luke	49,579

Floor Area	September 2010
St. Margaret	38,115
St. Mark	22,959
St. Matthew	47,759
St. Michael	29,730
St. Nicholas	51,753
St. Patrick (K)	31,280
St. Paul	34,940
St. Peter	34,735
St. Teresa (E)	18,008
St. Teresa (K)	34,445
St. Timothy	24,100
St. Vincent de Paul	25,284
Elementary Total	1,583,027

St. David	163,041
St. Benedict	169,359
Monsignor Doyle	145,980
St. Mary's	218,540
Resurrection	198,443
St. Don Bosco	1,485
Secondary Total	896,849

St. Louis (C) - former St. Patrick (C)	41,818
St. Louis (K) - former St. Jeromes	69,373
St. Louis (K) - St. Mary's campus	20,021
St. Louis (K) - St. Joseph campus	38,147
St. Louis (K) - St. Francis campus	35,155
91 Moore Ave	12,292
Catholic Education Centre	86,576
Dutton Drive	28,085
Diefenbacher Building	1,471
Sacred Heart	-
St. Louis (W)	-
St. Clement (C)	-
Admin. & Other Total	332,940

1.2 Background

Establishing the path to sustainability has come in part from the Ministry of Education. Some of the funding and other support mechanisms put in place by the Ministry, discussed below, have informed the WCDSB's conservation goals.

1.2.1 Energy Efficient Schools Funding

In April 2009, the Ministry announced it would be investing \$550 million over two years to support improved energy efficiency in schools. This includes:

- \$25 million for energy audits, energy controls, and thermostats.
- \$75 million to install interval meters and new lighting systems.
- \$300 million to install new energy efficient heating and cooling systems, windows, and roofs.
- \$150 million to create permanent spaces in existing schools to replace energy inefficient portables.

This builds on the \$2.25 billion in funding to replace major building components through the Good Places to Learn Renewal program of 2005-2006 and 2008-2009.

1.2.2 Inventory of Green Initiatives in Ontario Schools

The ministry is creating a database of green initiatives such as photovoltaic (solar) cells, windmills, and green roofs that schools have installed. Information on each technology will include initial start-up and maintenance costs, lessons learned, best practices and the effect these projects have had on student learning. Results will be shared with the education sector.

1.2.3 Renewable Energy Funding for Schools

In July 2009, the Ministry of Education announced funding of \$50 million for 2010-11 so schools could install the following five renewable energy technologies: solar photovoltaic, solar air heating, solar water heating, geothermal, and small or micro wind.

The Ministry is also working with the Ministry of Energy and Infrastructure to develop a list of qualified renewable energy vendors for school Boards to use.

1.2.4 Utility Consumption Database

When complete, the province's utility consumption database will collect electricity and natural gas data for all of Ontario's approximately 5,000 schools and Board buildings. Launched in August 2009, this resource:

- Allows Boards to analyze year-over-year consumption, following weather correction to remove the impact of abnormal or extreme weather conditions, against key indicators such as number of students, total building area, etc.
- Determines average provincial benchmarks for energy consumption based on common facility indicators.
- Identifies those schools and Boards that are the most energy efficient.
- Identifies schools and Boards that need technical advice and support to reduce their energy consumption.
- Sets annual energy reduction targets for the sector, Boards, and individual schools.


There is funding and incentives available to schools now more than ever. But this will be wasted if it is not distributed through a “lens of sustainability” and without the kind of careful planning that can turn a green school into an anchor for a greener community.

1.2.5 Green Schools Pilot Initiative

In April 2009, the Ministry of Education announced the Green Schools Pilot Initiative to support pilot projects for Boards to purchase, demonstrate, and test green products and technologies to incorporate into school capital construction projects.

This investment support is part of Ontario's efforts to reduce environmental footprints in its publicly funded schools, making them better places for students to learn and succeed in the future. Examples of technologies that have been instituted across 40 school Boards include:

- Thermal energy generation and conservation
Examples include biomass boilers fuelled by wood products that offset peak-time demands.

- 
- Wind energy generation
Examples include vertical wind turbines on school roofs that can generate electrical energy and offset energy use.
 - Solar thermal and electric energy generation and conservation
Examples include solar photovoltaic panels on school rooftops that generate electricity and heat to produce domestic hot water, supplement heating systems, and heat swimming pools.
 - Sewage and water treatment
Examples include onsite wastewater treatment systems, nitrogen removal filters that remove nitrates from wastewater, and greywater treatment systems that filter and sanitize greywater for non-potable water use such as toilet flushing.
 - Hybrid electric/thermal energy generation
Examples include technology that generates and captures solar and thermal energy and compact ultra-low emission generators for combined heating/cooling systems and back-up power.
 - Electric energy conservation
Examples include energy efficient transformers, dimming controls for lighting fixtures, programmable energy saving lighting controllers, high intensity discharge lights for gymnasiums and green thermostats that can control room heating, cooling, and lighting systems.



2. Importance of an Energy Management and Environmental Plan

“Over the past decade, changes in the Earth’s environment and its natural systems have emerged as a matter of increasingly urgent concern around the world. While the issues are complex and diverse, there is a shared and universal recognition that solutions will arise only through committed action on a global, national, regional, local, and individual scale. Schools have a vital role to play in preparing our young people to take their place as informed, engaged, and empowered citizens who will be pivotal in shaping the future of our communities, our province, our country, and our global environment”. (Background from Shaping Our Schools, Shaping our Future, June 2001.)

Energy Management has become of global importance in recent times. A major portion of the energy used within our buildings is generated from fossil or non-renewable fuels.

***We do not inherit the
earth from our
ancestors; we borrow it
from our children."***

– Native American proverb

In addition to depleting scarce resources, the continuous use of fossil fuels also results in other problems with pollution and global warming.

Global warming can be described as the effect of pollution on the climate, in particular the burning of fossil fuels (coal, oil, and gas), which causes emissions to the atmosphere of large amounts of greenhouse gases, of which the most prevalent is Carbon dioxide (CO₂). Such gases absorb infrared radiation emitted by the earth's surface and act as "blankets" over the atmosphere, keeping the climate warmer than it would be

otherwise. Global warming leads to problems such as melting of the polar ice cap and a subsequent rise in sea levels, creating more arid climates where freshwater resources are depleted and crop patterns are altered, and decreased air quality and smog leading to an overall reduction in the quality of human health.

Even though alternate sources of renewable energy, which are more environmentally friendly, are being explored, the technology has not yet evolved to a stage where these can eliminate our dependence on fossil fuels. It is therefore critical for us to manage our energy consumption in such a manner that it remains at the lowest possible level. Reducing our overall energy consumption, in addition to other methods of reducing our environmental footprint, will also help reduce our operating costs.

Health and Indoor Environmental Quality - Energy management policies can have an important impact on the quality of the learning environment, particularly in the areas of lighting and indoor air quality. People spend 90% of their time indoors and when comfortable and satisfied with their indoor environment, they become more productive. In fact, studies have shown that this can also lead to a noticeable decrease in sick or personal days taken.

Social Responsibility – One in five Ontarians learns or works in a publicly funded school every day. As our Vision states, schools can and should be centers of the community. It is important that we be a leader in the community to further new environmental



technologies, support environmental policies, and be a role model for environmental stewardship. Schools focused on stewardship education create many environmental ambassadors. As we are responsible for the most valuable asset of any community, children, it is our responsibility to prepare them for a world in which environmental issues and conservation are at the forefront.

Education and Environmental Literacy – Incorporating education into the energy management plan provides a unique opportunity to shape students' understanding of their place in the world and relationship to the environment around them, along with establishing an outlook influenced by conservation and respect.

Giving students an outlet to make change will empower, inspire, and excite them, developing a confidence that they will carry through to their post-secondary and professional careers.

When students become educated about their environment and the many ways in which they can affect it, they invariably will go home and tell their parents all about it, spreading the word rapidly and further enhancing a culture of conservation in our communities. When sustainability concepts are learned early, they may become part of the natural thought process in decision making. Carried into adulthood, these values can lead to innovations in technology and governance, having large scale benefits not only to our community but to the world.

Enrollment – Incorporating environmental awareness and conservation into the curriculum demonstrates to parents that the Waterloo Catholic District School Board is modern and dynamic, providing the best possible education for their children; education that is relevant to the world we live in. Encouraging parent involvement in school

greening projects will be an added benefit to parents who take an active interest in their children's education.

Further, environmental excellence in school building and operations demonstrates care for the health and comfort of the students and staff, making WCDSB schools a desirable place to work and enroll kids.



Fiscal Responsibility – This Energy Management and Environmental Plan is a plan for future investments and concentrations of effort. Limiting our consumption of energy and water will reduce our risk of exposure to increasingly volatile utility prices. Costs invested in the initiatives determined here can be quickly recovered from lower operating costs in the long term. These savings can be redirected to the classroom.

The Canadian Green Building Council notes that design, operation, and behavior each share a one-third responsibility for long-term energy performance. This Energy Management and Environmental Plan is the key to a cohesive strategy for all.

3. School Energy Performance

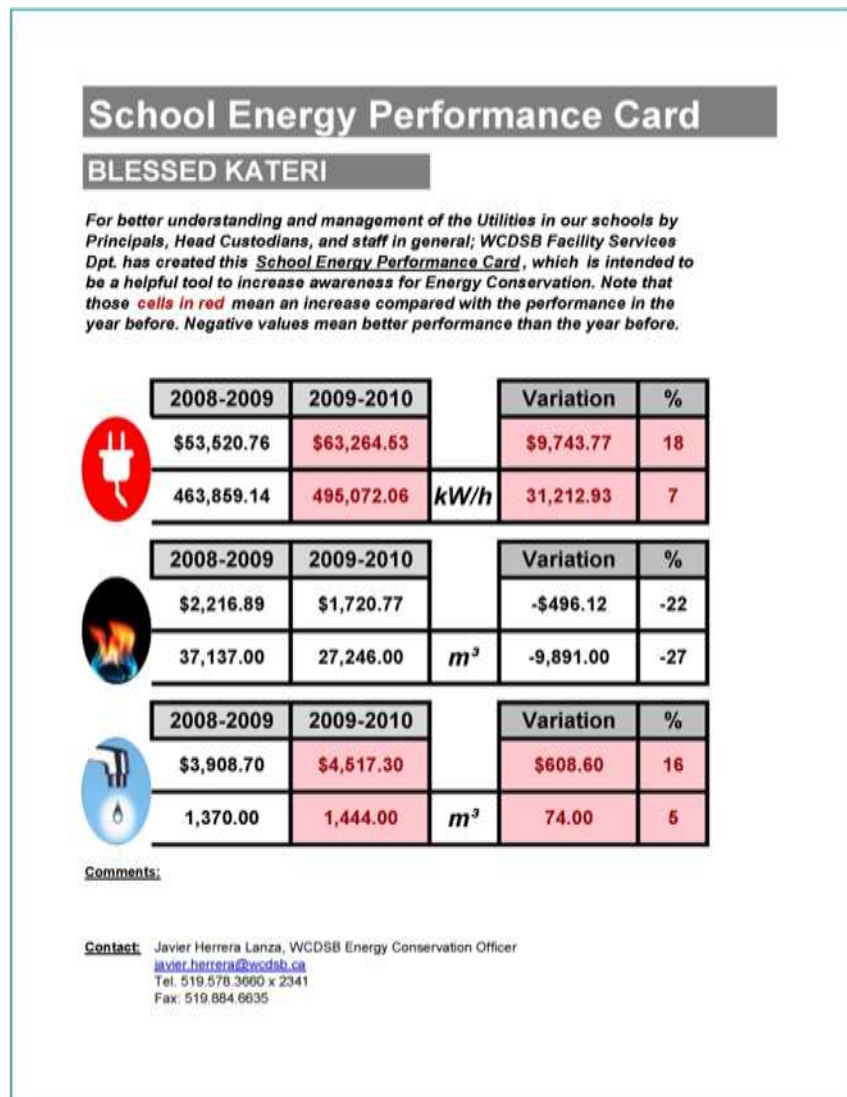
3.1 Energy Performance Cards

For better understanding and management of the utilities in schools by Principals, Head Custodians, and other staff, the WCDSB Facility Services Department created the School Energy Performance Card, which is intended to be a helpful tool to increase awareness for Energy Conservation.

Energy monitoring and tracking is one of the cornerstones of good energy management. The performance cards show the annual consumption of energy and water and also the costs associated with the purchase of these utilities. By monitoring the energy use from year to year, the Board can track the results of the energy conservation efforts of each school. The performance cards also provide an indicator as to which schools should be targeted for major energy conservation measures. The School Energy Performance Cards are issued to Principals, Head Custodians, and staff in order to facilitate better understanding and management of utilities.

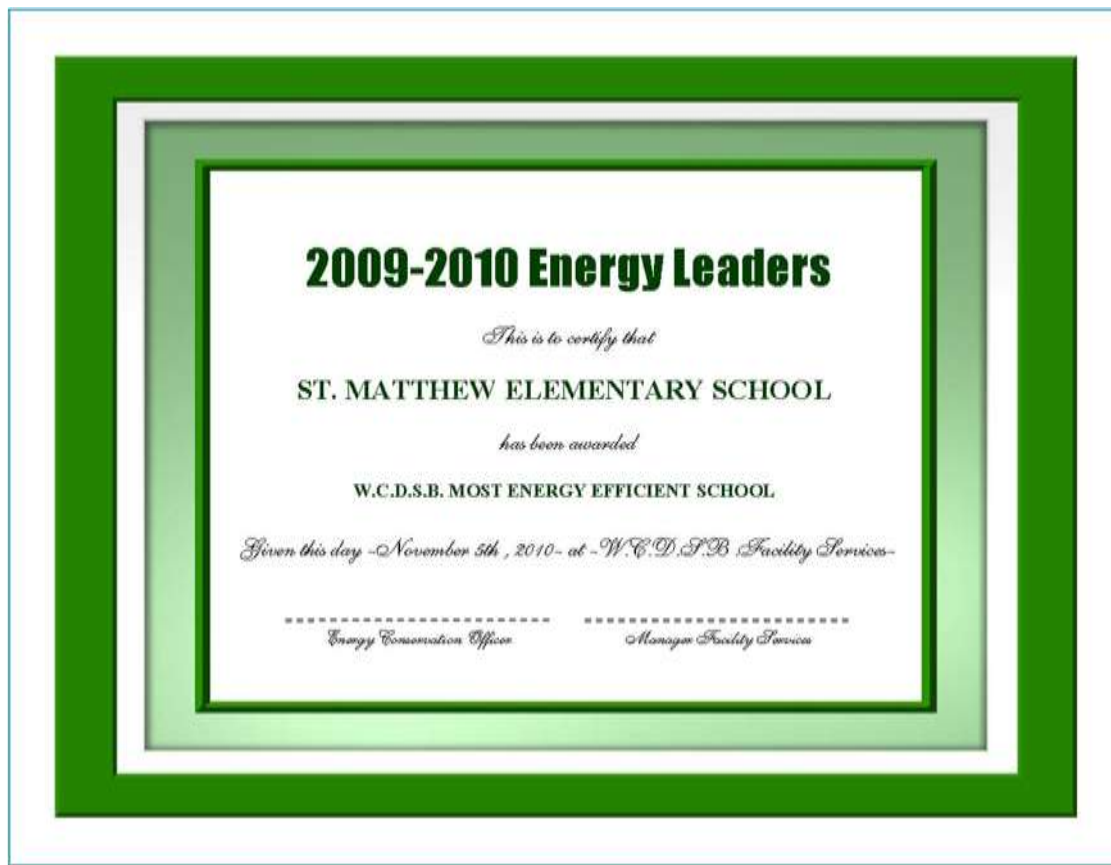
Information gleaned from the Performance Cards has highlighted key performance indicators that provide us with a baseline of energy consumption and costs, both within each school and across the Board. This baseline is useful in establishing a strategy for conservation initiatives and will also serve as a method of measuring our success when new consumption and costs are compared with the baseline.

A sample School Energy Performance Card previously issued is included here:




These performance cards are used to involve each school in the Board-wide effort to improve energy efficiency and, ultimately, reduce our carbon footprint. Schools are able to view their performance in relation to other schools across the Board and can compete for yearly recognition.

Each year, the WCDSB awards the Best Electricity Saver, Best Natural Gas Saver, Best Water Saver, and Most Energy Efficient School.



3.2 WCDSB Carbon Footprint

One of the most important steps toward sustainability is an understanding of where we are today. In order to quantify that, we look at our resource consumption and contribution to global warming through greenhouse gas emissions. Taken altogether, this creates a measure known as our carbon footprint.



Based on the energy audits conducted and billing and consumption data gathered by VIP Energy Services Inc., we have been able to obtain estimates of the carbon footprint of each of our schools and other Board buildings dating back, in most cases, to the 2005-2006 academic year. The following table outlines the measured progress to date and quantifies exactly where things stand with respect to energy consumption for utilities.

Why does the table list school performance in terms of CO₂ Equivalent?

The dominant man-made greenhouse gas is Carbon dioxide (CO₂), which is emitted whenever we burn fossil fuels in homes, factories, or power stations. But there are other greenhouse gases such as Methane (CH₄) and Nitrous oxide (N₂O). These are much more potent than CO₂ but are less prevalent.

In order to simplify the notion of estimating a carbon footprint for an activity or product, and compare data in a meaningful way, all carbon footprint estimates are written in terms of Carbon dioxide equivalent or CO₂e. This means that the total climate change impact of all the greenhouse gases caused by an item or activity are combined and expressed in terms of the amount of Carbon dioxide that would have the same impact. CO₂e is expressed in tons (tCO₂e).

A complete inventory of all direct sources is still underway and definition of "Scope 3" sources such as waste and business travel accounting are still in the works ("Scope 1" includes gas heating, refrigeration, and fleet vehicle usage. "Scope 2" is concerned with electricity consumption.). A complete data set meeting Sustainable Waterloo's carbon footprint measurement and reporting requirements should be in place by 2015.

(See the Glossary for more about Sustainable Waterloo.)

Carbon Footprint by School

	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010
Facility	tCO2e	tCO2e	tCO2e	tCO2e	tCO2e
91 Moore Avenue	100.24	74.02	68.13	62.50	68.55
104 Ontario Street North	-	-	-	-	5.21
Blessed Kateri	158.23	167.72	163.61	187.07	171.75
Blessed Sacrament	175.67	196.61	161.89	232.55	211.21
Canadian Martyrs	218.56	232.61	163.52	173.90	156.64
Christ The King	172.23	158.89	154.24	160.60	158.36
Complex	9.13	21.87	21.61	23.99	22.40
Dutton Drive	176.91	186.29	190.64	192.96	167.37
Catholic Education Centre	473.21	457.31	408.01	447.54	476.93
Holy Family	98.98	97.16	96.81	101.25	95.94
Holy Rosary	231.30	211.63	206.28	210.12	193.81
Holy Spirit	198.86	198.19	193.86	202.33	184.61
John Sweeney	214.59	236.01	196.63	241.44	212.50
Monsignor Doyle C.S.S.	692.67	719.14	671.32	720.14	596.31
Monsignor Gleason	163.11	120.37	107.31	136.12	127.83
Monsignor Haller	116.47	159.57	125.66	138.52	161.69
Mother Teresa	200.46	215.70	210.09	198.28	190.05
Notre Dame	139.48	128.17	98.94	147.29	121.13
Our Lady of Fatima	181.74	184.23	187.71	197.85	197.10
Our Lady of Grace	118.82	111.04	98.31	140.89	132.33
Our Lady of Lourdes	123.21	140.23	149.52	146.78	140.81
Pope John Paul II	-	-	-	-	-
Resurrection C.S.S.	810.63	879.71	799.36	829.31	793.71
Sacred Heart	148.64	148.35	149.36	182.61	35.48
Sir Edgar Bauer	176.27	185.54	199.32	200.10	187.21
St. Agatha	84.17	84.90	84.64	89.64	83.17
St. Agnes	149.65	166.53	163.25	160.53	154.95
St. Aloysius	133.23	98.75	76.68	93.41	90.14
St. Ambrose	264.52	260.42	278.75	289.71	305.40
St. Anne (C)	144.89	123.16	118.86	117.41	104.30



St. Anne (K)	246.16	236.65	236.03	236.40	246.95
St. Augustine	155.28	149.55	151.28	201.04	197.36
St. Benedict C.S.S.	833.49	869.13	875.02	840.05	814.99
St. Bernadette	153.23	162.97	139.17	195.96	206.28
St. Boniface	105.69	118.36	114.13	113.20	108.09
St. Brigid	86.63	103.73	103.05	109.61	77.12
St. Clements (C)	64.91	68.37	81.53	39.62	1.79
St. Clements (S.C.)	138.25	168.35	218.44	211.91	132.55
St. Daniel	148.90	151.99	138.03	138.85	133.06
St. David C.S.S.	903.4	986.8	1,136.0	1,117.1	1,104.0
St. Dominic	214.08	220.84	203.21	290.44	253.63
St. Elizabeth	150.77	145.20	168.80	179.52	170.29
St. Francis (C)	161.66	184.92	225.56	225.71	181.02
St. Francis (K)	216.11	213.81	217.27	222.53	196.41
St. Gregory	169.49	169.66	146.33	155.30	149.58
St. John	184.47	178.86	206.06	168.02	161.07
St. Joseph (C)	149.01	131.00	126.07	127.75	116.93
St. Joseph (K)	157.00	168.50	166.25	169.48	154.52
St. Louis (C)	241.06	278.66	247.29	294.78	257.22
St. Louis (K)	376.87	362.42	354.79	446.46	404.15
St. Louis (W)	107.19	124.80	121.81	98.72	4.66
St . L. (W) Port. 70 Willow St.	6.49	0.37	0.13	-	0.17
St. Louis W., 77 Young St.	92.74	94.66	98.74	141.10	98.70
St. Luke	228.64	256.08	265.25	267.18	258.39
St. Margaret	156.80	157.12	166.73	173.25	165.49
St. Mark	83.35	79.48	66.62	92.33	82.25
St. Mary C.S.S.	1,364.7	1,338.5	1,254.7	1,234.4	1,220.9
St. Matthew	327.38	334.48	329.74	340.85	283.18
St. Michael	201.66	196.02	195.59	210.48	154.37
St. Nicholas	195.45	205.66	216.28	237.14	214.28
St. Patrick (K)	176.48	225.95	175.26	208.43	183.83
St. Paul	182.67	146.96	145.82	157.82	145.91
St. Peter	237.86	235.22	226.04	160.99	161.77
St. Teresa (E)	107.19	98.58	98.79	116.69	106.19

St. Teresa (K)	159.38	163.45	101.12	164.34	151.32
St. Timothy	110.05	114.71	140.55	137.37	137.40
St. Vincent de Paul	114.37	129.62	127.43	140.61	139.82
Board Total	14,584	14,935	14,530	15,390	14,122

Taken as a whole we find that the WCDSB was responsible for 14,122 tons of CO₂ equivalent for the 2009-2010 academic year. Knowing this, we will be able to evaluate our performance going forward and measure the success of our Energy Management and Environmental Plan as we monitor and compare our tCO₂e in future academic years.



3.3 Comparison with Other Boards

Nearing the end of the United Nations Decade of Education for Sustainable Development (2005–2014), energy conservation is being implemented to varying degrees in institutions of all types. While most Ontario school Boards have adopted a strategy to reduce their energy consumption, many fall short of the sustainable implementation of the type of change that is required.

Some Ontario school Boards have already embraced the challenge and are building green and energy efficient schools:

- More than 100 Ontario schools from over 16 school Boards have qualified under Natural Resources Canada's Commercial Building Incentive Program (CBIP), achieving an average of 39% energy savings (over Code compliance), and 11 have surpassed the 50% energy-saving mark.
- Ontario schools have also been recognized under the Leadership in Energy and Environmental Design (LEED™) green building certification program.

In a survey completed by ZAS Architects Inc. and Halsall Associates for the creation of the Ontario Ministry of Education's *Green Schools Resource Guide*, half of Ontario school Boards scored their own familiarity with "green", "sustainable", or "high performance" schools as moderate or low.

This provides an opportunity for the WCDSB. Ultimately, school Boards and their school communities are in the position to define "Green Schools" for themselves.

3.3.1 Benchmarking Green Schools

Benchmarks provide representative values against which you can compare the school's actual energy performance. Comparison with benchmarks of annual energy use per square metre of floor area or cost per pupil will enable an assessment of energy efficiency to be made and remedial action to be taken.

Once benchmarks are determined they can be used to measure future success in energy consumption by comparison.

Canadian Benchmarks

In 2001, Natural Resources Canada's Office of Energy Efficiency (OEE) issued the *Benchmarking Guide for School Facility Managers*, intended to help facility managers calculate their school's energy performance and compare with benchmarks in the same region across Canada.

Getting started involves finding out where energy is being used and determining the main areas that can be improved. There are approximately 15,000 schools in Canada administered by about 495 school Boards.

Energy use and cost data were gathered during its first pilot program. About 1,473 schools responded to the OEE's data collection process. The Agence de l'efficacité énergétique and Québec's Ministère de l'Éducation provided additional data from 2,770 schools in Québec. Because fiscal years vary, the data are based on 1997–1999.

Results from the study show the average breakdown of energy consumption by fuel type. In Ontario, an estimated 56.5% of school Boards' energy demands are met with natural gas, while electricity supplies 36%. Oil and other fossil fuels make up the remaining less than 10%.

The WCDSB, in comparison, supplies 39.8% of our energy demands from natural gas and 60.2% from electricity. We do not utilize oil or other fossil fuels to meet our needs.

Region	Number of Schools in the Analysis	Area of Schools (in millions of m2)	Electricity	Gas	Oil	Other	Total Energy Use (eGWh)
Territories	7	0.031	29.2%	0.0%	70.8%	0.0%	5
British Columbia	406	1.71	33.6%	49.0%	16.4%	1.0%	368
Alberta	371	1.76	31.1%	68.9%	0.0%	0.0%	560
Saskatchewan	90	0.36	22.9%	77.1%	0.0%	0.0%	127
Manitoba	113	0.51	32.4%	57.8%	8.8%	1.0%	123
Ontario	444	2.4	36.0%	56.5%	7.4%	0.1%	343
Quebec	2770	12.15	50.9%	39.9%	9.2%	0.0%	2451
Atlantic Provinces	43	0.18	30.8%	69.2%	0.0%	0.0%	32
WCDSB	46	0.261	60.2%	39.8%	0.0%	0.0%	66.7

Note: 1 eGWh = 1,000,000 kWh: Provincial Averages are from 1997-1999 data

Calculating a school Board's energy benchmark involves collecting data on occupancy, annual energy use, climatic variations, and physical characteristics of the site.

For example, the table below shows average energy consumption broken down by area (on the left) and by number of students (on the right). The "Actual" column for each lists the real data; comparing provinces across the country by their actual number of kilowatt hours consumed. This comparison alone would not give the whole picture if we want to understand how energy efficient a school is, either with regard to its design, operations, or behaviors of its staff and students. This is because the climate varies greatly across of the provinces and territories. Of course a school in Tuktoyaktuk is going to use more energy to heat the building than a school in Southern Ontario.

To compare energy consumption in a fair way which takes climate factors into consideration, the consumption totals are "Normalized" using a calculation to take into consideration the number of days per year that a building needs to be heated due to the outside temperature, known in the energy industry as heating degree days (HDD).

Summary of School Boards' Annual Energy Consumption Benchmark, Categorized by Region						
Region	Number of School Boards in Analysis	Actual Average ekWh/m²	Normalized Average ekWh/m²	Number of Boards in Analysis	Actual Average ekWh/student	Normalized Average ekWh/student
National	109	242	246	103	3116	3170
British Columbia	11	240	260	11	2511	2815
Alberta	11	328	327	10	4340	4344
Saskatchewan	6	383	397	4	3650	3674
Manitoba	7	293	303	6	3990	3877
Ontario	7	255	253	6	3523	3506
Quebec	65	214	217	65	2684	2727
Atlantic Provinces	2	171	167	1	1840	1727
WCDSB	1	255	253	1	3155	3140

Note: WCDSB 2010 weather and consumption data, 66,687,115ekWh, 261,319m², 21,136 FTE Enrollment.

Results of this study show that Ontario falls somewhere in the middle of the pack in terms of the energy consumption of its school Boards.

The WCDSB strives to analyze our consumption data and compare our performance to what other Boards and provinces are doing. Advances in Measurement and Verification and general protocol are pushing the models and data that we generate to new levels of accuracy and detail. Linear regression and cumulative sum modeling are being investigated to improve statistical accuracy in our reports and in estimation of actual savings to ensure we keep vendors to their guaranties.

UK Benchmarks

The *Managing Carbon Consortium* website and its online benchmarking tool were originally developed as part of the UK's Carbon Trust initiative. The UK has ambitious targets for reducing emissions of greenhouse gases, and the education sector can make a valuable contribution to this national effort by reducing the use of energy throughout the sector.

The benchmarking tool is a method which allows schools to compare their energy performance with other schools, by comparing their annual energy use per square metre.

This data can be used as a tool to compare the energy used in a school with the typical consumption of similar schools. This can help to indicate which schools have developed sustainable energy practices that deserve to be recognized. It can also be used to indicate which schools need to address their energy policies to reduce energy consumption and costs.

The following tables contain the benchmark data collected from 14,200 schools in the UK for the academic year 1999-2000.

Benchmark figures calculated from DfES data for 14,200 schools for the year 1999/2000 (the base year, FY 2000)

Benchmarks for Primary schools - NEW

Benchmark	Statistical meaning	Fuel/sqm (kWh/sqm)	Elec/sqm (kWh/sqm)	CO2/sqm (kg/sqm)
Best Practice	15% of schools did better than this level	78	19	27
Good Practice	25% of schools did better than this level	105	23	34
Typical	50% of schools did better than this level	151	32	46
Bad Practice	75% of schools did better than this level	203	46	60

Calculated March 2005, using data from FY 1999/2000

Benchmarks for Secondary schools - NEW

Benchmark	Statistical meaning	Fuel/sqm (kWh/sqm)	Elec/sqm (kWh/sqm)	CO2/sqm (kg/sqm)
Best Practice	15% of schools did better than this level	79	23	28
Good Practice	25% of schools did better than this level	103	27	35
Typical	50% of schools did better than this level	144	33	45
Bad Practice	75% of schools did better than this level	190	42	56

Calculated March 2005, using data from FY 1999/2000

By calculating the annual consumption in terms of kilowatt hours per square metre, we can allow schools of different sizes to be compared in a meaningful way. For each category, we calculate the median value of the data. This is the value which 50% of data

points will be higher than, and 50% will be less than. It is much less affected by outlying data than the average value.

We also want to establish, for both categories, some measure of which schools are doing significantly better than typical, and which are doing less well. We define schools demonstrating “good” practice as those whose energy consumption represents the first quartile level of the data.



At this level of consumption 25% of the schools in the category will be doing even better, while 75% will be using more energy. In a similar way, we define the third quartile as the level demonstrating poor performance. At this level 75% of schools will have better (lower) energy consumptions, while only 25% will be worse.

For the very best performing schools, we use the 15th percentile, the level at which only 15% of schools will be doing better, as a measure of best practice.

The benchmarks are calculated separately for electricity and fuel, to identify schools which may be doing very well in terms of electricity consumption, for example, but may be doing less well in terms of fuel consumption.

Finally, we have to consider weather corrections. When the benchmark graph is displayed, the benchmark levels are always the same within each category. The individual school, however, may have its consumption level modified slightly to reflect geographic location. The different regions of the UK are normalized by the average degree days for the year. It is assumed that 75% of the fuel consumed is used for heating, and this component is modified by a degree day calculation.

The benchmarks are designed to encourage the lower 75% to make improvements, aiming towards the good practice benchmarks, while also suggesting that the top 25% of performers should not be complacent. Wherever a school stands in comparison to the good practice benchmarks, there will always be room for improvement.

The *Managing Carbon Consortium* website offers a demo page which is accessible to anyone and allows data to be added from any school in order to gain a comparison with all other schools entered into the benchmarking tool.

The screenshot shows the 'the Managing Carbon consortium' logo on the left, with 'Energy International' in large text on a blue background with green grass at the bottom. Below the logo is a navigation menu with links: 'Schools Benchmarking Home', 'Step by step guide', 'Local Authority Log in', 'Demo account', 'Download ECG073 - Saving energy in schools', 'Information', and 'Contact'. A 'Logout' button is also present. The main content area is titled 'energy benchmarking tool for Schools'. It features a section 'First, either SELECT a school from the list:' with a scrollable list of schools: 'Mary Carr', 'Mary Carr', 'Claremont Fan School', 'Trinity Road Primary School', and 'Harrowgate Hill Primary School'. To the right of this list is a 'Click here for help ?' link and a 'delete from list' button. Below this is a section 'OR to create a new school, enter a new name, school type and postcode, and click the add to list button:'. It includes a text input for 'name', a dropdown for 'Select school type', and a text input for 'Enter new building's postcode:'. An 'add to list' button is next to the postcode input. To the right of this section is a 'downloads' button and a 'To go to the download screen, and obtain downloadable spreadsheets of your LA's school data. click here:' link. At the bottom, there are '<< Back' and 'Next >>' buttons, with the text 'WHEN YOU ARE READY click the Next button' above the 'Next >>' button.

the Managing Carbon consortium

Energy International

Making business sense of climate change Schools Benchmarking Help: 01527 515 755

Schools Benchmarking Home

energy benchmarking tool for Schools

First, either SELECT a school from the list:

Mary Carr
Mary Carr
Claremont Fan School
Trinity Road Primary School
Harrowgate Hill Primary School

Click here for help ?

To delete the highlighted School, click here: delete from list

OR to create a new school, enter a new name, school type and postcode, and click the add to list button:

Select school type

Enter new building's postcode:

add to list

downloads

To go to the download screen, and obtain downloadable spreadsheets of your LA's school data. click here:

WHEN YOU ARE READY click the Next button

<< Back Next >>

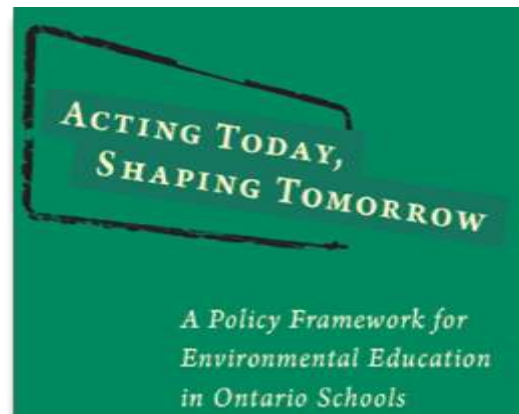
<http://www.energybenchmarking.co.uk/schools/demo/admin.asp>

3.3.2 Ontario Ministry of Education


The Ministry has gone as far as publishing its own policy framework for Ontario schools. *Acting Today, Shaping Tomorrow* (published in 2009) provides guidance to school Boards and schools on how they can develop or revise an environmental education policy, teach environmental literacy, and enhance the development of more environmentally responsible practices.

The specific actions from the identified strategies that stem from this policy are clear.

The Ministry of Education is committed to working with education partners across Ontario to realize the vision of environmental education and achieve the key goals of the policy framework for environmental education in Ontario.



The Ministry, school Boards, and schools each have a vital role to play. The environmental education framework addresses the need for a unified and cohesive approach that will ensure consistent province-wide implementation.



“Ontario’s education system will prepare students with the knowledge, skills, perspectives, and practices they need to be environmentally responsible citizens. Students will understand our fundamental connections to each other and to the world around us through our relationship to food, water, energy, air, and land, and our interaction with all living things. The education system will provide opportunities within the classroom and the community for students to engage in actions that deepen this understanding.”

Shaping Our Schools, Shaping Our Future, p. 4

Its development has been guided by the following five key principles:

1. Environmental education is not only about visible environmental issues but also about their underlying causes. Getting to the root of these causes requires placing an emphasis on personal and social values and active stewardship.
2. Student engagement and leadership are central to environmental education.
3. Leadership by example means integrating elements of environmental education and responsible environmental practices into all decisions and actions.
4. Environmental education must be implemented locally so that it is meaningful and relevant to our diverse communities.
5. Realizing environmental education in Ontario schools is a long-term, ongoing process that will evolve over time.

The Ministry has drafted performance indicators by which to measure the relative success of energy conservation and stewardship initiatives adopted within schools and

school Boards, and has committed to performance indicators which the Ministry itself will adhere to.

These performance indicators fall under three categories.

- Status indicators
- Facilitative indicators
- Effect indicators

Status indicators tell you where you are at the beginning of the process. They provide the baseline information against which future progress can be measured.

Environmental education is education about the environment, for the environment, and in the environment that promotes an understanding of, rich and active experience in, and an appreciation for the dynamic interactions of:

- the Earth's physical and biological systems;
- the dependency of our social and economic systems on these natural systems;
- the scientific and human dimensions of environmental issues;
- the positive and negative consequences, both intended and unintended, of the interactions between human-created and natural systems.

Shaping Our Schools, Shaping Our Future, p. 6

Facilitative indicators tell you about the supportive context and processes already in place that can facilitate implementation. They can be divided into context indicators, which describe the general supportive context, and process indicators, which describe the level of engagement of the ministry, the school Board, the school, and other stakeholders in the process.

Effect indicators measure short-term, mid-term, and long-term results and are usually known as output, outcome, and impact indicators, respectively.

These indicators as outlined by the Ministry are:

Status Indicators			
	Ministry	School Board	School
	<ul style="list-style-type: none"> • Number of school Boards that have environmental education policies in place • Type of professional learning provided • Nature of environmental education opportunities and expectations provided in the revised curriculum • Type of teaching resources available 	<ul style="list-style-type: none"> • Availability of community partnerships for environmental purposes • Availability of environmental education training • Availability of teaching resources 	<ul style="list-style-type: none"> • Types of environmentally responsible management practices currently in place • Type and number of environmental education resources in school library and classrooms
Facilitative Indicators			
	Ministry	School Board	School
Context Indicators	<ul style="list-style-type: none"> • Availability of resources from other ministries • Availability of training 	<ul style="list-style-type: none"> • Support dedicated to school resources for environmental education or greening practices/facilities 	<ul style="list-style-type: none"> • Type of community groups that could support implementation at school level
Process Indicators	<ul style="list-style-type: none"> • Extent of participation by stakeholders • Extent of training already offered • Existence of interbranch and interministry mechanisms of cooperation 	<ul style="list-style-type: none"> • Extent of participation by stakeholders and broader community • Existence of Board-wide environmental education committees • Existence of activities and programs that use environmental education as an integrating theme 	<ul style="list-style-type: none"> • Type of community groups that could support implementation at school level

Effect Indicators			
	Ministry	School Board	School
Output Indicators	<ul style="list-style-type: none"> • Environmental education integrated into curriculum review process • Environmental education integrated into other frameworks and guides 	<ul style="list-style-type: none"> • Policy for environmental education established • School Board staff participating in professional development related to environmental education • Board-wide committee established to coordinate implementation within the Board 	<ul style="list-style-type: none"> • Environmental education plan developed • Schools consider purchased of resources and materials through the lens of environmental education and environmentally responsible management
Outcome Indicators	<ul style="list-style-type: none"> • Shared inventory of school Board practices created 	<ul style="list-style-type: none"> • Implementation plan in place that is renewed, revised, and communicated annually 	<ul style="list-style-type: none"> • School council provides advice on implementation • Community partners involved as resources for school planning • Number of student focused, action-oriented environmental education projects increasing
Impact Indicators	<ul style="list-style-type: none"> • Student leadership and engagement improved • Alignment between initiatives improved, leading to better outcomes for all students 	<ul style="list-style-type: none"> • Opportunities for student leadership in environmental education increased • Environmentally responsible practices are included in Board activities and operations 	<ul style="list-style-type: none"> • Environmentally responsible practices are included in Board activities and operations • Students are more involved and engaged in environmental education • Environmental education used as an integrating theme for planning purposes at the whole school level

3.3.3 Summary

The following insights have been gleaned from the above benchmarking as well as from comparisons with the British Columbia government and school Boards across Ontario, which are detailed in the References section of this document.

Energy conservation is being implemented to varying degrees in school Boards across Ontario, Canada, and the world. While the concept of a green school is still emerging, there is an exciting opportunity for school Boards to contribute to the discourse of what defines a green school.

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

Environmental strategies for green schools encompass both operational and policy improvements as well as environmental education.

A comprehensive energy management plan should be for the long term, taking advantage of “low hanging fruit” to result in immediate cost savings which will be redirected to more complex projects involving higher initial costs with larger net benefits.

The schools and Boards examined did not attempt to apply boiler plate solutions used by business and industry but have taken advantage of the unique physical and non-physical attributes of schools as opportunities, from green power generation on large flat roofs to community gardens on their large properties.

No measure is too small to make a contribution to the overall goal, including turning off lights and computers when not in use.

An energy management and environmental plan is most successful when students and teachers are involved and encouraged to participate actively in auditing, planning, monitoring, and implementing.

On-going professional development is a key factor in the success of an Energy Management and Environmental Plan so that staff understands how their role fits into the greater goal.


The Energy Management and Environmental Plan and accompanying education should be a required part of daily school activity.

It is important to share our experiences and successes as we carry out our Plan, so that they may be used as a tool and a beacon for other Boards beginning the process.

It is possible to achieve a green school while adhering to the budgetary constraints of a publicly funded school system. This fact remains clear that new technology and ideology changes have produced continued operational cost reductions while improving indoor comfort and environmental sustainability. These cost saving projects essentially pay for 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.

A growing number of school Boards are looking to LEED™ standards when building new schools. This Board is no exception in consistently looking to ensure that new development is properly planned to achieve long-term sustainability.

British Columbia has emerged as the Canadian leader in its efforts to make all public buildings carbon neutral. This is a good resource to look to.



From the performance indicators set out by the Ministry for schools and school Boards, we have learned that for our Energy Management and Environmental Plan to be successful we must:

- Identify opportunities to form community partnerships for environmental education purposes.
- Expand on and plan for professional development.
- Inventory teaching resources and assess what is available in our school libraries and classrooms.
- Support school greening practices such as environmental clubs.
- Assess community groups that could support environmental education now.
- Document the current level of participation by stakeholders and the outside community to identify opportunities and areas for improvement.

Our Board is proud to have a Sustainability Committee responsible for our overall energy and environmental strategy. This team meets regularly not only to discuss opportunities within the Board but also to set goals and improve on current standards. Our team, like the WCDSB as whole, is always striving for excellence. The following is a list of the existing members:

- **Arnie Wohlgemut**, Sr. Manager of Facility Services
- **Darcy Davis**, Web Developer
- **Dave Bennett**, Sr. Manager of Capital Planning
- **Javier Herrera Lanza**, Energy Conservation Officer
- **Jeff Admans**, Manager of Purchasing
- **John Shewchuk**, Chief Managing Officer
- **Maura Quish**, Manager of Human Resources
- **Robert Holowack**, Spec. High Skills Major & Tech.
- **Rodney Eckert**, Principal
- **Sandra Quehl**, Chief Information Officer



4. WCDSB Energy Conservation Measures to Date

Our conservation measures to date are a broad sweep of inspirational ideas. The way in which these initiatives have been adopted and supported across the Board is a direct result of our successful history and our optimism for the future. The following section highlights some of the more intensive energy conservation measures implemented to date.

4.1 Objective Measurement

As a first step in the Board's Energy Management policy the Facility Services staff created a reliable Board-wide Energy Consumption database to set benchmarks that will be the reference point not only for global sustainability moving forward but also to help put a placeholder on the starting conditions to mark improvement.

Complete details on the measurements from each school and their performance cards are included in the Energy Performance Cards section of this document, Section 3.1.

Based on the results tabulated, the WCDSB's historical energy and water consumption totals have been identified here.

Figure 4.1.1 - Annual Total Energy Consumption (ekWh)

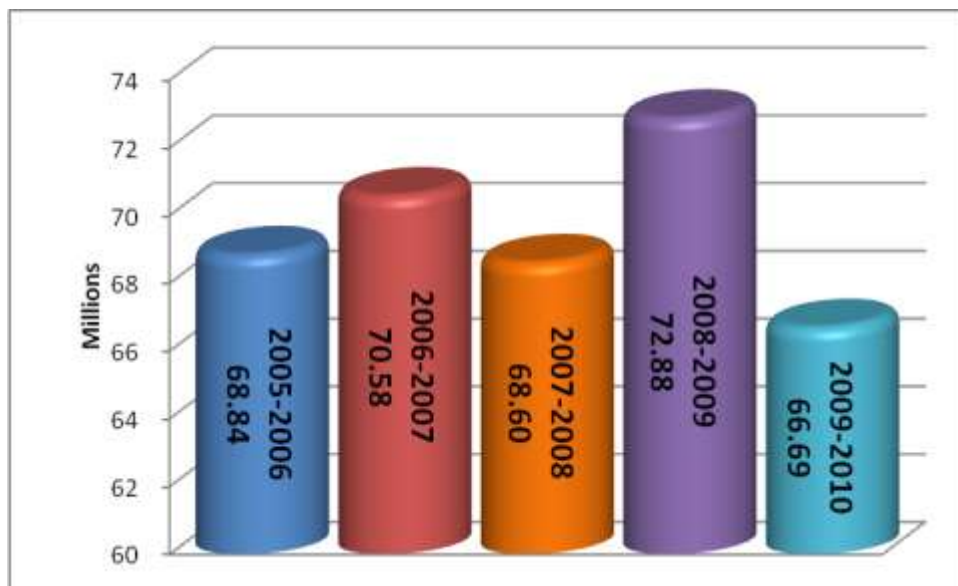
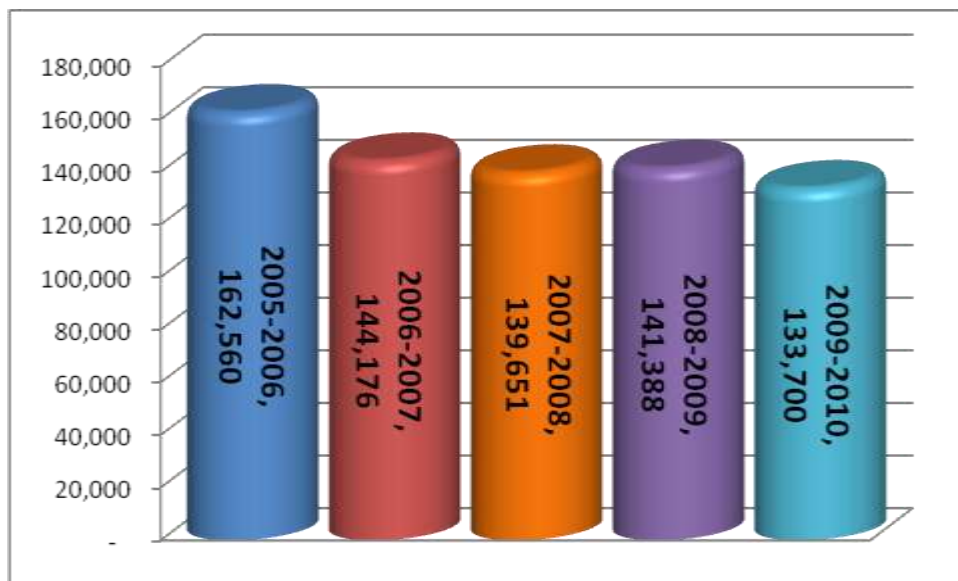


Figure 4.1.2 - Annual Water Consumption in m³



4.2 Where to Start? Energy Audits

Once the overall consumption is measured for any organization the next level and natural progression is to gain an understanding of where the utilities are consumed in order to focus on waste reduction and target systems that consume the most resources based on specific criteria.

A cross-section of schools has been audited and will continue to be audited in order to keep our finger on the pulse of the average school energy balance. Remediation measures and on-going capital planning will be implemented based on these audits in order to reduce or eliminate causes of negative performance.

Based on the information gained from the School Energy Performance cards the lowest performing schools were selected to be the focus of the first energy audits undertaken. VIP Energy Services Inc. was contracted by the WCDSB to perform energy audits at the following schools:

- St. Ambrose
- St. Clements
- St. Francis
- St. Matthew

In total, the energy audits identified 106 energy management opportunities in these four schools. The total savings potential was determined to be \$84,011, with an associated cost of \$932,195.

These opportunities range from low-cost/low-effort changes, like the installation of low flow faucet aerators to reduce water consumption, instituting a summer shut-down procedure, and replacing worn out weather stripping, to more complicated measures such as the installation of a renewable energy generation system. Other process improvements such as reducing the size of equipment and process loops were also identified. Some of these opportunities are less complicated and financially viable while others are more technically involved and require significant upfront investment. The Board ultimately decides which energy savings measures to put in practice according to our budget and identified payback periods.

Since many of the schools within the Board use similar equipment and are designed for a common purpose, many of the opportunities identified in the audits of these four schools have been standardized throughout. Individual energy balances may be required to quantify the savings and costs associated with these retrofits at the other schools. In any case, the energy management opportunities identified for the four schools audited will be useful indicators as to what to look for in the other schools.

Funding for retrofits under the Electricity Retrofit Incentive Program (ERIP) was applied for and \$122,766 has been sanctioned. Further funding opportunities are identified in Section 7.3 of this document.

4.3 Green Schools Pilot Initiative

Large, flat rooftops are ideal locations for solar thermal and photovoltaic systems. The WCDSB has taken advantage of this through participation in the Ministry's Green Schools Pilot Initiative.

Two projects have been undergone at schools within the Board; the installation of solar district hot water heating at **St. Mary's Catholic High School** in Kitchener, and photovoltaic solar panels at **Monsignor Doyle Catholic High School** in Cambridge. These two pilot projects will open the door for new technology to be implemented in schools across Ontario so that we can utilize our flat roofs as an asset for electricity generation in the future. Our efforts are also helping to ensure that existing local technology is encouraged to develop further.

4.3.1 Solar Domestic Hot Water (DHW) Heating

As part of the Green Schools Pilot Initiative, the WCDSB has installed Viessman Domestic Hot Water Solar Panels at St. Mary's Catholic Secondary School.

Solar Water Heating is a process of thermal energy generation using energy from the sun. In this process heat radiation from the sun is used to passively warm

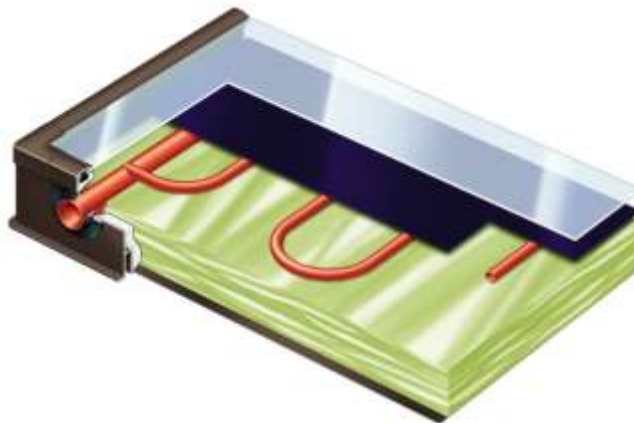


water for domestic use, water which would otherwise need to be heated using natural gas.

Essentially, collection panels on the roof collect passive radiation by acting as a blackbody, absorbing heat with high efficiency (roughly 70% of the sun's energy is converted to heat versus the 10-30% during photovoltaic generation). The panels preheat incoming water from city water mains so that less natural gas needs to be consumed in heating the water to the temperature that is required for use in various building operations systems. By preheating this water before it reaches the conventional water heater or boiler we can reduce the amount of energy consumed by the heating process.

This technology is particularly applicable to schools as the bulk of their hot water demand occurs during the day, when solar energy is generally readily available. Schools in use during the summer months are ideal for these types of projects.

Solar domestic water heating not only reduces operating costs due to the reduction of natural gas usage, but it also reduces the environmental impact as greenhouse gas emissions are reduced.



These panels are having a noticeable impact on overall consumption of St. Mary's School. However, as the project was only recently implemented, the actual numbers from this project are still being compiled.



4.3.2 PV Solar Panels

It is estimated that, using photovoltaic technology, the average high school roof in Ontario can produce up to half a megawatt of electricity that can feed the provincial energy grid. This is one step in reducing the need to produce electricity by burning coal or splitting atoms.

Presently, most school roofs are covered with tar and gravel, creating "heat islands". Covering these with Rooftop Solar PV systems will also act as shade to cut down on this effect and reduce our need for air conditioning thus reducing overall energy consumption. Further, every 10 to 20 years tar and gravel roofs need repair or replacement. They get stripped off and sometimes may end up in our environment. With proper design, engaging research, and innovation we are seeing photovoltaic systems covering major roofs while being artful and inspiring.

Solar photovoltaic (PV) panels use semiconductors to convert sunlight into electricity, providing energy whenever the sun is shining. Solar PV systems are easily scalable, providing any desired amount of power by linking individual panels together to form arrays. Panels are easy to integrate, having little impact on other building systems. For optimum efficiency a panel must be installed in an unshaded area and angled to face the sun as often as possible.

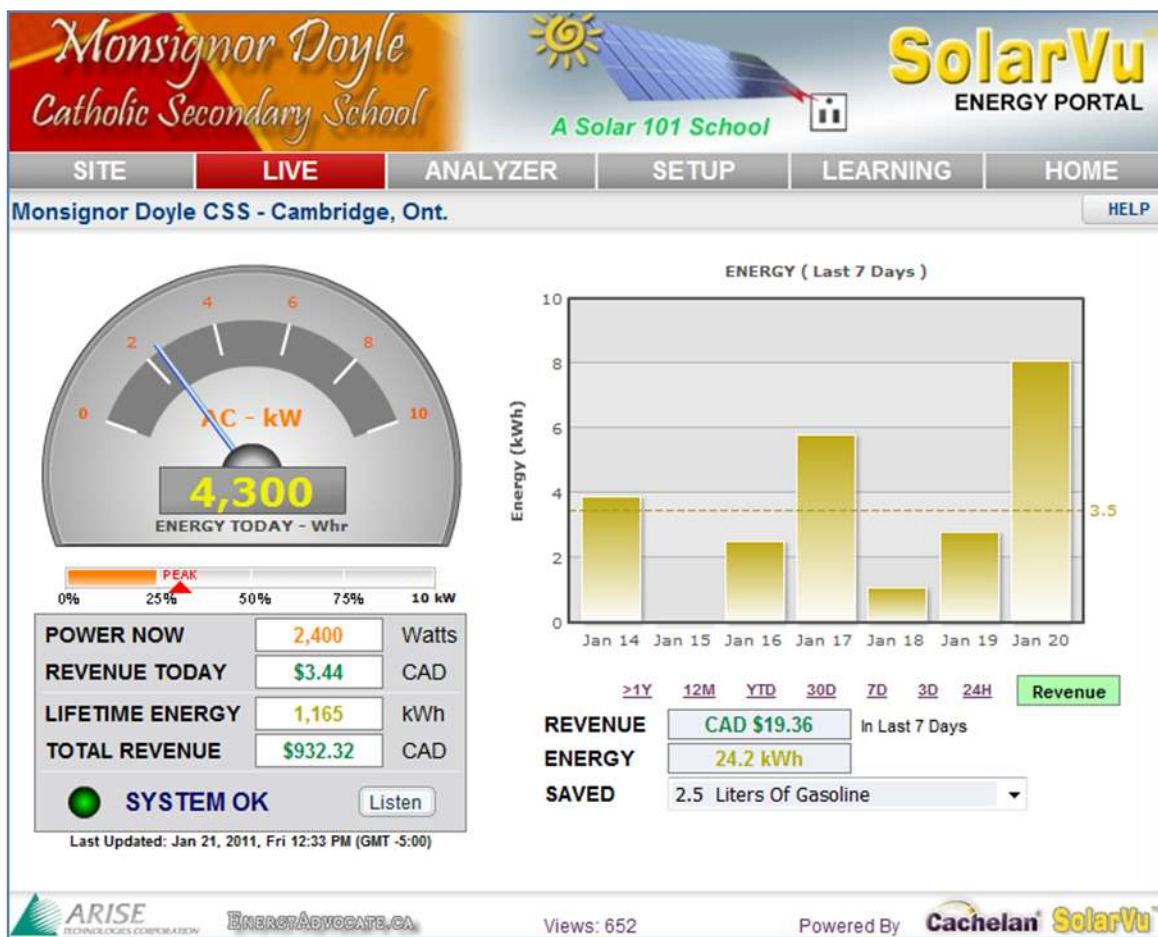


A 10kW solar PV system from ARISE Technologies was installed and is currently being monitored for performance at Monsignor Doyle Secondary School. This pilot initiative includes solar PV hardware, software, and a SOLAR 101 curriculum that produces clean energy while educating.

The panels installed at this school are registered under the Ontario Power Authority's Micro Feed-in-Tariff (Micro FIT) incentive program put forth by the province. Each kilowatt-hour generated by the units is paid out at \$0.802. The credit is issued on a separate check issued to Board quarterly.



The panels themselves are monitored online via the SolarVu program. SolarVu software technology allows the community to be directly involved. This is a good way to engage the public and promote good relations. This is a research, monitoring, and managing web portal that can include all schools in Ontario to be a smart energy management grid for schools. With further application this software technology enables us to manage our



energy waste and consumption. This helps us understand how to better achieve our goal of carbon footprint reduction. When a Solar 101 system is up and running, students across the world can link to the site and see in real time how many watts are produced, dollars earned, and carbon tonnage avoided.

<http://www.doyle.solarvu.net/green/solarVuLive.php?ac=doyle&dr=energyadv>

The panels at Monsignor Doyle have already generated 1,165kWh since its commissioning only a few months ago.

Looking to the Future

The Ontario government's goal of displacing the burning of coal with more sustainable methods of creating energy is of strategic importance. Creating a local hub of energy production on major flat roofs to ease the demand load on the grid on hot days in Ontario is a very important step to achieving independence from non-renewable energy sources. This is localized energy production and requires lots of flat roof space that schools and other such institutions have. Investing in our children's education on new technology is very much a long term benefit to Ontario.

The solar industry understands that if we are to help to create 55,000 new jobs in Ontario we will require training and education on the subject. In order to educate the community about this technology at the grass roots level it is essential that this is introduced as part of the school curriculum. The Solar 101 For Schools program is a good start in that education and prepares high school students for the new energy economy. Just as Ontario, at one point had to decide to invest in the new computer technology, Ontario is at the point of deciding to invest long term in solar technology. Solar 101 is comprised of 3 parts - hardware, software, and curriculum.

A strong market and demand for solar systems in Ontario is one of the reasons a solar manufacturer would locate in Ontario - if there is a market for the product manufacturers will locate nearby. Ontario schools are the perfect neighborhood locations to help promote the technology and create demand encouraging manufacturers to locate here.



Good examples of creative designs are the Vatican PV system that presently produces 1.2 Megawatts of PV energy - this had led to present plans of covering all feasible roofs at the Vatican and the math shows they will produce much more than they consume. A good lesson for students to learn is that you can produce energy and still be beautiful.

Parents, donors, and community members can buy/donate a panel to show their support for the school once the system is installed and the grid has been tied.

In the first month, the solar system at Monsignor Doyle earned \$600, to be reinvested in environmental projects across the entire Board.

The rows of solar panels installed at Monsignor Doyle will add an estimated 14,600 kWh of clean energy to the grid per year. To produce the same results by burning fossil fuels, 11 tons of Carbon dioxide would be exhausted into the atmosphere.

The total cost was \$180,000 for the 10-kilowatt size system. And based on a price of \$0.802 per kWh transferred to the grid, and on the estimated 1,460 sunny hours per year, the project is expected to generate \$11,709 a year.

4.4 Operational Efficiency Improvements

Despite the need for additional capital investments many conservation opportunities within the Board have been put in place with simple operational changes.

Changes in focus or simply looking out for the big picture enables us to continuously improve on existing systems.

It is always a preferable green and economic policy to save a watt rather than to generate a watt. The following documents the many and varied measures taken to improve our energy efficiency through operational changes. Many of these items were identified directly from the energy audits completed by the Board.

4.4.1 Intelligent Temperature Settings

Despite constant effort to improve the overall efficiency in schools, the primary function of any building is to keep its occupants comfortable. Advances in Building Automation System (BAS)



technology, response rates of controls, and overall building envelope quality have allowed many changes to be made to standard temperature settings and schedules.

Currently, BAS schedules throughout the Board are optimized at least annually and are programmed to specific longer periods of unoccupancy, such as the Christmas holidays. The schedule varies by school but is typically optimized to the updated bell times each year.

Heating and ventilation, which controls temperature and general comfort in a building, is the prime consumer of energy in a school. Optimization of temperature is taken very seriously as thermostat savings of 4% to 5% per 1 ° F setback are typically observed.

As such, the WCDSB has set a standard for temperature settings across the Board.


For Heating, all thermostats are set to no more than:

- 22° C for Classrooms, Offices and Meeting rooms
- 20° C for Secondary School Shops, Gymnasiums, Change rooms, Washrooms, Corridors
- 16° C Night Setbacks

For Cooling, all thermostats are set at not less than 24° C. Cooling is set at 27° C after the first week in July until the last week of August, except where summer school is in session.

Cooling Systems and window mounted and portable AC units are not operated when the building is unoccupied. Windows are kept closed in conditioned spaces.

There is also a Unit Ventilator Maintenance program in place for portable classrooms every year during the spring season to evaluate the physical and operational condition of this equipment and provide them with the scheduled maintenance, condensers clean-up, and necessary tune-ups. This program, which represents a standard in our Board, helps to extend the serviceable life of our equipment, maintains adequate indoor air quality, and reduces the amount of on/off cycles resulting in another smart way to save energy and money.



The Board sees these standards as starting points to jump off from, as many other Boards in the province have been able to lower nighttime setbacks significantly without compromising morning start-up or building integrity. Some of these changes may have to be made individually based on the building characteristics.

Advances in cooling standards are also being investigated. Most Boards have started overcooling slightly in the morning in order to be able to slack off during peak time-of-use periods, which are associated with highest time-of-use costs. The idea is to develop almost a separate set of operating sequences when the outside temperature is forecasted to change dramatically. Similar systems are already in place in other temperate climates where swings from heating to cooling requirements occur frequently.

4.4.2 Building Automation Systems

A Building Automation System (BAS) is used to automatically control and regulate the HVAC system within a building. The BAS ensures that the HVAC system is set and operating at optimum levels of efficiency.

Motors, dampers, valves and other heavy equipment like chillers, boilers, fans, and even lighting are programmed to start at different times during the day (staggered daily start up); this is a very effective strategy which reduces the electrical demand during the peak hours, lowering electricity bills and the environmental impact.

National Resources Canada states that average BAS can offer between 15-25% efficiency gains in HVAC performance.

So far, 30 schools in our Board have a complete BAS installed, with its demonstrated benefit for smart control of the energy use in our facilities (HVAC, Lighting, Air Changing, etc.). The BAS also helps to detect possible equipment trouble before it, fails being itself an important tool for maintenance cost reduction and subsequent environmental impact from the displacement.

Plans are being put in place to continue installing BAS into all of our schools as budget and local equipment upgrades allow for this additional control.

Using our finances in smarter ways for saving energy definitely includes going for BAS controlled buildings. These intelligent systems that monitor the entire building's mechanical operations reduce human interaction, eliminating wrong settings or poor operational practices and overall system failures.

Modern energy savings features like occupancy sensors, motion sensors, CO₂ monitors and photocell sensors for exterior lighting control that are all controlled by BAS will be progressively installed in all schools as budget allows.

Opportunities for BAS include advanced controls such as:


- Isolating dampers separate from heating and cooling systems, to minimize heat loss or gain when trying to bring the building up to set-point.
- Trending internal temperatures to ensure comfort and allow better tightening of occupancy schedules.
- Using free-cooling or additional outside air during temperate weather.
- Controlling advanced systems such as Variable Frequency Drives which modulate fan speed and Demand Controlled Ventilation which modulate dampers based on internal CO₂ levels.

4.4.3 Air Intake and filtration

The WCDSB is committed to ensuring that clean and healthy air is constantly supplied to occupied spaces by applying the latest filter changing practices. We comply with MERV 8 (Minimum Efficiency Rating Value) normative guidelines set by the National Air Filtration Association (and adopted under ASHRAE standard 189.1 for high performance green buildings). These stringent guidelines are already the standard in our schools.

Following this standard, we conserve a considerable amount of energy a year as the HVAC systems run in their finest condition, off cycles are extended without affecting the indoor comfort parameters, and maintenance/emergency calls have been noticeably reduced.

Air filters are supposed to trap dirt and dust, but a clogged filter will reduce airflow and make the system work harder, consuming up to 10% more energy to keep students comfortable.



Similarly, optimizing the amount and schedule of fresh air being brought into a building can make a huge difference to comfort. For every cubic foot of air per minute not being heated or cooled it is estimated that we can save as much \$4/cfm/year.

For this reason, all outside air dampers are closed during unoccupied hours (controlled by BAS); this reduces the on/off cycles of the heating equipment, thereby reducing the energy consumption to minimum levels during these hours. Air quality is also monitored to maintain the adequate comfort level in the building at the time it will be occupied again.

4.4.4 Boiler Replacements

Boilers are one of the most costly pieces of equipment to operate. Selection of a properly sized and efficient unit is critical as it ALWAYS returns on its original investment. Typically, a boiler's cost can be described in two parts; approximately 5% for the initial capital outlay, and 95% for the on-going energy use and maintenance of the unit.

Proper boiler maintenance is critical to keeping the operating costs down for boilers. We currently rebuild and clean all burners on an annual basis (during the summer), checking tube scaling and recalibrating combustion cycles.

Parallel to this effort, old inefficient boilers are being replaced almost systematically with new efficient boilers at the time of major school renovation/retrofit projects whenever possible.

The Board will strive to replace existing boilers with units that incorporate as many of the following features as possible:

- Linkageless combustion controls which allow the fuel-air ratio to be changed depending on demand, increasing efficiency by 2-3%.
- Annual Fuel Utilization Efficiency (AFUE) of 82% or more (as recommended by NRCan's Office of Energy Efficiency). These new ratings are 4-6% better than previous standards by eliminating running pilots and having additional cycling options.
- Standard Economizers: Heat exchangers in the flue stack that reclaim latent heat from the combusted fuels increase efficiency by 2-3%.
- Condensing Economizers: Large exchangers in the flue that not only reclaim latent heat but also sensible heat (which includes the water vapour from the combustion reaction) increase efficiency by as much as 11%.
- Water Treatment: This can serve to increase boiler efficiency and extend the serviceable life of the units by as long as 5 years.

4.4.5 Commissioning and Re-commissioning Strategy

Continuous commissioning of complex buildings such as schools allows for control sequences and settings to be monitored, verified, and corrected before they become a problem. Continuing with this important policy helps us to keep our equipment running in optimal working condition, saving considerable amounts of energy and reducing negative impact to our environment.

New equipment is commissioned before starting to provide full time service to ensure that factory parameters are met. This makes an important difference in their energy consumption patterns.

Equipment already in place will be scheduled to be re-commissioned according to manufacturer recommendations and will receive programmed maintenance to make sure they are working under the right conditions. This saves energy by eliminating possible malfunctioning.

Properly commissioned schools perform 5-10% better than non-commissioned buildings. Furthermore, buildings which are commissioned effectively have significantly less comfort issues and subsequent complaints from their occupants, resulting in less capital spend to compensate for specific problems.

4.4.6 Limiting Use of Small Appliances in Schools

As a result of trends identified by the Performance cards, on October 19, 2010 a Memorandum, **APF 011 – Appliances, Home Furnishings and Carpets**, was issued to all schools limiting the allowable use of small appliances throughout and calling for staff fridges to be unplugged at the end of every school year for the duration of the summer break. This was part of an effort to limit the energy load of added appliances such as kettles, microwaves, bar fridges and hot plates.

This memorandum APF-011, is included in the appendices of this document.

4.4.7 Sealing, Weather-Stripping and Caulking

Simple repairs around a school can quickly add up. The Board is committed to maintaining and ensuring that the thousands of windows, doors, and other building penetrations are sealed tightly. This type of basic on-going effort is most often not recognized as being a major factor in energy conservation but also in overall morale and occupant comfort.

Lack of maintenance can lead to waste of 3-10% in a school before it even becomes noticeable. Proactive prevention is the guiding philosophy in this matter. Typically, if it has already become a leak there are many more like it.



Systematic replacement of door and window seals, caulking and weather-stripping is now part of our maintenance protocol.

4.5 Energy Efficient Lighting Systems

Lighting is perhaps one of the most prominent topics in energy conservation as it affects us all immediately and is quite apparent when lacking in any way. Despite these obvious factors, lighting is actually only a small part (10-20%) of the overall consumption of electricity in a school.

Background

T-8's with electronic ballast are at least 25% more efficient than T-12 lamps with magnetic ballast.

A characteristic of premium T-8 and T-5 lamps is that they function with a reduced amount of mercury so as to pass the "TCLP" test specified in the RCRA Hazardous Waste regulations. This is an indicator of the suitability of waste lamps for land filling. Longer equipment life reduces both maintenance and disposal costs.

T8 lamps are rated from 18,000 to 30,000 hours – equivalent to 5 - 6 years in a typical office application. Electronic ballasts are more efficient than magnetic ballasts and don't contain toxic PCB's.

Recent changes in legislation eliminating the manufacture of inefficient fluorescent lighting and ballast (T-12's and magnetic ballast) have enabled huge improvements in lighting technology. These old lights were discontinued in July 2010.

The subsequent ban on incandescent lighting in 2012 will also force some much needed change in current behavior.

For some time now, all old T-12 lamps have been replaced with more energy efficient T-8's across the WCDSB. The Board has also taken the initiative to further this baseline by moving to T-5 lights for gyms and exploring new avenues in lighting such as investigating Light Emitting Diode (LED) and induction lighting technology. All of these efforts have helped in reducing the electricity

usage, thus the consumption of fossil fuels. This reduces harmful Carbon dioxide emissions and other air pollutants during the electricity generation process.

Incandescent bulbs in exit signs were replaced with energy efficient LED (Light Emitting Diodes) lamps which have a longer life and excellent Colour Rendition Index (CRI).

The Board is committed to not only meeting new lighting standards but to try to exceed requirements through innovative technologies such as inductive lighting, which eliminates the penetrating electrode in a standard fluorescent tube extending the life by at least 3 to 5 times or by installing LED lighting as it becomes more affordable.

We will continue to develop and improve internal lighting standards such as using 25W high efficiency output lamps in existing T-8 fixtures, making the best of our current assets. We are currently running out our existing inventory in order to do this.

4.5.1 Occupancy Sensors and Daylight Harvesting Sensors

Many classrooms and office spaces remain unoccupied with the lights on for 40- 70% of daily operating hours, wasting energy and money. Using occupancy sensors helps to eliminate 20% – 30% of lighting energy costs.

Occupancy sensors can also be used to regulate the lighting in the washrooms and change rooms. Typically, lights in washrooms and change rooms remain switched on continuously even when the rooms are unoccupied. Dual ultrasonic and infrared motion sensors can regulate the lighting such that the lights remain on only when the washrooms are occupied. These sensors do not solely depend on 'line of sight' to detect occupancy and hence will not turn the lights off when the rooms are occupied.

Occupancy sensors are only one component of a larger energy saving strategy, which includes dimming, daylighting, and load shedding.

Daylight harvesting sensors are installed in large building spaces with elevated daylight incidence (gymnasiums, hallways, and foyers) these daylight control systems consist of two basic types: dimmed and switched. Dimming control system varies the light output over a wide range to provide the desired light level; switching control turns individual lamps off or on as required. Daylight harvesting is a great way of making use of natural light and only turning on artificial lights when natural light levels are not enough.

So far, two of our schools have been equipped with these features: **Monsignor Doyle** and **St. Benedict**. ERIP (Electrical Retrofit Incentive Program) monetary incentive was awarded to those schools in 2008.

4.5.2 Night Sky Standard

Pollution of our environment comes in many forms. Light pollution refers to the intrusion of artificial light into areas unintended. The effect is often called Skyglow, the orange-ish glow seen radiating over towns and roadways principally from High Pressure Sodium Lighting, preventing any view of the dark night sky and glowing stars. Light pollution can alter the behavior patterns of nocturnal wildlife species, potentially placing them in peril. For humans, the lack of opportunity to witness and enjoy the stars and the vastness of the night sky, contributes to our feeling of separation from our natural environment.



Above and beyond the negative environmental effects, the light pollution itself represents wasted energy, as light shines it where it is not needed or wanted, due to inefficient lighting designs and task application.

The WCDSB's "NightSky" standard is being implemented in all schools' exteriors; Monsignor Doyle, St. Benedict, Pope John Paul II, St. Anne in Kitchener, and Holy Rosary were our first schools to have this energy saving system installed receiving the Electrical Retrofit Incentive Program (ERIP) funding as well.



Exterior lighting is turned off 20 minutes after security alarm system has been turned on through BAS interconnection.

Similar technology now exists to tie-in

emergency lighting to the same control systems. Investigation is underway. Design alternatives such as lower lighting levels and task oriented or motion sensed actuation are all opportunities to look into for the future.

4.5.3 Passive Reductions to Lighting Load

Painting walls and ceiling with lighter colours lighten the room and reflect more of the natural light that comes into the space during the day so, considerable savings in electricity (lighting) and visible improvement of the light quality in interior environments are reached, this technique is combined with the location of windows in the South side of the buildings to maximize natural light intake.

Caution must be used when developing these options as the same free lighting can compromise heating and cooling efficiency without proper window selection.



Revolutionary daylighting systems like light tubes are being considered to be installed as a pilot project in Monsignor Doyle, Canadian Martyrs, and St. Anne in Kitchener in 2011.



4.6 Indoor Environmental Quality

When comfortable and satisfied with their indoor environment, learning is facilitated. In fact, studies have shown that this can also lead to a noticeable decrease in sickness and even personal days taken by staff. The school building is one of the variables in student performance that is wholly within the control of the school Board, especially in such areas as air quality, acoustics, lighting, infection control, and supporting a healthy active lifestyle.


4.6.1 Reduction of VOC's

Volatile organic compounds (VOC's) are emitted as gases from certain solids or liquids. VOC's include a variety of chemicals, some of which may have short- and long-term adverse health effects. Concentrations of many VOC's are consistently higher indoors (up to ten times higher) than outdoors. VOC's are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials and furnishings, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions.



Organic chemicals are widely used as ingredients in household products. Paints, varnishes, and waxes all contain organic solvents, as do many cleaning, disinfecting, cosmetic, degreasing, and hobby products. Fuels are made up of organic chemicals. All of these products can release organic compounds while you are using them, and, to some degree, when they are stored.

Special attention is paid to regulate the content of volatile organic compounds (VOC) in a variety of products and manufacturing processes, including architectural coatings. That



section of the federal law initially focused on the release of VOC's into the outside air as ground-level ozone, a key contributor to smog. Today the popular focus for reducing VOC's in the built environment has turned inside, including the impact of house paints and other coatings on indoor air quality and the health of our children and building occupants.

The WCDSB will:

- Use low VOC paints.
- Use low emitting building materials such as flooring and cabinetry.
- Ensure old construction materials with asbestos content (floor tiles, plumbing pipes, insulation, sealants, etc.) are totally removed and replaced with asbestos free materials at every renovation or school addition.

Green and Eco-friendly materials replace the need for asbestos and reduce energy costs annually.

4.6.2 Green Cleaning and Maintenance Practices

Non-polluting and environmentally sound cleaning products started being used in our facilities during the summer 2009, a full 12 months ahead of the Ministry requirements. This change helped reduce considerably the load of effluent contaminants generated by the Board's daily operations.

This practice and the reduction in VOC's is being assisted by the Ministry of Education's Green Clean Program as outlined in their March 2010 resource guide.

The WCDSB recognizes the myriad benefits of a policy that supports green cleaning and maintenance practices, including improved indoor air quality, water quality, waste management, and workplace safety. This important consideration is further detailed in Section 6.2.1 of this Environmental Management Plan.

4.7 Building Envelope

The building envelope is the largest heat transfer surface in the building. Unfortunately, very often the building envelope is not upgraded or repaired as any work on the building envelope tends to be very expensive. Over time however increasing amounts of heat and conditioned air can be lost through the building envelope. The effect can be such that these losses can negate savings gained through other energy conservation measures. The best example to use is that it does not matter how efficient your solar heating is, if half of it is used to heat the environment anyway.

4.7.1 Upgrading windows



Single pane windows are poor insulators. Dual single pane windows are often not operated properly and end up acting as single pane windows. Installation of minimum double glazed operable windows with High-Solar-Gain Low-E coating and Argon gas fill in all renovation/addition projects is important to reduce losses through the windows.

High-performance windows not only provide reduced annual heating and cooling bills; they reduce the peak heating and cooling loads as well. They accomplish this by reducing not only the radiant heating effect

by acting as insulators but also reduce radiative heat transfer caused by absorption of heat into darker objects. Making windows opaque to non-visible light helps reduce the unnecessary heat gains.

Installed windows comply with Window Design Standard CSA/CAN A440-M98 and Board's stipulated level of performance (Air Leakage, Wind Load Resistance, etc.).

Operable windows are prioritized in our renovation/addition projects due to the advantage they offer for personal comfort control and beneficial connections to the environment. All sealants and glazing materials are asbestos free.

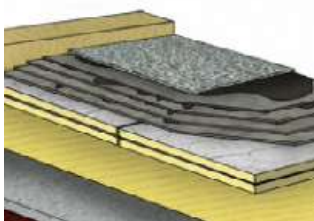
Many organic materials, such as carpet, fabrics, paper, artwork, paints, and wood in use in our schools may fade upon exposure to sunlight. The most harmful radiations in sunlight are the ultraviolet (UV) rays, which are the most energetic and thus most likely to break chemical bonds, leading to fading and degradation. Coatings on glass reduce the UV transmitted by up to 75 percent. UV absorbers are incorporated into thin plastic films in multilayer windows and as an interlayer in laminated glass.

In both cases, the UV transmission is effectively reduced to less than one percent. Low E-coated glass and windows incorporating plastic layers reduce fading for many common interior furnishings.

Exposed fasteners and/or pop rivets are not used as a fastening method to prevent the possibility of bridging the thermal barrier. Double weather-stripping is mandatory at all sash perimeters, it is also concealed to prevent accumulation of foreign matter due to cleaning, operation or handling which would reduce the effective life of the seal.

4.7.2 Roofing Upgrades

Heat rises and for that reason almost 70% of the heat from a standard building escapes from the roof. Several changes have been made to reduce this loss. The first change is a new standard to use higher R-value 4-ply roofing membrane substituting former 2-ply systems. Although we still have some old 2-ply systems, all new roofs are being upgraded.



The use of 4-ply application has improved the service life of our school roofs considerably (25-30%), reducing the maintenance frequency due to the gains in quality and durability. This stretching in the maintenance requirements has also made



longer the cycle of waste disposal associated with roof replacements. Quality Control level has been a determining factor at the time the roofing contractor is selected. Insulation material is expanded polystyrene, neglecting any presence of asbestos. Thickness is strictly observed keeping the Board's minimum standard of 2" which warrants the R-20 value once the roof is completed. This superior roof quality has enlarged the heating off periods in those schools due to more efficient building envelopes.

Wherever financially and physically possible, additional insulation to 4" or roughly R-40 insulation will be added or converted when roofs are being replaced due to age.

The Board also hopes to test high reflective roofing in the coming years as budget allows. This newer technology reduces the heat island effect caused by large dark surfaces in the sun (essentially acting as blackbodies absorbing higher percentages of solar radiative heat). The white or silver roofing systems reflect up to 85% of the heat normally absorbed, reducing heating requirements during the summer.

4.7.3 Doors Upgrades

Doors throughout the Board are being investigated to ensure best in class selection and installation.

Newer windows and doors have lower heat transfer by as much as 50% and typically attenuate noise as much as 30-40dB. Their double seals and added rigidity make for a much longer life.

4.8 Water Efficiency

As stewards of God's world, we take ownership of the responsibility to manage our resources responsibly. Sustainable water management is of growing importance as we come to fully recognize the significance of the effects that our actions have on freshwater quality and availability and the magnitude of the issue becomes unavoidable as we appreciate how much we all depend upon it for survival.

The Region of Waterloo is the largest community in Canada to rely primarily on groundwater. Approximately 75% of our water comes from aquifers, while the remaining 25% comes from the Grand River. Because we rely on a limited supply of groundwater, practicing water efficiency and water conservation ensures that water is available to meet all of the demand requirements of our community.

4.8.1 Low/No Flow Fixtures

The first step in sustainable water management is to reduce or limit our demand on water resources.

Many of the faucets installed in the washrooms and other areas are rated for a flow rate of between 1.5-2.2 GPM, with the majority of the faucets being in the 2.0 GPM range. These sinks are using well above the required amounts of water typically needed for



hygienic use. The savings come not only from the reduced water usage but also from the reduced gas used for domestic hot water heating due to the installation of flow restrictors. Ultra low flow, 0.25-0.5 GPM, aerators and restrictors installed systematically throughout the building can reduce the

water consumption by up to 35%. Though the rated flow of these faucets is only 35-50% that of the old faucets, they are more reasonable because faucets are rarely opened all the way. This retrofit typically has one of the fastest paybacks and is relatively easy to execute.

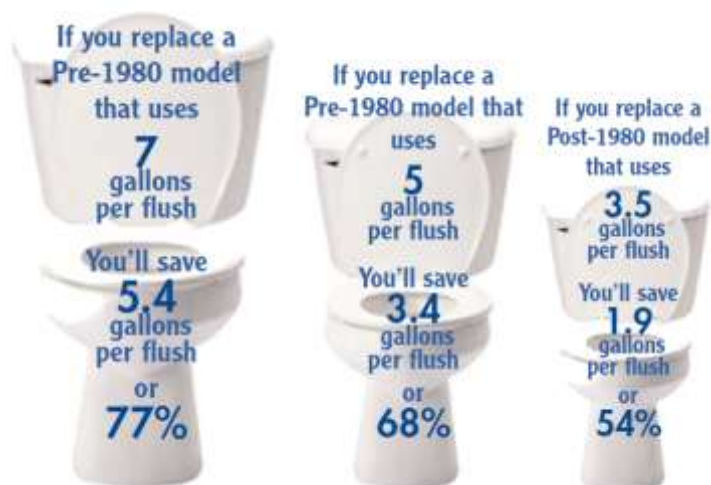
The WCDSB will fix all leaky faucets. A faucet that leaks at a rate of one drip per second can waste about 9,000 liters of water a year (source: NRCAN). Similarly, timed low flow shower heads help reduce water and gas consumption.

Commercial style water closets typically use 13 L per flush and residential style water closets use 6 L



per flush. Dual flush electronic valves help in reducing the consumption of water by reducing the water used to flush liquid waste.

Urinal motion sensors for flushing are one of the water conservative technologies installed in several schools; infrared sensors in sink taps have been installed as well. The latest development, however, are waterless urinals.



4.8.2 Stormwater Retention or Greywater Re-use

In every building within in the Board we use municipally supplied potable water to meet our water needs, including building operations such as boilers, and process water such as for flushing toilets, washing, cleaning, and landscape irrigation.

A further step in reducing our demand for municipal water is to use non-potable water. Stormwater retention can provide us with water for irrigation and, if treated, can be used to run our building operations.

Water collection systems for houses that allow watering when needed have been around for thousands of years yet are only now starting to compete with pressurized plumbing systems.

Stormwater retention projects are already in place at **Monsignor Doyle**, **Our Lady of Fatima**, and **St. Agatha**, and certificates have been issued from the Region recognizing our efforts. In 2004, the City of Kitchener awarded **St. Mary's Catholic Secondary School** for stormwater retention.

Beyond stormwater collection is the recycling of wastewater from regular building occupancy. Greywater includes the water that is discharged from various consumption points in the schools except the toilets. The wastewater is currently treated as a material to be disposed of and not as a by-product that can be reused. Greywater reuse is one of the leading methods already used around the world where water is a much more scarce resource than Canada. Greywater can be used in applications like sub-surface irrigation for school yards and gardens and to flush toilets. A detailed study is in the planning stages to test the quality of greywater and to design a process capable of treating it.



Installing rain barrels and underground cisterns is another sustainable and smart solution in keeping with the region's Ground Water Protection Program and watering bans.

4.8.3 Avoidance of Hazardous Chemicals



The above initiatives address issues of water quantity. The WCDSB is also taking steps to conserve the quality of our shared community water resources.

Although a multitude of products are tested each year to see how we can reduce our costs and improve current environmental practices very few new products meet all the stringent guidelines to ensure everyone's safety.

Simple changes like using bacterial digesting units have reduced the need for harmful chemicals. Grease traps on lab floors are combined with the use of bacterial digesting (Liquid Micro-Organism) to break down organic material suspended on grey and sewer

waters, controlling odours and reducing service calls to the pump truck for pipe clogging events.

This product has a significant environmentally positive impact because it is a non-toxic, non-corrosive, and non-polluting formula being completely safe to environment.

Neutralizing tanks are installed to make sure that waters returning from Labs to the sewage system are completely free of chemicals.

Cleaning chemical use at our Board is guided by the Green Clean Program published by the Ministry in March of 2010. The key framework sets out which products to allow and methodology for formal evaluation. Essentially, only EcoLogo (1988 Canadian Organization) or Green Seal (US Not-for-profit consortium) products are endorsed under this guide.

4.9 Waste Management

4.9.1 Baseline Waste Audits

In light of the Ontario Ministry of Environment's Ontario Regulation 102/94 requiring waste audits in schools with 350 students or more, combined with our commitment to the environment, the Board will attempt to baseline its overall waste flows prior to the next sustainability publication in order to assess the size of our impact and determine the best methods we can use to recycle or reduce those waste streams.

This baseline audit will include all waste except hazardous waste, liquid industrial waste, and gaseous waste. Comprehensive waste audits will identify the amount, nature, and composition of the waste, the manner by which the waste gets produced including management decisions and policies that relate to the production of waste, and the way in which waste is managed. Based on these waste audits the WCDSB will be prepared to develop an informed waste reduction work plan.

As an example, based on enrollment for January 2011, 23 schools have more than 350 students and would therefore be targeted for waste audits. Lessons learned at these schools could then be incorporated across the Board.

Enrollment for the Month of January 2011	
Elementary Schools	TOTAL PUPILS
Blessed Kateri Catholic Elementary School	403
Blessed Sacrament Catholic Elementary School	283
Christ the King Catholic Elementary School	282
Canadian Martyrs Catholic Elementary School	316
Holy Family Catholic Elementary School	228
Holy Rosary Catholic Elementary School	376
Holy Spirit Catholic Elementary School	678
John Sweeney Catholic Elementary School	658
Monsignor Wm Gleason Catholic Elementary School	167
Monsignor RM Haller Catholic Elementary School	205
Mother Teresa Catholic Elementary School	555
Our Lady of Fatima Catholic Elementary School	631
Our Lady of Grace Catholic Elementary School	302
Our Lady of Lourdes Catholic Elementary School	220
Pope John Paul II	481
St Agatha Catholic Elementary School	117
St Agnes Catholic Elementary School	259
St Aloysius Catholic Elementary School	377
St Ambrose Catholic Elementary School	290
St Anne (K) Catholic Elementary School	400
St Anne (C) Catholic Elementary School	149
St Augustine Catholic Elementary School	401
St Bernadette Catholic Elementary School	253
St Boniface Catholic Elementary School	106
St Brigid Catholic Elementary School	211
St Clement Catholic Elementary School	214
St Daniel Catholic Elementary School	345
St Dominic Savio Catholic Elementary School	481
Sir Edgar Bauer Catholic Elementary School	323
St Elizabeth Catholic Elementary School	369
St Francis Catholic Elementary School	255
St Gregory Catholic Elementary School	177
St John Catholic Elementary School	172
St Joseph Catholic Elementary School	224
St Luke Catholic Elementary School	652
St Margaret of Scotland Catholic Elementary School	387
St Michael Catholic Elementary School	382
St Mark Catholic Elementary School	263
St Matthew Catholic Elementary School	454
St Nicholas Catholic Elementary School	533
St Paul Catholic Elementary School	289
St Peter Catholic Elementary School	302
St Teresa (E) Catholic Elementary School	231
St Teresa (K) Catholic Elementary School	249
St Timothy Catholic Elementary School	292
St Vincent de Paul Catholic Elementary School	365

Enrollment for the Month of January 2011	
Total Elementary Enrolment	15,307
Secondary Schools	TOTAL PUPILS
Monsignor Doyle Catholic Secondary School	1096
Resurrection Catholic Secondary School	1624
St. Benedict Catholic Secondary School	1573
St. David Catholic Secondary School	1083
St. Mary's High School	2082
Total Secondary Enrolment	7,458

In the meantime, we have already begun to adopt the principles of waste reduction work plan as set out in Regulation.

"In developing the work plan, regard shall be had to the following principles:

- 1. Reduction is the first objective.*
- 2. If reduction is not possible, then reuse is the next objective.*
- 3. If reduction and reuse are not possible, then recycling is the final objective." (O. Reg. 102/94)*

Ontario Regulation 102/94 is included as an Appendix to this document.

4.9.2 Waste Reduction

Processing of waste and reduction of garbage collection and handling costs are important issues both from the environmental and cost perspectives.

The primary consensus is to reduce the quantity of garbage generated in our schools by encouraging parents to prepare healthy foods in re-usable containers for their children, eliminating as much as possible the use of disposable products.

4.9.2.1 Reduced Paper Usage

As part of our effort to mitigate our environmental footprint, children and staff are strongly encouraged to reduce the paper consumption by using every single sheet efficiently; two sided printing and photocopying is being encouraged. Formal guidelines around these changes are in the works and being refined at the moment.

Further efforts the WCDSB is considering include paperless meetings and presentations as a standard.



4.9.3 Waste Stream Separation

The government of Ontario in 1994 introduced Ontario Regulation 103/94 under the Environmental Protection Act. This regulation prescribes source waste separation programs for industrial, commercial, and institutional facilities in Northern Ontario. As a proactive measure, the WCDSB is taking steps to adopt this policy now. This policy applies to a location or campus of the institution if, at the location or campus, at any time during the calendar year, more than 350 persons are enrolled. This continues to apply for the two calendar years following the last year in which more than 350 persons were enrolled at the location or campus.

Categories of waste that must be provided for include:

- Aluminum food or beverage cans, glass bottles and jars for food or beverages, steel food or beverage cans (including cans made primarily of steel)
- Cardboard (corrugated)
- Fine paper
- Newsprint
- Food/Organics
- Garbage

Further separation is made by our service provider.

Ontario Regulation 103/94 is included as an Appendix to this document.

The WCDSB actively participates in the Blue Box waste program which recycles all of the above materials.

THE WCDSB has also launched a pilot project at three schools (**St. Anne** in Kitchener, **Resurrection Catholic High School**, and **St. Nicholas**) where Molok vertical bins will be installed. These vertical bins are 60% below ground, significantly reducing their required space, the simplicity of the design allows for high compaction rates and reduced waste removal requirements. As budget permits, more schools will be added to this program, with priority given to Eco-Schools.



A standard has been rolled out to install Molok systems and recycling bins in every classroom for schools with enrollment over 250 students, which is planned to be completed by 2014.

Pope John Paul II has Molok units installed as a pilot project, and **St. Louis** main campus is also looking to have food separation bins installed in 2011.

4.9.3.1 Food-waste Separation Program

The Region of Waterloo has a rich history in agriculture and is fortunate to still support local farmers. Sustainable food production is one of the primary components of a healthy community. As part of our mission and vision to transform God's world as the heart of the community, the WCDSB recognizes that we can contribute to our community by maintaining and increasing soil organic matter content through composting our food waste. Not only will this enrich our food supply but will extend the life of our landfills by diverting mass that would otherwise fill it.

In the spring of 2011, the WCDSB will pilot the Region of Waterloo's Food Waste Separation program. The Region will provide us with dedicated green bins for this purpose and will pick up the compost created in our facilities. Formal program adherence to the Region's Green Bin program will be investigated to further divert waste from traditional municipal dumps. The Region intends to make compostable waste illegal to dump by late 2012.

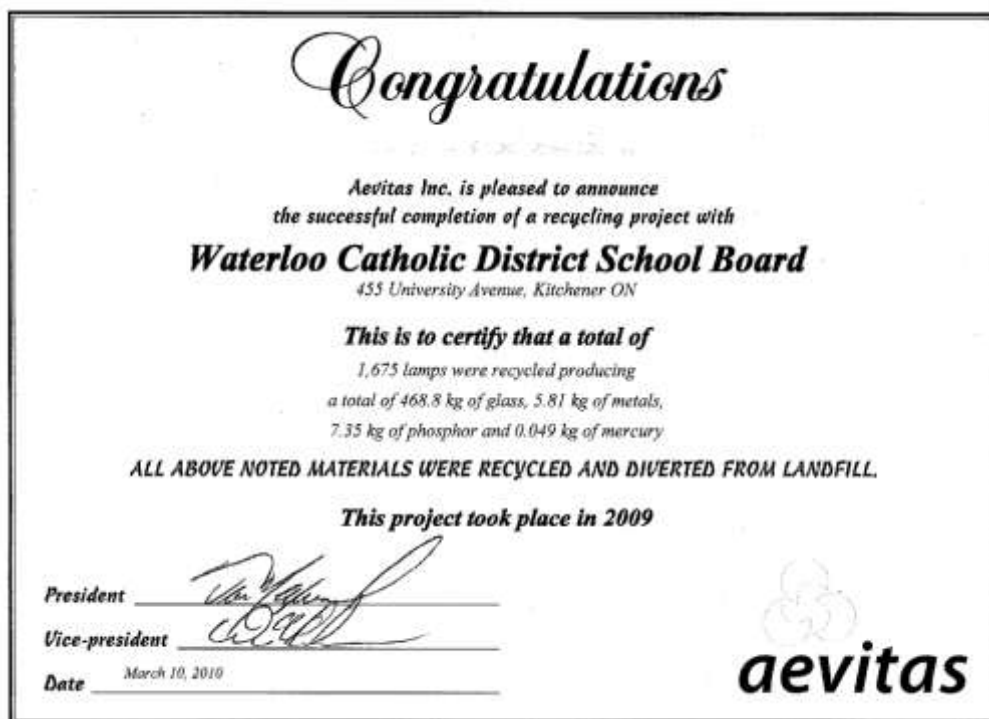
This project will include educational experiences for students as well as promotional materials as part of a partnership between the WCDSB and the Region of Waterloo. Participating in the green bin project will assist schools in achieving EcoSchool certification and help students and their families practice environmental stewardship at school and at home.



4.9.4 Recycling

Recycling policy will go to more advanced standards when recyclables will be separated in different containers. The WCDSB is evaluating the benefits of hiring a dedicated company who takes care of recyclables collection with strong environmental approach.

The WCDSB has taken its recycling initiatives above and beyond waste separation. In 2009, the WCDSB undertook to recycle all of its spent, mercury-containing fluorescent lamps. This Board was successful in diverting 9,558 lamps from landfills. As responsible members of our community 100% of our heavy metals are diverted from landfill and recycled wherever possible.



4.10 Stewardship Policies

Stewardship is an ethic that embodies cooperative planning and management of environmental resources with organizations, communities, and others to actively engage in the prevention of loss of habitat and facilitate its recovery in the interest of long-term sustainability.

4.10.1 Appointment of a Conservation Officer

The position of Conservation Officer was created with Government funds to deal with the increasing amount of environmental and energy conservation policies and strategies to be implemented in our Board.

This officer is also focused on developing the methodology for assessing the cost and benefits of conservation measures and maintains a catalogue of conservation measures, their average costs and benefits for use by our facilities.

Environmental and Energy conservation educational support is part of the Energy Conservation Officer duties.

Investigation into the possibility of a part-time Sustainability Officer is also underway, however must go through standard practice for creation.

The organizational chart shown here outlines the various people directly involved in day to day conservation at the Board administration level. These people are responsible for all the various aspects of energy and environmental conservation planning and oversight.

4.10.2 Use of Local Products and Contractors

As with all initiatives launched by our Board, supporting the local economy with the use of local products and local labour is a top priority. After all, it wouldn't make sense to use a green product that had to be trucked from a thousand miles away. Carbon emissions from the trucking would negate the positive attributes of the product. By buying local products and utilizing local labour, we are able to support our local communities and minimize the use of fossil fuels for transportation, cultivating green technology in the region.

At the time when a facility is scheduled for retrofitting careful equipment and material selection is made to guarantee that the most energy efficient ones are installed. Energy Star rated and high efficiency equipment is prioritized even though some financial sacrifice has to be made.

4.10.3 Eliminating Engine Idling

An engine idling awareness program is conducted across the Board's schools via principal-parent communication with active participation of the students to reduce/eliminate engine idling at pick-up and drop-off times. Schools buses are also part of this initiative to reduce considerable amounts of CO₂ and other greenhouse gasses emitted every day.

Students are encouraged to use bikes or walk to and from school when weather permits. To facilitate this, bike racks have been installed and maintained in several schools.



The WCDSB has also implemented a strategy focused on reducing the use of fuel and travel time of the maintenance workforce. Labour is assigned within specific work areas

which are conveniently located to minimize the number of trucks and fuel miles needed. This has not only enabled us to provide faster and more effective response to maintenance issues, but has resulted in reductions to harmful greenhouse gas emissions.

4.10.4 Active & Safe Routes to School

Green Communities Active & Safe Routes to School is a comprehensive community-based initiative that taps into the increasingly urgent demand for safe, walkable neighbourhoods. Active & Safe Routes to School promotes the use of active and efficient transportation for the daily trip to school, addressing health and traffic safety issues while taking action on air pollution and climate change.


The Active & Safe Routes to School web site provides resources, tools, information and links for schools and communities to create their own unique Active & Safe Routes to School program. Resources for teachers are linked to the Ontario Curriculum using the Curriculum Unit planner.

If just nine families participate regularly in a Walking School Bus over the course of a school year, they can collectively prevent almost 1,000 kg of carbon dioxide from being released into the atmosphere.

Kitchener/Waterloo

Waterloo Region is comprised of the three municipalities of Kitchener, Waterloo and Cambridge, plus the four townships of Woolwich, Wellesley, North Dumfries, and Wilmot. The population of Waterloo Region is over 500,000. The majority of schools are part of either the Waterloo Region District School Board (98 elementary schools, 15 secondary schools) or **Waterloo Catholic District School Board (47 elementary school, 5 secondary schools)**. In addition, Waterloo Region has 4 French schools and 11 private schools. In total, there are over 90,000 elementary and secondary school students in Waterloo Region.

Active & Safe Routes to School promotes the use of active and efficient transportation for the daily trip to school, addressing health and traffic safety issues while taking action on air pollution and climate change. Active transportation refers to any form of



transportation that requires physical activity like walking, biking, in-line skating or skateboarding.

This international initiative, which began in 1997, strives to create an environment that is conducive to, and supportive of, safe, walkable communities. It is comprised of many initiatives including the following eight.

- Walking School Bus
- Walking Wednesdays
- International Walk to School Day/Week
- Classroom Mapping
- Walk a Block
- Neighbourhood Walkabout
- Walking Buddies
- No Idling at School

The Active and Safe Routes to School Workgroup of Waterloo Region was formed in 2002 and consists of partners from Region of Waterloo Public Health, Waterloo Catholic District School Board (WCDSB), Waterloo Region District School Board (WRDSB), City of Cambridge, City of Kitchener, City of Waterloo, Ministry of Transportation, Waterloo Region Police Services and Run for Life. The ASRTS workgroup provides numerous supports and training to local schools.

4.10.5 Energy Efficiency and Phantom Loads

Over the past 20 years, computer use in schools has dramatically increased. Despite new technologies such as LCD screens with energy savings modes, this has resulted in an increase in energy consumption and costs. The number of computers at a school can range from 20 to 300. Each computer can consume 23–185 W and cost between \$10 and \$70 per year. Therefore, computer use can increase a school's consumption and costs by 5-8%. (Source: Benchmarking Guide for School Facility Managers and VIP Energy School Audit Database)

In an effort to improve energy efficiency and reduce the effect of phantom loads, the Board has instituted a standard that all PC's are to be shut down by 11 PM. All School computers are automatically de-energized every night at 11 PM, saving approximately 5%-10% of the electricity bill amount.

Trying to go a little bit further in our energy conservation strategy, the Board's IT Department is studying the possibility of shutting down all of the Board's computers at 5 PM in addition to the current 11 PM time schedule.

4.10.6 Monitoring

Facilities' energy consumption performance is being tracked using advanced web tools provided by Union Gas and Waterloo North Hydro. For many schools that are going to be incorporated in the near future; these features are effectively used to detect system failures and alleviate consumption peaks; e.g. Union Gas ("MyAccount"), Waterloo North Hydro ("Utilismart"), and Energy + ("e-meter").



Further monitoring to look at just-in-time or real-time usage is under investigation pending funding to better educate our students on the immediate effect and cost associated with real-life changes and choices made every day.

Larger and newer projects such as the photovoltaic pilot are being monitored online for performance as well to demonstrate the effects in a way that is easy to understand.

4.10.7 Green Spaces

The WCDSB has paid special attention to the creation and conservation of green spaces for learning in all our schools; encouraging students and teachers to interact actively with the environment is a priority.

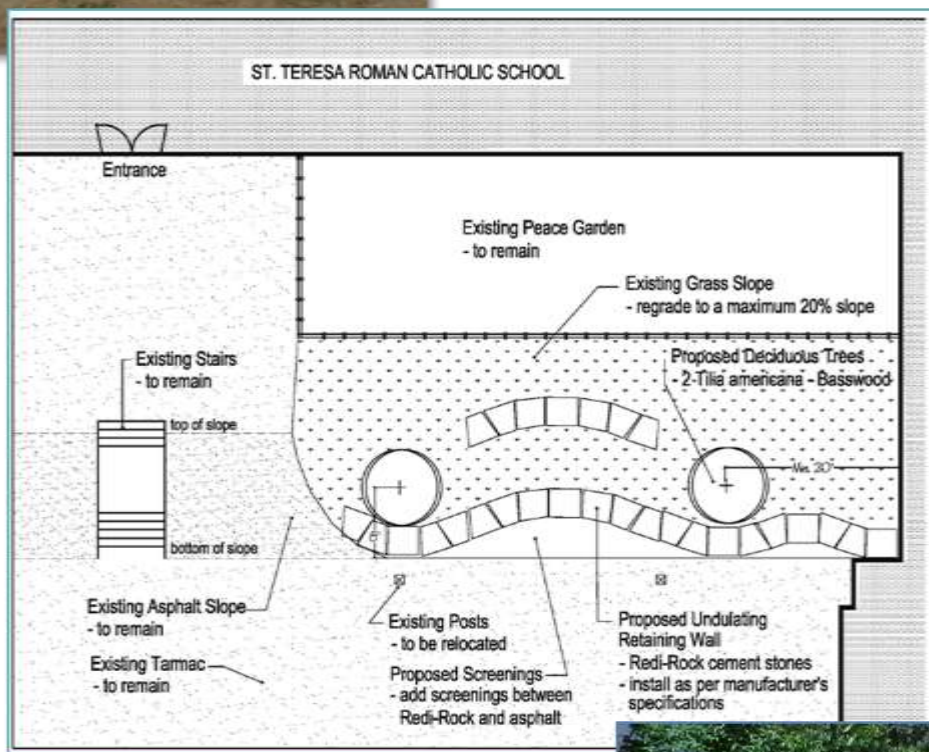
Team working with organizations like Evergreen focused on the environment conservation and smart use of our native botanical species are part of this ambitious plan which strengthen the creation of EcoSchools as another tool for the incoming Environmental Studies program to be implemented the next School year.



Parents Council's are significant force in this strategy contributing ideas and funds to create green projects in every school.

The WCDSB Board is committed to continue increasing the Carbon Absorption capacity in our facilities, setting as an ultimate target a near zero carbon footprint on our operational energy consumption. This means having an amount of trees planted equivalent or higher to the carbon emissions produced in our daily operations.

In June 2010, School Council at **St. Teresa School** in Kitchener approved and fundraised to expand the Peace Garden and set up an outdoor classroom in front of it. The outdoor classroom will consist of rocks for the students to sit on as well as trees to shade the site. The project was assisted by an Evergreen Consultant and Landscape architect.



The Toyota Evergreen Project distributed a total of \$19,970 in grant money to 13 schools in Waterloo Region and Guelph.

Evergreen is a national charity with a mandate to bring nature into schools, communities and homes. The grant is designed to transform asphalt and concrete school grounds into healthy, safe and creative environments. To receive the grant each school had to submit an application that included their project proposal. The schools then worked with Evergreen staff to develop a more detailed plan.

School Ground Greening projects in place:

- St. Anne (Kitchener)
- St. Boniface
- St. Francis (Cambridge)
- St. Augustine
- St. Daniel
- St. Matthew
- Canadian Martyrs
- St. Margaret
- Our Lady of Lourdes
- St. Elizabeth
- St. Michael
- St. Ambrose
- St. Francis (Kitchener)
- St. Nicholas
- Our Lady of Fatima
- St. Joseph (Cambridge)
- St. Gregory



Current received applications for 2011

- St. Dominic Savio
- St. Luke
- Mother Teresa
- Our Lady of Lourdes

4.10.8 Professional Development

In future, the Board intends to pay special attention to providing staff with more advanced tools and knowledge to deal with new environmental policies and its challenges.


Participation in workshops and seminars is crucial to have our staff updated with new strategies and technologies in the energy conservation/ environmental field.



5. Environmental Stewardship Education



Environmental education seeks to promote an appreciation and understanding of, and concern for, the environment, and to foster informed, engaged, and responsible environmental citizenship. As part of the WCDSB's commitment to providing both staff and students with more advanced tools and



knowledge to deal with new environmental policies and its challenges, this section outlines our strategy for incorporating environmental education into the curriculum.

People are the most determining factor in any Energy Conservation policy, and there is a rapidly growing movement toward the development of schools that embed environmental education, not only in the classroom, but also in school design and operations. Curriculum enrichment can be accomplished by providing teachers and students with classroom activities aligned with the environmental management plan to help develop awareness of the importance of environmental resource conservation.

Some teachers may feel inhibited about incorporating environment and conservation into their lessons for the first time if they have not had experience with it. Fortunately, there are a number of resources available to assist teachers and school Boards in incorporating environmental education into the curriculum, both from within Ontario and across North America.

Programs suggested here can be adopted in their entirety or combined to suit the unique needs and creativity of the WCDSB.

5.1 Curriculum – Environmental Science

The Environmental Science course offered at WCDSB high schools provides students with the fundamental knowledge of and skills relating to environmental science that will help them succeed in work and life after secondary school. Students will explore a range of topics, including the impact of human activities on the environment; human health and the environment; energy conservation; resource science and management; and safety and environmental responsibility in the workplace. Emphasis is placed on relevant, practical applications and current topics in environmental science, with attention to the refinement of students' literacy and mathematical literacy skills as well as the development of their scientific and environmental literacy.

5.2 Ontario EcoSchools Program and Education

A process can be an important early step in developing a successful, lasting, and locally responsive Green School.

The Ontario EcoSchools program provides a model by which the WCDSB can integrate their energy and conservation strategies with educational opportunities.

The Ontario EcoSchools program is an environmental management guideline, similar to ISO 14000 or the Natural Step, but tailored to the unique needs and features of schools. It offers a five step process as a systematic way for schools to address environmental management. Schools and school Boards have the option to decide their level of involvement and may choose to apply for EcoSchools Certification, which recognizes schools for their annual achievement in four key areas: energy conservation, waste minimization, ecological literacy, and school ground greening. Schools can certify with bronze, silver, or gold EcoSchool status depending on how successfully the school has met the requirements of the program.

Developed and run by school Boards, Ontario EcoSchools also helps improve school building operations to reduce environmental impacts. The Ontario EcoSchools program also provides curriculum resources for grades K-12 that help students develop both ecological literacy and environmental practices to become environmentally responsible citizens.



The Ontario EcoSchools program is aligned with and supports all of the goals and strategies of the framework for environmental education in Ontario – Acting today, Shaping Tomorrow:

“Ontario’s education system will prepare students with the knowledge, skills, perspectives, and practices they need to be environmentally responsible citizens. Students will understand our fundamental connections to each other and to the world around us through our relationship to food, water, energy, air, and land, and our interaction with all living things. The education system will provide opportunities within the classroom and the community for students to engage in actions that deepen this understanding.”

Such a context will combine classroom learning with experiential learning, and provide opportunities to interact with, develop caring and concern for, and take action in the places where students live, study, and play. It will provide connections between the curriculum and the world around us, allow students to directly observe impacts and

issues, and expose students to the many points of view that must be considered in making choices to preserve the health of the natural environment.

Ontario EcoSchools resources offer an environmental perspective to the choices we make in operating our schools and in planning classroom programs based on the Ontario curriculum. It consists of four components:

- Ecological Literacy
- Waste Minimization
- Energy Conservation
- School Ground Greening

Ontario EcoSchools helps schools and school Boards through achieving the following goals and strategies:

- Promote ecological literacy for all students with teaching resources linked to the Ontario curriculum Gr. 1-12.
- Provide leadership opportunities for students by establishing an EcoTeam.
- Establish environmentally sound operational practices by adapting the Ontario EcoSchools templates for use throughout the Board.
- Develop a process for continual improvement in environmental education and operational practices within each school through the initial and follow-up EcoReviews.
- Incorporate an environmental education component into the school planning process through the creation of a Board-level environmental committee.
- Provide an opportunity for the whole school community to work together to develop environmentally-responsible practices at school through the Action Plan templates.
- Benchmark their environmental practices, assess their progress and be recognized for their achievements through an annual certification process.

Certified EcoSchools use less energy than non-Certified EcoSchools. An independent analysis of energy use at the Toronto DSB indicates that on average, Certified

EcoSchools use 12% less electricity and 7% less natural gas than comparable non-Certified EcoSchools.

The Board is proud to state that St. Nicholas was the first school to be Silver Certified under the EcoSchool program, and has now earned Gold Certification in the 2011 academic year.

Seven additional schools were also certified under this banner in 2011. We hope to eventually see all of our schools partake in this program with the vigor it has embraced throughout the province.

These seven schools are:

WCDSB Eco-School Certified					
Board	School	Address	Score	Level	Year
WCDSB	St. Margaret of Scotland	210 Cowan Blvd.	61.5	Bronze	2011
WCDSB	St. Nicholas*	525 Laurelwood Drive	86	Gold	2011
WCDSB	Holy Family	313 Huron Street	69.5	Silver	2011
WCDSB	Pope John Paul II	75 Pebblecreek Drive	80.25	Silver	2011
WCDSB	St. Anne (Kitchener)	250 East Avenue	88	Silver	2011
WCDSB	St. Mary's High School	1500 Block Line Road	71.5	Silver	2011
WCDSB	St. Ambrose	25 Chalmers Street S	71.25	Silver	2011

*** Silver Certified in 2010**

5.3 Other Resources

SEEDS Foundation of Canada



SEEDS' Green Schools program provides recognition and focus to environmental efforts undertaken by schools and helps to build a strong school image in the community. Materials such as certificates, the trophy and the banner can be presented in special ceremonies involving local dignitaries and the media.

This program encourages students to be environmentally responsible and to take personal action at school and with their families. Classes undertake projects to communicate about or to enhance the environment. Classes then log their project results and report them to SEEDS. By keeping records of their achievements, schools gradually work towards 100 projects to become recognized as an environmental Green School. Some schools go on to achieve Jade status (250), Emerald status (500) and ultimately Earth School with 1,000 completed projects. There are 261 Earth Schools in Canada. SEEDS' statistics show that over 563,650 projects have been completed under this program at more than 8,000 Canadian elementary schools. Haldane School in Chase, BC is the first Earth 5 school in Canada, having logged 5,000 environmental projects.

Projects consist of the combined effort of the classroom to take Action to enhance the environment, to communicate to others about the environment, or to demonstrate the wise and sustainable use of resources that make up that environment. Examples include hallway displays on nature themes, schoolyard plantings, schoolyard litter pick-up, sharing songs about the environment, and reusing common objects to make bird feeders or other useful items.

Participating schools receive a Green Schools Kit which includes a project idea book and resource manual, as well as log books for students to track their progress, trophies and a set of certificate, and a progress chart to be displayed in the school hallway.

A few ideas to get you started!

Our Edible Landscape ...

- What would you include and how would you pack a lunch that is good for both you and your environment.
- Our communities have four distinct seasons that contribute to them being an awesome place for farming. Make a calendar of events for each of our seasons that contribute to an aspect of agriculture.
- Imagine that you are in charge of a large market garden, a grain farm or raising livestock. Outline how you might operate it to look after the environment at the same time.
- Explore information about common insects that are beneficial or harmful to your local environment. Draw a picture of them and then write your findings below to create a case file of critters.

Waste Watchers ...

- Prepare an announcement that would encourage classmates to recycle or reuse.
- Make a mobile that depicts suggestions for the reduction of household waste or the conservation of water.
- Design an action plan that would help to reduce classroom waste.
- Classify pictures under the headings of reduce, reuse, recycle and rethink.
- It's easy to start reducing your environmental footprint. Write a pledge card for three stewardship actions you will commit to. Decorate its border.
- Draw a cartoon strip showing recycling in your community.

Zero in on Communities ...

- Pairs of students perform mock interviews of 'constructed' or 'natural' resources that shape their community by assuming the role of an interviewer or resource.
- Many of our towns, cities, rivers, and lakes are named after animals. Use a detailed road map to help you prepare a list of the ones in your area.
- Make an iMovie, slide show, or video on a favorite location in your community that would help to sell it as a "vacation spot".
- Present information on how land sustains communities and quality of life in your area.

What's Cooking in Your Community ...

- Write a recipe for a healthy environment for your neighborhood, yard, or community.
- List the ingredients necessary to help preserve our wetlands.
- Trace the journey of a pizza ingredient from the field to the oven.
- Make a poster to advertise locally produced food.

Spread the Word ...

- Email a friend a message about how we can protect rural spaces.
- Write a list of energy or water saving tips that can be posted in your home as reminders.
- Send a letter about an environmental concern to someone you know.
- Print a letter of the alphabet onto a page, then surround it with nature pictures that match that letter.

Environmental CSI ...

- Use the internet or your library to help you find out about these species at risk: Swift Fox, Piping Plover, Bull Trout, Burrowing Owl, Wood or Plains Bison, Woodland or Mountain Caribou, Peregrine Falcon, Whooping Crane, Sage Grouse, Northern Leopard Frog, Western Blue-flag.
- Create a multimedia presentation that illustrates how communities can show their concern for their natural environment.
- Compare and contrast ways that families and communities of the past used resources differently than they are used today.

Moving in the "Write" Direction ...

- Plan, carry out and evaluate a plan that helps you reduce your ecological impact.
- Design a poster that promotes a positive environmental action.
- Keep a diary of the water saving actions that you do.
- Debate the issue "Should there be limits on the number of visitors to Provincial and/or National Parks?"

Digging Deeper ...

- Identify, then share information on materials that insulate local animals from the cold (**wool, feathers, natural shelters**) and identify **materials used by humans** for the same purpose.

- Respond to the statement "After all, dirt made your dinner!".
- Healthy plants require a nutritious diet. What should be in a Food Guide for a Growing Plant and why?

Brain Teasers ...

- Write a math question using environmental information. You must know how to answer the question!
- Construct a word game that uses only words specific to agriculture.
- Develop some test questions about the environment in your community. You must know the answers!
- Pick a letter of the alphabet and then see how many animals you can think of whose names begin with that letter.

Alien Invasions ...

- Explain **why** exotic pets (e.g. snakes, fish, spiders, mice, **frogs**, etc.) should never be released into the **natural** environment.
- Collect and chart information on **invasive species** and management plans for their control.
- Use this statement to start a **paragraph** "Every habitat views **invasive species** differently."
- Create a skit or monologue of an **invasive species** coming into **your school yard**.

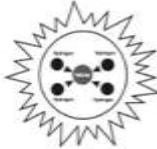


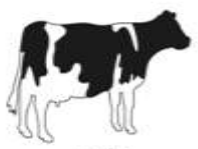
National Energy Education Development Project (NEED)

NEED is a U.S. project that begun in 1980 with a mission to promote an energy conscious and educated society by creating effective networks of students, educators, business, government and community leaders to design and deliver objective, multi-sided energy education programs.

NEED recognizes that students are the energy workforce of the future. They will be designing more efficient energy technologies, building cleaner burning power plants, working miles offshore exploring for natural gas and petroleum, installing wind and wave technologies on our outer

continental shelf, and finding the best places for wind and solar technologies across the country. A NEED student may make the next breakthrough in energy technology or may write ground-breaking energy legislation that considers science, economics, and the environment.

NEED provides free online curriculum guides for teachers that are aimed at taking the fear out of teaching about energy. Resources include charts and posters, flash cards, step by step experiments, etc.

1  SUN	Through the process of fusion, I convert nuclear energy into radiant energy.
1  HUMAN BEING	I store chemical energy from food in my cells and turn some of it into other forms of energy.
1  GREEN PLANT	Through the process of photosynthesis, I convert radiant energy into chemical energy and store it in my cells.
1  COW	I store chemical energy from food in my cells and turn some of it into other forms of energy.

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Energy Flow PAGE 17

Teacher Guide

GOAL

TO UNDERSTAND FORMS OF ENERGY, ENERGY TRANSFORMATIONS, AND THE FLOW OF ENERGY THROUGH SYSTEMS.

BACKGROUND

For comprehensive background information, see NEED's **Intermediate** or **Secondary Energy Infobooks** and **Elementary** or **Secondary Science of Energy**.

CONCEPTS

- Energy is stored in many different forms.
- Energy is neither created nor destroyed, it is transformed from one form to another.
- Most of the energy on Earth can be traced back to nuclear fusion in the sun's core.
- Energy flows through all dynamic systems on Earth.

TIME

One 45-minute class period

MATERIALS

- Samples of coal (can be obtained free from the American Coal Foundation, www.teachcoal.org)
- Regular flashlight and hand-generated flashlight (call NEED at 1-800-875-5029 for suppliers)
- Transparencies of pages 8, 10, 11, 12, 13, 14, 15
- Copies of worksheets on pages 9 and 16 for each student
- Copies of pages 17-22, cut and folded along the dotted lines into Energy Flow Cards
- Pieces of string and tape for Variation II of Energy Flow Card activity
- Overhead projector
- Large wooden kitchen matches

PROCEDURE

Step One—Preparation

- Obtain the materials you will use in the activity.
- Make transparencies and hand-outs you will use in the activity.
- Familiarize yourself with the activity.

Step Two—Introduction: Forms of Energy

- Introduce the activity by lighting a wooden match and asking the students to describe what is happening in energy terms. Explain the energy flow from the match back to the sun.
- Use the **Forms of Energy** transparency to provide an introduction to the forms of energy.
- Distribute the **Forms and Sources** worksheet and have the students complete it. Review the answers with the students.

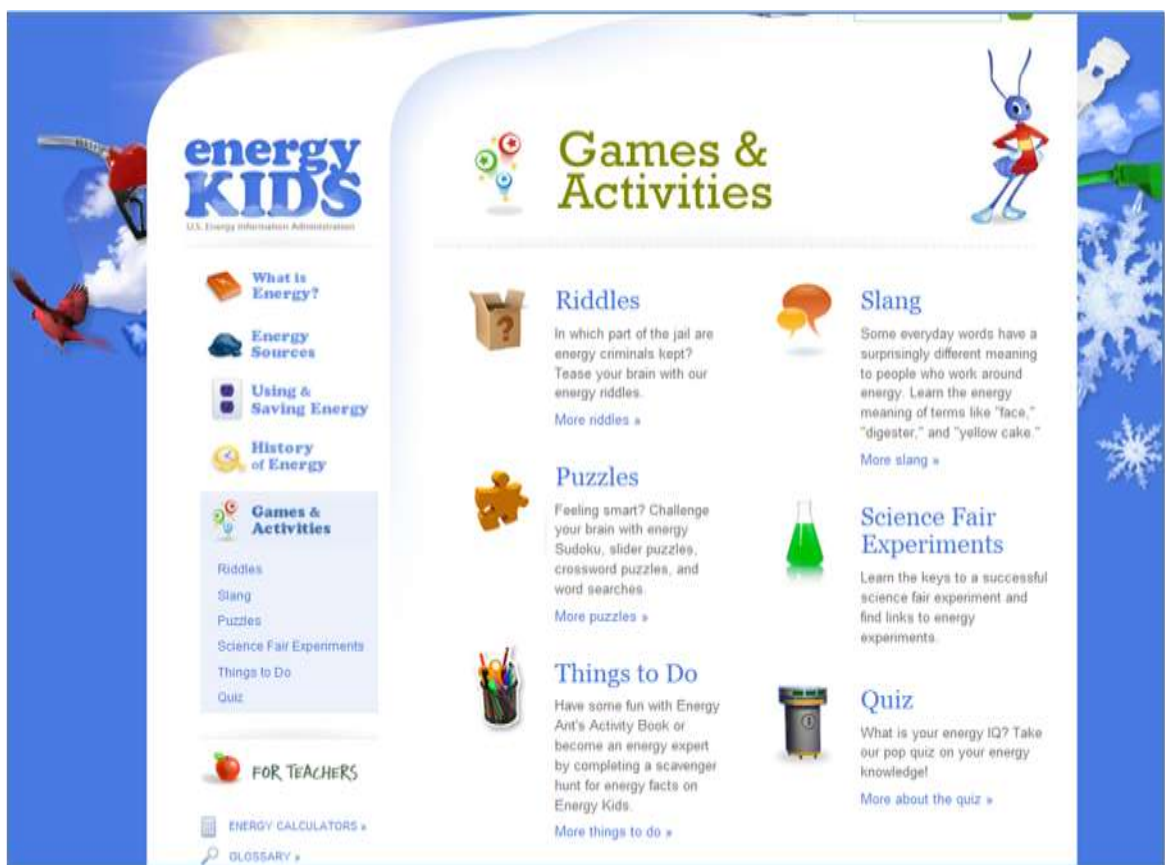
(See the References and Resources page at the end of this document for the site address).

Energy Information Administration (EIA)

The U.S. Energy Information Administration (EIA) is the statistical and analytical agency within the U.S. Department of Energy. EIA collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment.

EIA resources are utilized by professionals in the energy industry across North America.

The EIA has developed its own educational tools for teachers and students to promote education and understanding regarding energy and conservation, available on their government website called Energy Kids (see the References and Resources page at the end of this document for the site address).



Toronto and Region Conservation Authority (TRCA)

In addition to its outdoor education centres, the Toronto and Region Conservation Authority (TRCA) offers educational resources to teachers through its “From Ripples to Waves” program. The program focuses on the connections between water use and energy consumption and is designed to spark new conversations with students which explore the social, economic, and environmental issues that are central to the global water crisis.

By selecting and delivering two or more lessons from “From Ripples to Waves”, teachers may claim points within the curriculum section of Ontario EcoSchools certification. Eligible curriculum must maintain “clear connections to in/for/about the environment”, must be taught over two lessons or periods, and must include assessment or evaluation of student work.

Further, implementing one or more of the school and community action projects outlined in “From Ripples to Waves” could allow a school’s EcoTeam to claim points within the Environmental Stewardship section of Ontario EcoSchools certification. Eligible activities must maintain a “clear, well-communicated connection to the environment”, must engage the whole school community, and must be initiatives that do not fall within the other sections of the Ontario EcoSchools program.

See the References and Resources section of this document for the TRCA’s From Ripples to Waves program, which offers free lesson plans like the excerpt included here.

WAT'ER YOU WEARING

LESSON SUMMARY

This activity introduces the concept of virtual water and examines the amount of water that is embedded in our clothing as a result of production. Students will develop a Virtual Water Trail Diagram and a means to identify stages of production that consume water.

FOCUS QUESTION

How do our fashion choices affect our water resources?

BACKGROUND

According to the Canadian Water Governance group, the water that Canadians use for washing, cooking, flushing the toilet and drinking adds up to approximately 331 litres per day per person.¹ Many of us don't realize however, that without even thinking about it, we also consume hundreds of thousands of litres of water that is embedded in our food, clothing and other products. This water use contributes to our overall water consumption, or water footprint, and is called virtual water. Nearly everything we use contains virtual water from cell phones to paper to shoes to roller-coasters.

The concept of virtual water was first put forth by Professor John Anthony Allan as a means to quantify the amount of water that is used in the production of a good or service. The Water Footprint Network suggests that the water used in production is said to be 'virtual' because it is no longer contained in the final product. For example: a standard microchip contains about 32 litres of virtual water, but this water is not physically sitting in our computers.² While it is difficult to calculate a product's precise virtual water content, the concept encourages us think about water differently – a few litres of water are wasted when you take a long shower, but hundreds (or even thousands!) of litres of water are wasted when you throw away manufactured products. Some common virtual water values are:

5.4 Outdoor Education

Grand River Conservation Authority (GRCA)

The Grand River Conservation Authority (GRCA) runs an outdoor nature centre program offering hands on, curriculum-based outdoor education classes for elementary and high school students.

The GRCA operates five Nature Centres: Laurel Creek (Waterloo), Guelph Lake (Guelph), Rockwood (Rockwood), Shade's Mills (Cambridge) and Apps' Mill (Brantford). Each year, the centres provide environmental and outdoor education programs to over 50,000 children from school classes, community youth organizations and family groups. GRCA staff is trained nature interpreters with a passion for kids and environmental education. Courses include aquatic studies, caving, geology, orienteering, canoeing instruction, geography, science, and more.


5.5 Specialist High Skills Major (SHSM)

The Ontario Ministry of Education's Student Success Strategy is part of the government's commitment to reach every student, which benefits all students by providing more choice in innovative, engaging, and quality learning opportunities.

The Specialist High Skills Major (SHSM) is one component of Phase Three of the Student Success Strategy, announced in December 2005 and launched in the 2006–07 school year.

A Specialized High Skills Major (SHSM) is a ministry-approved specialized program that allows students to focus their learning on a specific economic sector while meeting the requirements to graduate from secondary school. It also assists in their transition after graduation to apprenticeship training, college, university or the workplace. Each major is a bundle of 8-10 courses in the student's selected field.

The SHSM program provides an opportunity experiential learning in conjunction with focused classroom courses so that students can gain transferable skills and



understanding to prepare them for post-secondary education and their career. It opens the door for students to explore areas of interest and discover related career possibilities which they may otherwise be unfamiliar with.

Among a variety of other specialization, there are SHSM's designed for the following fields directly related to the environment:

- Agriculture
- Energy
- Environment
- Forestry
- Horticulture and Landscaping
- Non-Profit

Students must successfully complete all the required components in order to earn the SHSM designation on their diploma – a red seal embossed with the words “Specialist High Skills Major”. In addition, students receive an “SHSM Record” (see page 22), which outlines their achievement with respect to the following five required components:

1. A defined bundle of 8 to 10 Grade 11 and Grade 12 credits
2. Sector-recognized certifications and training courses/programs
3. Experiential learning activities within the sector
4. “Reach Ahead” experiences connected with the student’s postsecondary pathway
5. Development of Essential Skills and work habits required in the sector, and use of the Ontario Skills Passport (OSP) for purposes of documentation


School Boards need a strategic plan to ensure that a quality SHSM program is available for students. This plan should address all aspects of a quality program, including Board and school advisory committees, delivery of all five required components, tracking of student progress, marketing of the program, and evaluation of program effectiveness.

As part of the planning process, the following factors must be considered:

- Existing pathway initiatives in schools that address several postsecondary options for students
- Existing specialized programs in schools
- Current employment trends in the region, based on labour market data
- The Board's and schools' long-range plans and priorities
- Delivery options
- Transportation requirements
- Collaboration with the coterminous and/or neighbouring Board(s) to avoid duplication and enhance opportunities for students
- Existing business and industry partnerships and their possible expansion
- Existing postsecondary educational partnerships
- Student enrolment in courses and programs
- Board and school staff "champions" to assist with the implementation of the SHSM
- Teacher qualifications for the required major credits
- Available resources and facilities at the school and in the community

In 2009, there were five SHSM programs being offered by the WCDSB. All five were being offered at St. Mary's Catholic High School and included the fields of construction, manufacturing, health and wellness, transportation and hospitality and tourism. Interest and enrollment in the program exceeded the Board's expectations. As such other opportunities were assessed by the WCDSB Council.

Among the other SHSM fields of specialization available for the 2010 to 2011 school year, two secondary schools in the WCDSB are offering an SHSM in the fields of Energy or Environment. St. Benedict Catholic High School in Cambridge offers an SHSM in the Environment field, which prepares students for careers in: conservation and fishery, soil testing, ecology, environmental biology, waste diversion, environmental toxicology, outdoor recreation, wastewater treatment, and the like.



St. Benedict and St. Mary's also offer an SHSM in the Energy field, which prepares students for roles as engineers, energy auditors, building operators, and in the power industry.

Resurrection Catholic High School is offering an SHSM in Horticulture and Landscaping.

6. Opportunities for WCDSB

6.1 Green Purchasing

The Waterloo Catholic District School Board is working towards including energy efficiency and environmental considerations in the procurement of goods and services, such as selecting local contractors where possible, and the purchase of green cleaning products.

Green Purchasing will take this commitment to the next level and ensure that environmental management is considered in procurement decisions at all levels within the Board and at every school in the district. This mandate can be used both in the ordering of products as well as includes a guideline to be used in the text of RFP's and other tender documents.

Model purchasing policies have been reviewed and borrowed from where appropriate, including the University of Waterloo's Green Purchasing Practice, which is one of the first public institutions to include a locally produced standard as part of its green policy. The LEED™ 2009 rating system for Schools has also been used to inform this purchasing practice.

6.1.1 WCDSB Green Purchasing

Intent: Sustainable practices are not only economically efficient and environmentally sensitive; they are conducive to the well being of all district employees, teachers, and students.

The purpose of this is to

- Minimize negative environmental impacts of the WCDSB through materials usage, energy consumption, and waste disposal.
- Improve occupational Health and Safety of our staff.
- Improve indoor environmental quality for students and staff.
- Encourage and support environmentally responsible products and services in our community.

Additional benefits of this purchasing practice are:

- Increased awareness of staff on the environmental issues affecting procurement by providing relevant information and training.
- Awareness and education of students of environmentally responsible purchasing choices as they see this policy implemented in their school.

Responsibility:

All WCDSB departments, offices and schools shall identify and purchase the most environmentally responsible products and services that are available for the intended purpose and that meet the performance requirements.

Factors that should be considered when determining the environmentally preferable good or service include, but are not limited to:

Materials Selection Criteria:

- Select products which are durable and which can be maintained for long life cycle.
- Consider salvaged materials such as beams and posts, flooring, paneling, doors and frames, cabinetry and furniture, brick, and decorative items.
- Recycled materials with a preference on post-consumer waste.
- Select rapidly renewable materials. Rapidly renewable refers to materials that are grown or raised in ten years or less. Examples can include wool, bamboo, cotton, agri-fiber, wheat-Board, straw and cork.

- Select wood-based materials and paper products that are certified in accordance with the Forest Stewardship Council's principles and criteria. Look for the FSC logo.
- Low emitting materials. To reduce the quantity of indoor contaminants that are odorous and/or harmful to the comfort and well-being. This should be taken into consideration for the purchase of adhesives and sealants, paints and coatings, flooring, composite wood products like cabinetry, ceiling and wall systems, and furniture.
- Select products which can be recycled, reused, or will biodegrade after use.

Regional Materials – Use materials or products that have been extracted, harvested, or recovered, as well as manufactured within in 500 miles of the end use location.

Packaging Criteria

- Products that have no packaging or minimal packaging
- Products that can be purchased in bulk, where possible
- Acquire packaging, where possible, that is refillable or reusable.
- Seek providers that will accept packaging back, for example when purchasing computers.
- Seek packaging that is recyclable, biodegradable, and/or contains recycled material.

Selection of products which are endorsed and adhere to nationally recognized, third party standards organizations:

Energy Star



Forest Stewardship Council (FSC)



Strategies:

These goals can best be achieved by establishing a list of vendors which can satisfy these goals.

Tender Documents:

The following statement shall be included within all appropriate tender documentation.

“The Waterloo Catholic District School Board is committed to environmental stewardship and ongoing reductions to our carbon footprint. We encourage our suppliers to and services providers to strive for outstanding environmental responsibility. As such, we will consider environmentally superior product choices in our procurement decisions, and will, when appropriate, factor a certain percentage of costs toward superior environmental goods and services.”


This policy shall be reviewed regularly and updated to include current standards and technologies.

Nothing in this policy shall be construed as requiring a department, agency or contractor to procure products that do not perform adequately for their intended use or are not available at a reasonable price in a reasonable period of time.

6.2 Document Green Cleaning Strategy and Guidelines

In school, sustainability is closely tied to protecting children's health. Reducing the use of necessary chemicals can promote a healthier indoor environment. Other benefits of using green cleaning products include avoiding or limiting the environmental implications of producing, transporting, and disposing of hazardous chemicals.

The WCDSB has been using non-pollutant and environmentally sound cleaning products in our facilities since the summer of 2009. This helps to considerably reduce the load of contaminants generated by the Board's daily operations.



The next step is to incorporate green cleaning into the energy management and environmental by documenting the Board's commitment to green cleaning and establishing strategies and guidelines to achieve these goals.

There are resources available to assist the Board with this process. The Ministry of Ontario's Green Clean Program is one such resource.

6.2.1 Green Clean Program

In March, 2010 the Ontario Ministry of Education became the first province in Canada to develop and issue a green clean program for publicly-funded schools. The Board had already adopted this standard prior to the mandate, so embraced the fact that environmental purchasing accountability was being regulated.

The *Green Clean Program Resource Guide* provides a comprehensive tool to assist school Boards that are interested in adopting a green clean program. It encourages safe and healthy indoor ecosystems that support student learning and a healthy workplace environment by minimizing or potentially eliminating the use of non-green cleaning products in schools across Ontario.

The Guide sets out a comprehensive framework for a green clean program that is easy for schools to adopt and includes:

- A Board-wide environmental sustainability policy to support staff and students in implantation.
- The procurement of green products that are certified by either EcoLogo or Green Seal.
- The implementation of alternative cleaning processes that either significantly reduce the amount of chemicals being used or introduce new technologies that result in more effective processes.
 - Pilot programs to test new products or technologies in a limited number of schools before Board-wide implementation.
- Formal evaluation
 - Product / Process effectiveness
 - Cost / Benefit Analysis

The implementation of a green clean program is significantly more than shifting from traditional cleaning chemicals to greener products or using new equipment; it is about adopting a new philosophy toward cleaning and asking stakeholders to change their daily behavior. Ultimately, the core of a green clean program is a change management process. Implementation of a green clean program is a long-term evolutionary process, through degrees of “greenness.”


Four pilot schools were studied for the development of the Guide. Custodians at all schools reported that the certified green products met or exceeded their expectations in terms of product performance and ease of use. Further, the overall conversion to green certified products was reported to be cost neutral from a product cost and labour perspective.

The need for school Boards to formally recognize schools for successfully implementing green clean was identified as an effective way to promote the program across the sector. School Boards also reported that it would be helpful to use visible signs to increase awareness of a green clean program among occupants across pilot school sites.

6.3 Guidelines for Location and Construction of New Schools

Considerations include site selection, right-sizing, green design, etc. Refer to guidelines like the LEED™ 2009 New Construction and Major Renovation rating system for schools, or the Green Schools Resources Guide, published by the Ontario Ministry of Education in December 2010.

We build schools that perform more than 30% greater than Natural Resources Canada’s (NRCan) Model National Energy Code for Buildings (MNECB). The MNECB contains minimum requirements for energy efficiency in new buildings, and those that include major renovations and additions. Detailed information is outlined on building envelope, lighting, electrical power, heating, ventilating and air conditioning (HVAC) systems, which can offer major energy savings.



Details from that guide are available on-line at any time. They are scheduled to be revised regularly to meet on-going technology improvements.

Design Principles

1. Recognize rights of humanity to co-exist in a healthy, supportive, diverse and sustainable condition.
2. Accept responsibility for the consequences of design decisions upon human well-being, the viability of natural systems and their right to co-exist.
3. Create safe objects of long-term value: Do not burden future generations with requirements for maintenance or vigilant administration of potential danger due to the careless creation of buildings, processes or standards.
4. Eliminate the concept of waste: Evaluate and optimize the full life-cycle of products and processes respecting the Board's expectations and experiences. Boards may believe that they cannot afford environmental consideration. The reality is that they cannot afford not to pay attention to the environment.
5. Rely on natural energy flows: Human designs should incorporate energy efficiently and safely for responsible use. An environmentally responsible architect can reduce the energy consumption of most buildings by using off-the-shelf components and a pay-back period of one to five years, while still improving the quality of the interior environment.
6. Understand the limitations of design: No human creation lasts forever and design does not solve all problems. Those who create and plan should practice humility in the face of nature. Treat the Board's standards and experiences as a model, not an inconvenience to be evaded or controlled.
7. Seek constant improvement by the sharing of knowledge: Encourage direct and open communications among colleagues, Boards, and users to link long-term, sustainable considerations with ethical responsibility.

6.4 Guidelines for Decommissioning of Old Schools

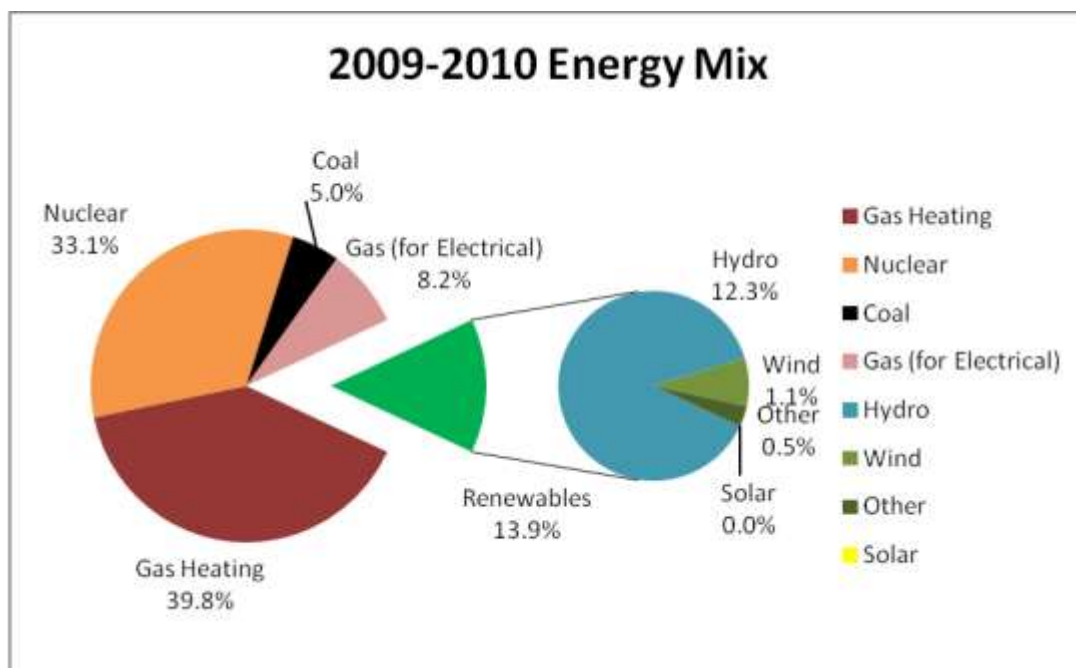
The Board will give similar consideration to energy and waste conservation policies for the decommissioning and deconstruction of old schools. LEED™ practices will be observed where specific materials can be reused or recycled when being displaced from a de-commissioned site. The preference in any asset's case would be to sell it for reuse by another organization.

Proper disposal of any hazardous materials will always be adhered as is required by any public organization.

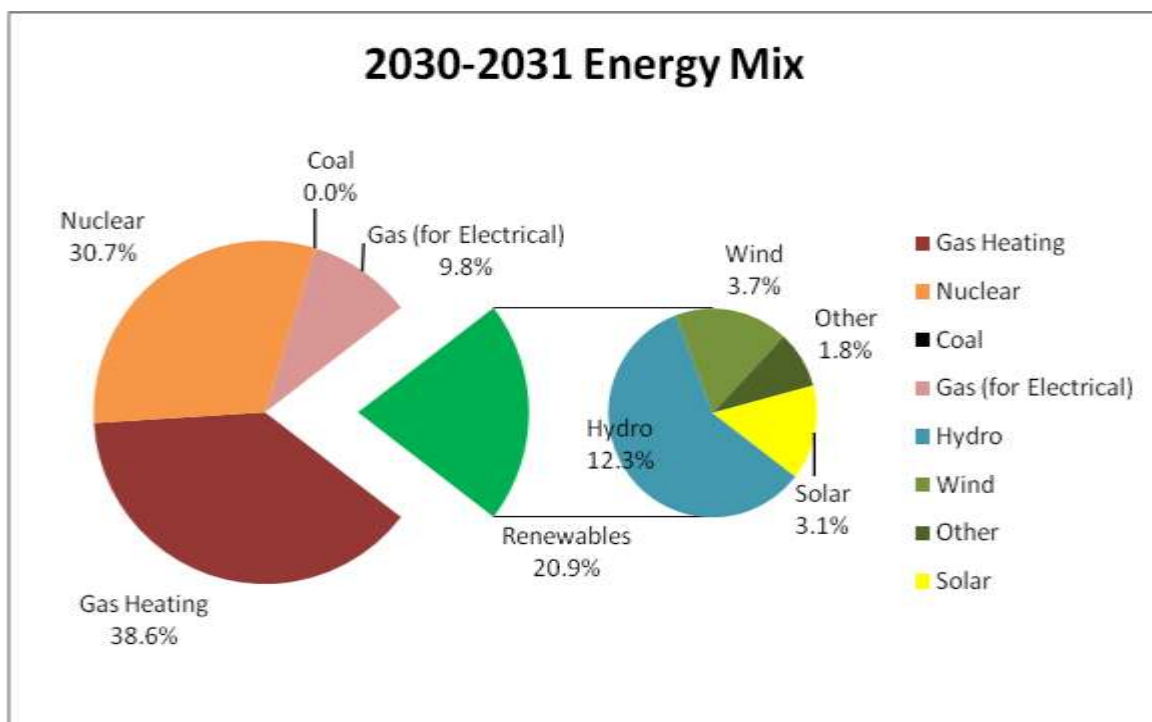
Often these types of re-investment or revitalization plans not only help the local community but tend have the best financial outcome for the Board as well.

6.5 Purchasing Renewable Energy

The Board has a current energy supply mix as follows based on 2010 IESO electrical supply mix and direct fuel consumption. We currently have no alternative fuel or renewable energy procurement and are completely exposed to what the market delivers.



Our goal is to alter our energy mix over the course of the next 20 years in order to meet some of the carbon footprint reduction goals set in the sustainability plan. These changes will occur not only through current programs such as the feed-in-tariff program from the OPA but also through varied purchasing methods which make most financial sense.



According to the U.S. Environmental Protection Agency (EPA), on average, replacing each kilowatt-hour (kWh) of traditional power with renewable power avoids the emission of more than one pound of Carbon dioxide. Because of the sheer quantities of electricity involved nationwide, consumers have enormous influence to reduce environmental impacts from conventional power generation. If the typical commercial building switched to 100% renewable electricity, the use of green power would have the equivalent environmental impact of avoiding the Carbon dioxide emissions of nearly 28 vehicles each year. (Source: Guide to Purchasing Green Power)

Green power generates less pollution than conventional power and produces no net increase in greenhouse gas emissions, helping protect human health and the environment.

The WCDSB has begun to generate renewable energy at one of its schools. The shift to renewables can further be realized by committing to purchase electricity from renewable energy providers for other schools and buildings within the Board.

The WCDSB can decide whether to supply renewable energy fully to certain buildings or as a percentage of total electricity purchased in others.

Green power can be priced differently than standard power sources. It has usually been more expensive than conventional electricity sources, largely due to the relative newness of renewable technologies and their gradual diffusion into mainstream markets, compared with conventional electricity. Nonetheless, the cost of green power is continuing to fall as growing demand drives the expansion of manufacturing facilities and reduces production costs. Several green power technologies are now cost-competitive with conventional sources.

Green power may also be more difficult than conventional power for an organization to purchase, causing transaction costs in addition to any price premiums. Although organizations that are buying green power for the first time might need to invest extra effort, these costs fall significantly over time as the electricity purchasers gain experience.

Committing to purchase Green Power is a process that requires a number of considerations in order to make an informed choice. These factors should include; Financial Strength, Verification, Product Choice, Price and Social Responsibility. If possible, local sourcing is a means by which you can ensure that your green power purchase displaces an equivalent amount of power produced by fossil fuels.

FINANCIAL STRENGTH

Suppliers with a strong financial background are a necessity to ensure that the supplier will be able to honour the entire term of the contract. This consideration has become even more important since the recent global credit difficulties. Financial strength can be ascertained through audited annual reports, web sites and/or bond ratings.

PRODUCT VERIFICATION

In Canada EcoLogo is the current accepted standard in substantiating vendor claims of the authenticity of renewable supply. Approved suppliers of green power can be found on the EcoLogo website.

The EcoLogo Program is a Type I eco-label, as defined by the International Organization for Standardization (ISO). This means that the Program compares products/services with others in the same category, develops rigorous and scientifically relevant criteria that reflect the entire lifecycle of the product, and awards the EcoLogo to those that are verified by an independent third party as complying with the criteria.



Under this standard, the availability of certified Renewable Energy Certificates (REC's) and bundled electricity make it easier for consumers and purchasers to support renewable low-impact electricity products, leading to the potential growth in this market over time.

Bundled renewable low-impact electricity and REC's recognized in this standard can be derived from the following generation technologies: biogas-fuelled electricity, biomass-fuelled electricity, solar-powered electricity, wind-powered electricity and hydro-powered electricity. New additions to this revised EcoLogo Renewable Low-Impact Electricity Products standard are geothermal, tidal and wave-powered electricity.

PRODUCT CHOICE

While there are a variety of sources of renewable power with varying degrees of environmental benefit; solar, "run of river" hydro, and wind all produce zero greenhouse gas emissions. Also important to the type of generation is the choice in product options available. The broad definition of "product" includes such attributes as billing, percentage green, and choice in assignment. To clarify the latter, a purchase of 1,000 MWhs has the same benefit whether it is assigned to a specific building or spread across the portfolio of buildings. If submitting for LEED™ certification it is worthwhile to ensure that 100% of the building be powered with EcoLogo certified power. Billing options typically include a choice to be billed directly by the retailer or to have the charges rolled up within the electric utility bill.

PRICE

Ultimately buying renewable power is similar to purchasing other goods and services and price must be considered. It is important to get appropriate comparisons so that price can be fairly included in the assessment. Avoid stipulating unnecessarily stringent requirements as this may inhibit a fair and competitive process.

SOCIAL RESPONSIBILITY


Social responsibility is difficult to assess but for the purposes of sustainability should include the record of the supplier in all jurisdictions in which they operate. Some of the factors in the assessment may include: whether the company supports community development, equitable employment, charitable activities and other pertinent social factors.

The benefits of renewable, low-impact electricity products are numerous:

- The displacement of non-renewable fuels with renewable, more sustainable fuel sources.
- Lower air emissions that contribute to climate change, smog, acid rain, and air-borne particulate pollution.
- The reduction of solid wastes arising from both the mining and extraction of non-renewable fuel sources and the disposal of toxic metal emissions and nuclear wastes.
- The reduction of impacts on aquatic and terrestrial ecosystems from electricity generating activities.

6.6 School Grounds Greening

Children spend an average of 25% of their school day outside. Yet, too often school grounds are windswept, treeless asphalt, concrete, or turf grass surrounded by chain link fence. There is mounting evidence to show that such landscapes contribute to anti-social behavior such as bullying and vandalism because children are insufficiently stimulated and have no quiet place in which to develop positive, caring relationships.



Over the past decade, school ground improvement projects in Canada have multiplied significantly. This trend continues to grow, with improvement projects ranging from greening initiatives involving tree plantings, food gardens, and habitat areas, to enhanced play and gathering spaces involving such things as boulders, planter boxes and amphitheaters.

Benefits of school grounds greening:

For Students:

- Greater opportunities for meaningful and imaginative play and learning
- A safer, less hostile outdoor environment
- Improved academic performance
- Increased environmental awareness

For Teachers:

- New curriculum connections
- Increased morale and enthusiasm for teaching
- Increased engagement and enthusiasm for learning
- Fewer discipline and classroom management problems

For Schools:

- Better attendance and fewer dropouts
- Increased pride in school
- Decrease in bullying on school grounds
- Better connections to community

For Community:

- Stronger sense of community
- Healthier natural environment
- Active involvement for parents
- Increased community satisfaction

The WCDSB recognizes that the best landscapes are dynamic, unique spaces that help to create a sense of place and inspire and transform people's connections with each other and the natural world is only the first step. We will continue to green the school grounds of all schools within our Board, and take every opportunity to foster the ability for students and teachers to interact with their local environment.


School gardens will be individual and personalized by each school to meet their needs, involve the students, and encourage participation and creativity. Community involvement will be sought and encouraged in these endeavors. These areas will serve as outdoor classrooms, not only for use in connection with science and environmental studies classes but for all classes.

These gardens, like our schools, will be centers of our community. They will be open to our friends in the community so that they may also have a place to find peace with nature.

Specifically, the WCDSB will actively reduce the percentage of our properties covered in paved surfaces and green space covered in turf grass. Replacing these with materials such as paving stones and hardy native plant species reduces stormwater run-off and increases groundwater recharge, improving water quality for the community.

While allowing the individual schools the freedom to design and furbish their school grounds greening projects as desired, the WCDSB will prohibit the use of plant listed as invasive or noxious weed species. Once established native/adapted plants require minimal or no irrigation do not require active maintenance such as mowing or chemical inputs such as fertilizers, pesticides or herbicides, and provide habitat value and promote biodiversity through avoidance of monoculture plantings.

Further, shade trees can reduce cooling load, thus limiting the heat island effect of our schools. Trees can also help to reduce light pollution when strategically situated to block exit lights and any other lighting that may remain on after dark. Shade trees also have the obvious benefit of protecting students from harmful UV rays while playing or studying outdoors.



Rather than going to the landfill, food-waste can and should be composted on site for use in the school gardens. Rain barrels can also be utilized for watering these spaces, limiting our demand for potable water.

Going forward, school grounds greening will be instituted at the planning and design stage of any new schools to be built within the Board.

Resources include the guide *School Ground Greening: A policy and planning guidebook*, published by Evergreen in partnership with Toyota Canada.

For those areas of the school grounds which remain covered in turf grass, the WCDSB will adopt a policy to avoid the use of chemical pesticides and fertilizers as these are environmental pollutants as well as potentially harmful for staff and students coming into contact with it.

6.7 Sustainable Transportation

The WCDSB understands that buildings and the way we develop and run them generate demand for transportation. Transportation in turn has profound impacts on the environment, through the fossil fuels consumed, greenhouse gases emitted, and land space needed for roadways.

We also recognize that we have the opportunity to reduce transportation impacts by using a wide variety of practical strategies such as encouraging walking and bicycling, and reducing the number and length of automobile trips.

We have already made steps in the form of our policies to reduce engine idling on school properties and to reduce the number of vehicle miles travelled by streamlining staff tasks into efficient working zones.

Furthering our goal of reducing transportation related greenhouse gas emissions, the Board will encourage active transportation in various ways.

While schools already have bike racks available for students, we will also make an effort to provide separate bike racks and changing facilities to accommodate active transportation of school and Board staff.

The Board will also seek involvement in commuter incentive programs to encourage carpooling, such as Smart Commute or other system established by the Board.

6.8 Shared Facilities and Community Connectivity

The WCDSB and the Ministry of Education continue to be committed to the importance of schools as community hubs, supporting healthy activities for our students and for the community. This reduced redundancy in operational buildings throughout our community not only bolsters community living but also improves use of limited resources for infrastructure.

The Community Use of Schools (CUS) program was implemented several years ago to reduce the cost for not for profit (NFP) groups to use school facilities during non-instructional periods.

Last year, the WCDSB issued over 500 permits to NFP groups for total usage of almost 25,000 hours. Over 200,000 participants accessed our beautiful facilities for programs such as Girl Guides, Scouts, Cadets and Minor Sports.

The CUS program in this school Board applies to 46 elementary and 5 secondary schools. Our school Board has a large number of double and triple gyms. This makes us a popular choice with the community.

In addition to serving the needs of the K-W Region at large, the CUS program is working to tailor programs after hours to meet the needs of each school community. This requires a collaborative effort. Ideas are always welcome and community support is imperative to running free or low cost programming for the neighbours among each school community.

Our Catholic schools are providing a place for all and the opportunity to succeed in extra-curricular pursuits as well as academic. Imagine a school with an after school

drop-in program, and basketball, volleyball, scouts and guides in the evenings. On weekends, it's a place where community groups hold concerts, badminton practices and basketball games. This is another way that the WCDSB is able to fulfill our Vision of being the heart of our community.



6.9 Intelligent Lighting Design

Artificial lighting constitutes 20 to 30% of all energy use in a commercial building. Reductions in energy use can be achieved with natural daylighting, advanced lighting technology, and efficient lighting design.

Interior

In addition to the aforementioned changes in lighting from inefficient bulbs to more energy efficient versions, and the implementation of daylighting and occupancy sensors, the WCDSB will utilize intelligent lighting design.

This entails considerations such as individual lighting controls for office spaces and addition of task lighting. This enables single occupants or small groups to use only the amount of lighting required, rather than wasting energy to illuminate a whole room or space.



One of the most aggressive pushes has been the inclusion of occupancy and daylighting or photo-harvesting sensors. The use of occupancy sensors eliminates the risk associated with manual intervention as many people tend to forget or slack on them over time.



Daylight harvesting has been implemented in some atriums and where sufficient outside lighting is available. Windows receive a large amount of energy from the sun. Most of this is wasted on a single area, and direct sunlight causes harmful glare on desks and computer monitors. In fact, a single south-facing window can illuminate up to 20 to 100 times its unit area. This light can be a nuisance if concentrated in one spot, but is extremely useful if distributed to all parts of the room equally.

Light shelves bounce visible light up towards the ceiling, which reflect it down deeper into the interior of a room. External and internal light shelves mounted on the south- and west-facing windows redistribute light into the space, providing natural brightness to the building and reducing the need for daytime overhead lighting.

Trials are underway at St. Teresa (Kitchener), Monsignor Doyle, Canadian Martyrs, and St. Anne, Kitchener to test the effectiveness and overall effect of this light shelving technology. They are also implementing solar lighting tubes as a pilot this year.

Exterior

Light the minimum area for the minimum time. Limit all-night illumination to areas with actual all-night use or extreme security concerns—simple timers or photocells can be used to turn lights on and off at seasonally appropriate times. For security lighting, motion-sensors can spotlight intruders without beaming constant glaring lights.

Clearly identify the actual purpose of lighting to determine minimum acceptable levels.

Use renewable energy sources for lighting and other outdoor power.

6.10 Spreading the Word

The WCDSB understands that leading by example includes telling others about our experience, so that they can learn from our successes and failures. As such, the WCDSB will document and make public its green initiatives and projects.

As citizens we take an interest in the environmental responsibility of our public institutions. Members of the community who do not have a child in school or work in relation to the education industry will likely not be aware of the conservation and stewardship initiatives undertaken by the WCDSB and its schools. Publicizing green initiatives not only gives the project and its participants the recognition they deserve, but promotes pride in the successes of our community, and encourages others to do the same.



According to the US EPA, an organization should provide and seek recognition for its green power commitments in order to sustain momentum and support for the renewable energy program. An organization should consider various internal and external promotional and marketing strategies to generate measurable, positive publicity and public relations benefits. To maximize the positive publicity, the use of green power should be made part of the organization's comprehensive environmental management efforts. When an organization highlights its green power purchase, it is important that it know the quantity of any emissions avoided. In addition to the public relations benefits, the purchase can motivate additional purchases by the general public, the organization's customers, and its affiliates, thereby extending the impact of the initial purchase.

Internal promotion is also important to improving employee morale. Internal publications, such as newsletters, are valuable ways of communicating information to an organization's employees, stakeholders, and affiliates and also helps support the organization's mission, growth, and development.

6.11 Support and Involvement of School Environmental Clubs

Four of the five secondary schools in the WCDSB have an active environmental club. St. Benedict has Environuts, Monsignor Doyle has T.R.E.E, St. David has Roots and Shoots, and St. Mary's has an environmental club which focuses on environmental issues and participants create awareness campaigns for specific issues as well as promote positive attitudes about the importance of the environment. It also conducts clean up days, competes in annual Envirothon, and offers Earth Day events.

The Environuts have initiated a program of collecting receipts from Zehrs and Sheridan nurseries which, along with donations and school funds helps to bring in plants into the classrooms and common areas. These plants add colour and atmosphere, as well as help to improve indoor air quality. Students also started a "Seed Team" which grows and takes care of plants from seed. Organizing Earth Week activities, regular school ground clean ups, Ground Water Festival, awareness campaigns.

Roots & Shoots was founded and is guided by Dr. Jane Goodall, renowned primatologist, environmentalist, and humanitarian, based on her belief that young people, when informed and empowered, when they realize that what they do truly makes a difference, can indeed change the world. The program—dedicated to inspiring tomorrow's leaders today—not only motivates young people to learn about pertinent issues facing our local and global communities, but helps them actually design, lead and implement their own projects as a means of solving them.

The WCDSB will, as a policy, provide support for school environmental clubs. We will develop a program by which we can formally recognize students who participate, show leadership, and demonstrate excellence in these environmental clubs. Teachers who facilitate these clubs will also receive our support and recognition.

6.12 Seek Opportunities for Participation with Local Universities

The WCDSB is fortunate to have two major Canadian Universities, the University of Waterloo and Wilfred Laurier University, located within the Waterloo Region. Opportunities may exist for students in the environmental studies faculties to focus

projects and theses to benefit the Board and its schools, furthering the sustainability plan.

Specifically, the University of Waterloo's Faculty of Environmental Studies offers a second year course suitably called "Greening the Campus" in which students carry out research projects aimed at making the school and its surrounding community more sustainable in various ways. Students learn to apply the skills and tools of interdisciplinary research to current real-life problems involved in running the university or in fostering sustainability in Waterloo, Kitchener, and the region. This course makes a direct contribution to enhancing the sustainability of the campus and the broader community in which it is located. The campus and the community serve as the laboratory for identifying, evaluating, and assessing indicators of progress toward greater sustainability.

The WCDSB will pursue a relationship with both higher learning institutions to this end.

7. Energy Saving Best Practices and Future Opportunities

7.1 General Best Practices

7.1.1 Alliance to Save Energy

Under the **Alliance to Save Energy's Green Schools Program** participating schools in the United States have saved their schools from phantom loads and "energy vampires" by completely shutting down their empty buildings before holiday breaks like Thanksgiving, Christmas, and Spring Break. According to the Program, schools that fully prepare their buildings for their winter breaks waste significantly less electricity – and are rewarded with smaller electricity bills than schools that only shut down the most visible energy consuming systems.

The Green Schools Program, which empowers student Green Teams to change energy-consuming behaviors at their schools, has been helping school districts save on energy costs nationwide since 1996. In partnership with the Alliance and local power distributor Tennessee Valley Authority (TVA), the Green Schools Program started in Tennessee in

the 2009-2010 school year among 21 schools; many of those schools continued participating in the program in the 2010-2011 school year.

The TVA Green Schools employ many energy efficiency measures, but their complete Thanksgiving shutdown contributed to an average 10% decrease in energy use in November 2009 compared with November 2008.

In a proper shut-down, faculty and staff spend the last afternoon before break – when students are out of the building – unplugging all energy-consuming equipment to avoid vampire energy loads, and turning off items that cannot be unplugged. At schools in Knox County, Tenn., faculty and staff unplug and turn off items that other schools might not touch, including:

- HVAC equipment, lights and computers
- Computer monitors
- Gym scoreboards
- Clock radios
- VCRs and DVD players
- Empty refrigerators and freezers
- Phone chargers
- Exhaust fans
- Desk lamps
- Miscellaneous lights in bathrooms and closets

The list for a complete shutdown is comprehensive and involves more time than simply flipping switches. For instance, appliances such as refrigerators must be cleaned out before getting unplugged, thermostats must be lowered across the building, and HVAC systems must be cleared of clutter.

At the same time that student Green Teams at Green Schools unplug energy vampires, they also dress up as holiday figures and compose seasonal songs about energy efficiency to bring the informative and entertaining message of energy efficiency to their classmates.

The schools that have achieved the greatest seasonal successes conducted energy assessments of their schools, as well as presented the math and science data on school

building energy consumption to their student body and staff. Once students and staff understand how much energy they consume, Green Teams often are more successful at implementing energy-saving measures. While school system employees such as facilities managers or energy managers work to set up holiday energy-saving requirements, the Green Schools Program helps students put those requirements into practice.

Using similar initiatives under this Program, three California school districts managed to save a combined 5.7 million kWh of energy, equating to nearly \$1 million savings in energy costs and a reduction of 2,800 tonnes of CO₂ emissions.

7.1.2 Leadership in Engineering and Environmental Design (LEED™)

The U.S. Green Building Council (USGBC) is a coalition of the nation's foremost leaders from every sector of the building industry working to promote buildings that are environmentally responsible, profitable, and healthful places to live and work.

In 2000, USGBC established the LEED™ rating system as a way to define and measure “green buildings.” LEED is a third party green building certification program and the nationally accepted benchmark for the design, construction, and operation of high-performance green buildings and neighborhoods.



In school terms, LEED is like a report card for buildings, demonstrating to the community that a facility is built and/or operated in a way that supports the health and wellbeing of occupants and saves energy, resources, and money. LEED certification is available for both new and existing schools. The LEED rating system is an internationally recognized certification system that measures how well a building performs according to several metrics:

- Energy savings
- Water efficiency
- CO₂ emissions reduction
- Improved indoor environmental quality

- Stewardship of resources

School districts of all sizes, private schools, and charter schools can green their existing building stock through the *LEED for Existing Buildings: Operations & Maintenance* rating system, which is a set of performance standards for the sustainable, ongoing operation of existing buildings that are not undergoing major renovations. The certification system identifies and rewards current best practices and provides an outline for buildings to use less energy, water, and natural resources; improve the indoor environment; and uncover operating inefficiencies. Prerequisites and credits within the rating system address high-performance building systems, operations and maintenance best practices, and sustainable policies.

Whether pursuing LEED certification or not, the LEED rating systems and resource guides provide comprehensive strategies that can be incorporated into the energy management and environmental conservation goals of the WCDSB.

According to the USGBC, green buildings can reduce:

- Energy Use by 24-50%
- CO2 Emissions by 33-39%
- Water Use by 40%
- Solid Waste by 70%

7.2 Institutional Specific Best Practices

The **British Columbia Ministry of Education** has issued a *Sustainable Schools Best Practices Guide* designed to help the school community at the elementary or secondary level to address sustainability issues. It outlines best practices to help green-team leaders (e.g., students, teachers, administrators, support staff, parents) lead the school community through environmental actions in the areas of energy, waste, water, school grounds, and transportation.



The Best Practice Guide lays out the following Steps to Creating a Sustainable School:

1. Establish a school green team (see Creating a School-Wide Approach to Sustainability, page 3 of the Guide) with students, teachers, and staff.
2. Complete the Green Schools: Quick Survey (see pages 8-9) and/or more in-depth environmental audits to find out how green your school is in the areas of energy, waste, water, school grounds, and transportation.
3. Choose one or more of these areas to address: energy, water, waste, school grounds or transportation.
4. Develop short-term and long-term goals.
5. Create an action plan that includes educational awareness and involves the whole classroom or school.
6. Consult with other schools, districts, and community organizations for advice and support.

7. Evaluate progress regularly and at the end of the school term and year by revisiting the results of past environmental audits.
8. Celebrate successes – perhaps on key dates such as Earth Day or a school-designated Green Day – and have fun!

Sustainability goals at a school should reflect what is important to the school community and be designed with the possibility of expansion in the next year. Below are a few actual goals and results as reported by BC schools.

- Goal: To have 90% of students walking to school on Wednesdays.
Results: Students increased participation from 65% to almost 90% over a five-month period.
- Goal: To reduce, reuse, recycle, and maintain garbage reduction at 50% or lower.
Results: The number of garbage bags went from 48 to 19 by the end of the school year.
- Goal: To develop and implement a shade strategy for the school (planting of trees around the perimeter of the school).
Results: Completed the landscape design. Ready to plant trees in the school yard next fall.
- Goal: To better utilize solar power at the school.
Results: Additional solar panels were purchased. A new pump run by solar power will be installed for the school pond.

The Best Practice Guide includes a survey, waste audit data sheet, cost/benefit analysis worksheet, energy checklist, waste reduction checklist, daily water use worksheet, water reduction checklist, school yard naturalization checklist, and transportation audit and checklist. (See the References section of this document for the web address.)



WASTE REDUCTION



Waste Reduction Checklist

Reduce

- ☐ Buy less and use less.
- ☐ Purchase more environmentally friendly office supplies.
- ☐ Choose to purchase items with less packaging.
- ☐ Purchase recycled paper.
- ☐ Double-side all photocopying.
- ☐ Set printer to print double sided as a default setting.
- ☐ Print notices on half-sheets.
- ☐ Email notices.
- ☐ Use emails instead of faxes.
- ☐ Post newsletters online.
- ☐ Avoid printing out emails.
- ☐ Host paper-free meetings by setting the agenda on the board.
- ☐ Use fewer paper towels in the washroom.
- ☐ Encourage waste-free lunches.
- ☐ Reduce the use of tetrapaks by using refillable containers.
- ☐ Purchase condiments, sweeteners, salt, and pepper in bulk.
- ☐ Use dispensers instead of individually packaged servings.

Reuse

- ☐ Replace disposable items with reusable items and learn to share or donate to avoid the landfill.
- ☐ Reuse the other side of used paper.
- ☐ Use reusable coffee cups and water bottles.
- ☐ Stock cafeteria with reusable or biodegradable plates, cups, and cutlery.
- ☐ Donate uneaten lunch items to a "share a lunch" program.
- ☐ Donate used computers, eyeglasses, cell phones, clothes, textbooks, and other items.
- ☐ Host a clothing swap/sale/collection.
- ☐ Host a schoolyard/garage sale-type fundraiser.

Recycle

- ☐ Divert garbage by recycling items such as paper, glass, plastics, cans, tetrapaks, and cardboard.
- ☐ Recycle special items such as batteries, electronics, cell phones, and computers.
- ☐ Compost organic waste.
- ☐ Limit contamination of recycled items by ensuring they are clean.
- ☐ Recycle ink and toner products.
- ☐ Ensure correct disposal methods are used for chemicals.

7.3 Incentives


Financial incentives are available from numerous sources. Government bodies are moving away from large-scale incentive or granting programs even for energy savings, arguing that since most energy-efficiency measures pay for themselves, building owners shouldn't need capital incentives to go green. The trend of government funding has turned towards "enabling" green projects by supporting design and feasibility studies and other narrowly targeted initiatives.

A number of Ontario Boards have looked to Energy Service Agreements (ESA) to fund energy savings initiatives. These types of agreements usually see a private energy service organization funding the up-front cost of an energy upgrade, and guaranteeing the Board savings over the period of the agreement. The Board pays a portion of the savings back to the energy service organization. The advantages of an ESA are that they require little or no up-front capital or staff time investment by the Board.

However, ESA's are focused on financial return from energy savings and thus may not encompass larger operational and maintenance issues. Boards should also consider the cost of an ESA over the advantages. ESA charges can exceed the cost of more conventional borrowing.

NRCan's Energy Innovators Initiative:

- Federal Program Sources
 - Natural Resources Canada
 - Office of Energy Efficiency
 - Sustainable Development Technology Canada
- Provincial Program Sources
 - Ministry of Energy and Infrastructure
 - Ministry of Northern Development, Mines and Forestry
 - Ontario Power Authority
 - Enbridge Gas Distribution
 - Union Gas Distribution



The Ministry of Education, as part of its' Energy Conservation Initiative, has retained an Incentive Programs Advisor (IPA) to assist district school Boards in applying for financial incentives to support the implementation of projects that reduce electrical and natural gas usage. Working hand-in-hand with school Boards, the IPA matches a Board's energy efficiency projects with available incentive funding to extend their financial resources.

The IPA is a shared sector resource and has current incentive program information. The sector benefits by sharing their knowledge and experience from energy efficiency projects.

8. Outline for Cost/Benefit Analyses for New Initiatives

Many Ontario Boards have already found creative ways of financing green school investments that have returned good value to the Board over time. In financing a green school, the challenge for a Board becomes determining the value of the investment to calculate the expected return and managing the investment to achieve the best rate of return. To determine the value of the investment, the Board will have to review sources of capital available for the project, including provincial funding, incentive programs, Board reserves, capital from lending institutions and capital from the open market.

8.1 Cost Payback Period

Energy conservation is a relatively new field in that most of the techniques in place today have yet to be stressed tested over time. The technology used in many of the systems that are being investigated by the Board are usually cutting edge but by that same respect tend to come at a higher cost as the developing companies try to recuperate the research and developments costs.

The Board is often faced with longer paybacks from this fact but in the interest of community development and technology investment we are committed to doing our part to help these new technologies become established.

Financial scrutiny of any investment is necessary. However certain projects such the photovoltaic generation project at Monsignor Doyle Catholic High School are simply the right thing to do as long as we receive financial support from our Ministry or other organizations. Investing in local manufacturing and technology allows others within the community to benefit from the lower costs and more advanced systems.

Many organizations that initiate green building projects have noted that they require a significant learning curve. Between 2000 and 2003, the City of Seattle commissioned \$600 million in LEED™ projects. The LEED premium over conventional construction methods fell 150% between 2000 and 2003. The reason for the reduction in costs was simple: as the city's project managers, consultants, and contractors got to know the process and optimized their approach, the cost of building green fell. (Source: Green Building Resource Guide)

8.2 Benefits

The projects that we invest in today not only play a critical role in the overall energy and environmental reduction plans for us all but also have many side benefits that truly make these initiatives worthwhile.

Investing in our infrastructure and in the education of future generations to understand and embrace green living is extremely positive.

All energy conservation investment encompassed different aspects of our priorities to help within the culture of our schools. Safety, comfort, and convenience are all issues we hold dearly and are all factors improved when investing. For example, better insulation and lighting lead to fewer accidents in the workplace. Better building controls and heating systems mean more comfortable spaces to learn and live in. Finally, items like motion and occupancy sensors make it easier for us to conserve and less of a hassle to use the tools we have at our disposal.

The other major aspect of energy conservation is not physical in nature but rather emotional and psychological. Investments in places that we live and work always improve morale and create a great sense of belonging and pride in what we accomplish.

This type of trust and confidence building is key in our children's education, however do not necessarily come directly from the classroom.

Being the leaders of energy conservation in our community, province, and in the world make our Board more attractive not only from a basic interest level but also bolster the Boards' credit and reputation for innovation and growth.

9. Sustainability Planning

The benchmark of any successful Energy and Environmental Management Plan is a significant and meaningful reduction in water consumption and greenhouse gas emissions.

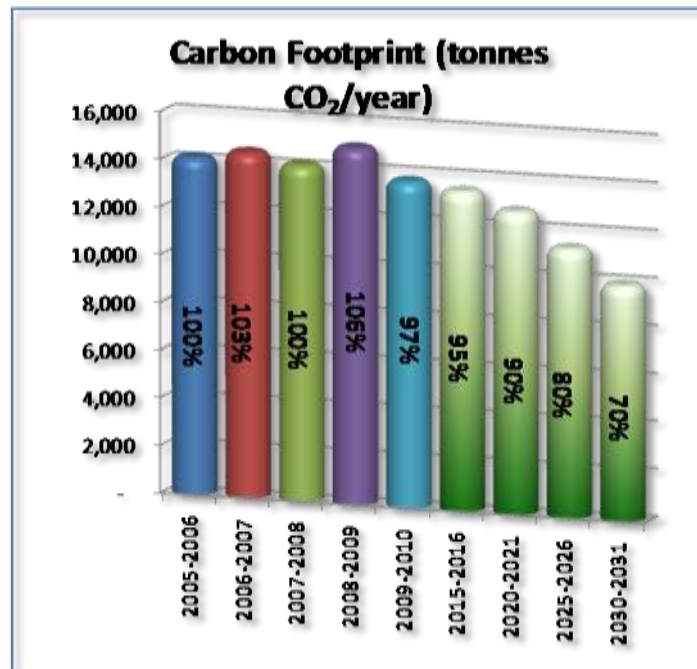
The following targets can be met if we accept and follow the strategies and action steps of our Plan. Described on the following pages, our long-term 20-year vision will guide us as we implement successive short-term 5-year action steps.

WCDSB Green Commitment*

WCDSB will reduce CO₂ emissions by...

- 5% below 2005 levels by 2016
- 10% below 2005 levels by 2021
- 20% below 2005 levels by 2026
- 30% below 2005 levels by 2031

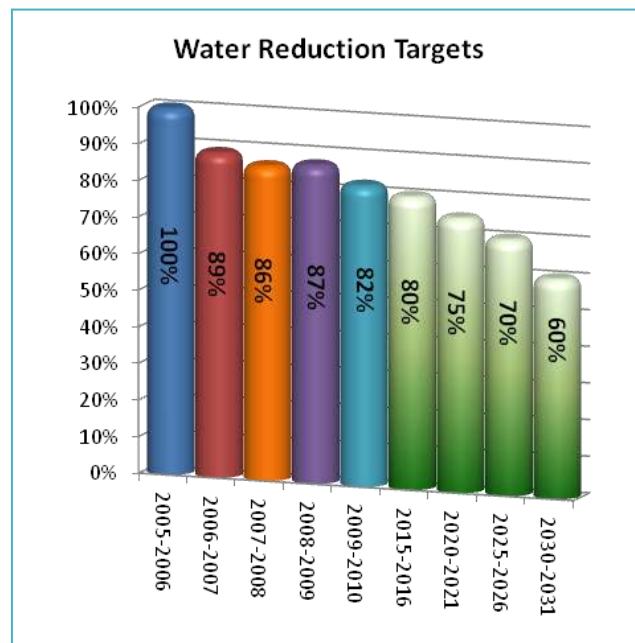
* Enrollment dependent



WCDSB will reduce water consumption by:

- 5% below 2005 by 2016
- 10% below 2005 by 2021
- 20% below 2005 by 2026
- 40% below 2005 by 2031

* Enrollment dependent



These global measurements, currently treated as a whole number regardless of the input variables, will be improved over time. This is because with statistically meaningful data, such as intensity per student or weather normalized data (ekWh per Heating or Cooling Degree Day), our ability to mathematically model is enabled through better metering and more frequent analysis.

These goals can be achieved by ensuring that the environment and energy conservation is a priority for the whole Board. We make sensible green choices and balance environmental values with other priorities.

Together we can achieve a Green Culture by:

- Rewarding green personal initiatives
- Elevating and enforcing green policies
- Incorporating green responsibilities into job descriptions and human resource practices.
- Fostering the EcoSchools program
- Communicating the WCDSB's green efforts and programs
- Providing appropriate funding for green projects

- Developing green project management standards
- Investing in renewable energy generation

Specifically, each of these principal goals can be achieved by the following means.

We will reward green personal initiatives by:

- Recruiting staff stewards from all schools and functional areas that will monitor green practices and techniques and relay results to the committee
- Recognizing positive efforts by WCDSB staff toward green personal initiatives
- Implementing the Energy Leaders Program award initiative

We will elevate and enforce green policies by:

- Revising the WCDSB environmental policy to reflect Green Plan strategies at least every 5 years
- Assisting relevant functions on environmentally sound purchasing practices
- Implementing consequences for not following policies

We will incorporate green responsibilities into job descriptions and human resource practices by:

- Revising job descriptions and interview questions, and amending union and exempt review processes to include green initiatives
- Updating staff information and orientation policies
- Applying relevant strategies to contractors and their staff



We will foster the EcoSchools program by:

- Potentially hiring a part-time Sustainability Coordinator to create and deliver presentations to staff, volunteers, students, and the community.
- Completing registration of all schools in the EcoSchools Program
- Serving on regional and national communities, spreading the information wherever possible

We will communicate the WCDSB's green efforts and programs by:

- Exhibiting new environmental ideas, conservation practices, facilities, and technologies to WCDSB and its community
- Participating with government and non-government groups in local, regional, and international conservation programs and projects
- Organizing sessions for the public and publishing articles through local news sources on WCDSB's green initiatives for internal and external media

We will provide appropriate funding for green projects by:

- Creating an operating budget for initiatives and projects related to the Sustainability Plan
- Reinvesting all revenues generated by green initiatives and projects back into other green related projects
- Applying to sponsored incentives, demand side management programs, and government programs

We will develop green project management standards by:

- Quantifying all material and energy inputs and outputs and illustrating to staff, volunteers, and students the amount of resources we consume and waste
- Conducting an external Environmental Management System assessment, for example an ISO 14001 Gap Analysis

We will invest in renewable energy generation by:

- Building renewable energy generation facilities or modular components at our schools
- Purchasing locally sold renewable energy

We are currently researching about the possibility of renting some of our rooftops out for the installation of Solar PV arrays; which could be another source of income or used to alleviate the dependency from fossil fuels at those facilities

Our work is never finished. Once we have implemented this Energy Management and Environmental Plan we will continually review, revise, renew, and monitor. We will communicate our efforts annually.

Public concern for the environment is the driving mechanism for change. Public concern for the environment has never been as high as it is today, and the momentum is still growing.

The Waterloo Catholic District School Board is going to be a leader in the local and international conservation movement. Academia has a credible voice that resonates with students, staff, and volunteers.

The strategic directions of the WCDSB Energy Management and Environmental Plan, including the wise execution of the 22 short-term action steps, will translate into serious reductions in our greenhouse gas emissions and water consumption. The result will demonstrate that sustainability is possible. We must remain a leader in what has become the most important issue for humankind: the environment.



Resources

9.1.1 British Columbia

The B.C. Government is setting an example and working to ensure that its operations are carbon neutral for 2010 and every year thereafter. This commitment – enshrined in the *Greenhouse Gas Reduction Targets Act* – is the first of its kind in North America. It applies to all provincial public sector operations, including government ministries and agencies, schools, colleges, universities, health authorities, and Crown corporations.

As part of this commitment, these organizations will:

- Measure their greenhouse gas emissions.
- Reduce these emissions as much as possible.
- Offset the remaining emissions by investing in projects that reduce greenhouse gas emissions, so the net effect of government activities is carbon neutral.
- Report out publicly on plans and actions to reduce emissions.

More than 150 public sector organizations, including schools, have already planned and implemented a wide range of programs and initiatives to conserve energy and save money. These activities are recorded in **Carbon Neutral Action Reports**. See a sample CNAR from the Vancouver School Board attached in the Appendices.



In the K-12 education system, there are 60 school districts and over 1,800 facilities, from remote districts with few students covering areas the size of Nova Scotia to large urban districts with growing school populations. Even with this variety, it is clear that school districts have been focused on the energy efficiency of their buildings and fleets for years. Many school districts used 2008 as an opportunity to undertake planning and put

resources such as sustainability committees, green teams, and energy managers in place.

2009 Highlights from this sector:

- 92% of school districts have introduced an anti-idling policy and/or raised anti-idling awareness for fleet drivers
- 92% post materials online that were previously printed
- 87% encourage staff to hold paperless meetings or presentations
- 87% have installed power management software which shuts down computers outside of regular business hours

Soon, everyone in B.C. who attends school, visits a government office or goes to the hospital will be in a carbon neutral facility. Through carbon neutral government, British Columbians will learn how to take action and will see first-hand the benefits of a low carbon lifestyle.

9.1.2 Innovative Ontario School Boards

The following sections outline school Boards across Ontario which are noteworthy as innovators in the concept of green schools and environmental education.

9.1.2.1 York Region District School Board

The York Region District School Board (YRDSB) has been able to flat line its energy costs despite adding approximately 80 new schools since 1997, while maintaining budgets in line with the funding formula. They have managed to achieve this by developing their own comprehensive mechanical and electrical guidelines. The Board has also developed a network of community partners that provide resources and financial support.

Lighting: The YRDSB focuses on optimizing lighting loads through targeting wattage, types of lights used in classrooms and, most recently, light harvesting. Light harvesting

technology maintains proper lighting levels at all times, signaling for some artificial lights in classrooms to be turned off when outdoor natural light is available.

Heating: The YRDSB has invested in high-quality “Eutectic” cast-iron boiler systems that allow the YRDSB to utilize low temperature heating in the shoulder months, as well as achieve more than 85% boiler efficiency and still maintain a capital life expectancy of over 30 years. Most recently, the use of variable water flow technology has allowed the electrical and natural gas consumption to be further optimized.

Staff Training: Every lead caretaker has received at least four hours of intensive training on the operation of their specific facility systems, with ongoing courses continually being scheduled. Trainees understand how their efforts fit into the big picture and how they contribute to the Board’s conservation goals.

9.1.2.2 Greater Essex County District School Board

The Greater Essex Country District School Board (GECD SB) joined the EcoSchools Environmental Stewardship program in 2006 and was the first school Board in the province to make it a required part of every school’s daily activity. This is a long-term project, not merely an initiative to cut costs during a period of high energy prices.



EcoTeams are established annually in each school, made up of at least one administrator, teacher, student, and custodian. It is this group’s responsibility to guide their school community in an effort to reduce, reuse, and recycle. EcoTeams conduct audits of energy usage in their building and formulate action plans to reduce the amount of water and electricity being used. In many cases just turning off lights and computers when not in use can have a dramatic impact.

When the GECD SB decommissioned Princess Anne Public School, it partnered with the Government of Ontario to invest in a unique infrastructure renewal project that will inform the design of educational facilities well into the future. **Dr. David Suzuki Public School** is a LEED™ Platinum certified school which will showcase innovative and proven

environmental and energy efficient technologies, demonstrating a new world of possibilities in educational facility design.

When the original Princess Anne School was demolished, the project team recycled 95% of the old school, including bricks, steel, and drywall for the creation of the new David Suzuki School. Any reusable items were salvaged. Lighting and millwork were donated to Habitat for Humanity.

The school opened in the fall of 2010 and houses students from the old Princess Anne School as well as the former Concord Public School, merging the two together into one more efficient system.



Canada's most environmentally friendly school

9.1.2.3 York Catholic District School Board

The York Catholic District School Board's (YCDSB) EcoChampions Program is an engaging, educational and pragmatic approach to teaching and realizing the benefits of energy cost savings. The Board is currently enjoying energy savings equal to 10% of previous costs, while the math and science curricula have been expanded to include energy conservation and other environmental subjects. Perhaps even more important, EcoChampions proves that an



individual can really affect the environment – simply by turning off a few lights – which is the message that student ambassadors take home to their friends and families.

EcoChampions is a two-part program. An interval meter is installed in the school and is connected the building automation system. Energy statistics from the meter are displayed on a monitor in the school foyer and in classrooms via the intranet. If pre-set energy consumption thresholds are exceeded, “Save Energy” LED signs in all classrooms and public areas flash. When the LED flashes, an energy savings plan swings into action. As each tactic is introduced, students may log into the Eco Website or view the central system monitor to see the actual, verifiable impact of their conservation efforts.



The total program costs, mainly for meters, LED's and wiring, amounted to \$7,000 per school. The costs tend to be paid back through energy savings in a little over two years. In 2010, 25 schools had signed up; YCDSB planned to have another 55 schools on the EcoChampions program by the end of 2010, and all schools will be completed

by 2011.

9.1.2.4 Upper Canada College

Upper Canada College (UCC) is a private boy's school in Toronto founded 180 years ago. It, like schools everywhere, has land, roof space, leaky buildings, and operating budgets that must work against the backdrop of rising energy prices. It decided to turn this



into an opportunity. Embracing sustainability, it laid out a plan that touched on all aspects of the school, including its curriculum, culture, and the management of its facilities.

The first step was to attack the “low hanging fruit” by installing new energy efficient lighting and paying greater attention the times when energy is needed and when it is not. In the first year, these simple changes saved the school \$200,000 on its electricity and gas bills.

This money was then redirected into more sustainability initiatives. Taking advantage of the land space that many schools have in the form of playgrounds and sports fields, the UCC installed geothermal piping in the ground during the process of renovating their



main sports field into a new arena. The arena also has a white roof to enhance its ability to reflect sunlight, thus reducing its heat island effect, and captures rainwater for use in its toilets, reducing the demand for city supplied potable water. Finally, the UCC utilizes special software that connects to all sensors, equipment, and lighting in the building, allowing for the ability to analyze consumption patterns and fine-tune energy use.

While the Upper Canada College does not have the same financial constraints of a publicly funded school, it is a prime example of what can be done when initial conservation measures are used to fund increasing complex strategies, as part of a strategy that extends beyond the confines of a few years.

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Glossary

Building Envelope – The exterior surface of a building – the walls, windows, roofs, and floor; also referred to as the building shell.

Carbon Footprint – A measure of greenhouse gas emissions associated with an activity. A comprehensive carbon footprint includes building construction, operation, energy use, building related transportation, and the embodied energy of water, solid waste, and construction materials.

Carbon Neutral – Carbon neutrality involves measuring operational GHF emissions, reducing those where possible, offsetting the remainder and demonstrating leadership through public reporting.

Commissioning – The process of verifying and documenting that a building and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the owner's project requirements.

Daylighting – The controlled admission of natural light into a space, used to reduce or eliminate electric lighting.

Emissions – The release of gases into the atmosphere. Usually refers to emissions of greenhouse gases.

Greenhouse Gases – Gases, both natural and anthropogenic, that contribute to the warming of the Earth's atmosphere by reflecting radiation from the Earth's surface. The most prevalent of these is Carbon dioxide.

Greywater – Domestic wastewater composed of wash water from kitchen, bathroom, and laundry sinks, tubs, and washers. It must not include wastewater from kitchen sinks or dishwashers, and does not come into contact with toilet wastewater.

Heat Island Effect – The absorption of heat by hardscapes, such as dark, non-reflective pavement and buildings, and its radiation to surrounding areas. Particularly in urban areas, other sources may include vehicle exhaust, air-conditioners, and street equipment; reduced airflow from tall buildings and narrow streets exacerbates the effect.

Light Pollution – Refers to the intrusion of artificial light into areas unintended. The effect is often called Skyglow, the orange-ish glow seen radiating over towns and roadways principally from High Pressure Sodium Lighting, preventing any view of the

dark night sky and glowing stars. Light pollution can alter the behavior patterns of nocturnal wildlife species, potentially placing them in peril. For humans, the lack of opportunity to witness and enjoy the stars and the vastness of the night sky, contributes to our feeling of separation from our natural environment. Above and beyond the negative environmental effects, the light pollution itself represents wasted energy, as light shines it where it is not needed or wanted, due to inefficient lighting designs and task application.

Phantom Loads and Energy Vampires – Appliances which draw power even when they are off, in stand-by mode, or in low power mode. Examples include televisions, coffee makers, stereos, microwaves, cell phone chargers, etc. Indicators of energy vampire appliances are those with remote controls, continuous display features (like clocks on microwaves), those that require rechargeable batteries, and those with external power supplies, such as inkjet printers. Cell phone and MP3 chargers draw power when plugged in, even when not actually connected to the device.

Post Consumer Recycled Content – The percentage of material in a product that was consumer waste. The recycled material was generated by household, commercial, industrial, or institutional end users and can no longer be used for its intended purpose. This includes returns of materials collected through recycling programs, discarded products, and landscaping waste.


Potable Water – Water that meets or exceeds federal drinking water quality standards and is approved for human consumption by the state or local authorities having jurisdiction; it may be supplied from wells or municipal water systems.

Renewable Energy – Resources that are not depleted by use. Examples include energy from the sun, wind, and small (low impact) hydropower, plus geothermal energy and wave and tidal systems. Ways to capture energy from the sun include photovoltaic, solar thermal, and bioenergy systems based on wood waste, agricultural crops or residue, animal and other organic waste, or landfill gas.

Stormwater Runoff – Water from precipitation that flows over surfaces into sewer systems or receiving water bodies. All precipitation that leaves site boundaries on the surface is considered stormwater runoff.

Sustainability – Meeting the needs of the present without compromising the needs of future generations to meet their needs. (Brundtland Commission)





Sustainable Waterloo – Founded in July 2008, Sustainable Waterloo is a not-for-profit organization that guides organizations in Waterloo Region towards a more environmentally sustainable future. To do so, Sustainable Waterloo's Regional Carbon Initiative supports and facilitates voluntary target-setting and reductions of carbon emissions by organizations across Waterloo Region.



Appendix A

CUSUM Analyses of WCDSB Schools

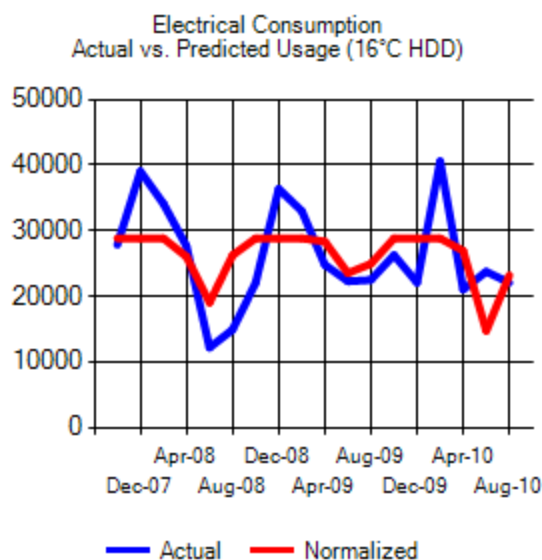
September 2007 to August 2010

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

Waterloo Catholic District School Board

Locations:

Facility Services [480 Dutton Dr.]

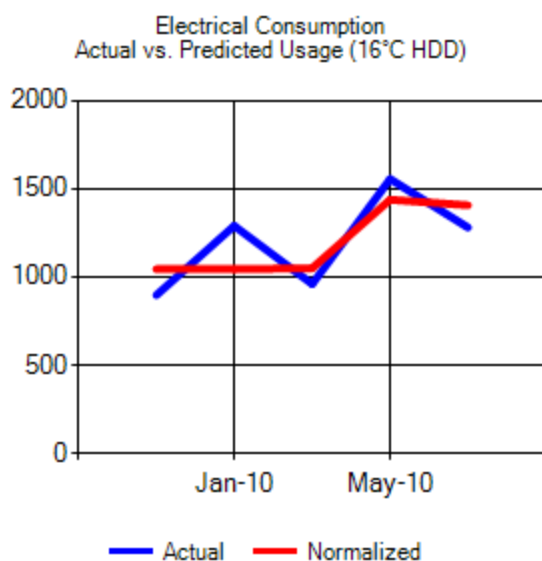


Predicted 1 Consumption = $-88.6 \text{ kWh/HDD} \times x + 28,814.6$; $R^2=26.1 \%$

104 Ontario Street North

Locations:

Main [104 Ontario St. North]

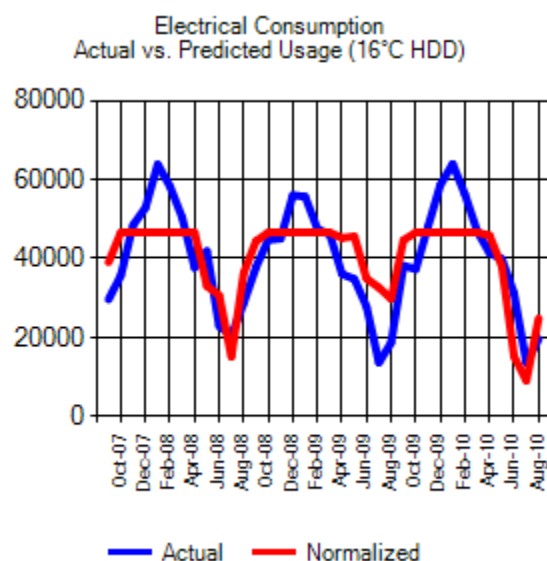


Predicted 1 Consumption = $3.2 \text{ kWh/HDD} \times x + 1,043.8$; $R^2=58.7 \%$

Blessed Kateri

Locations:

Main [560 Pioneer Dr.]

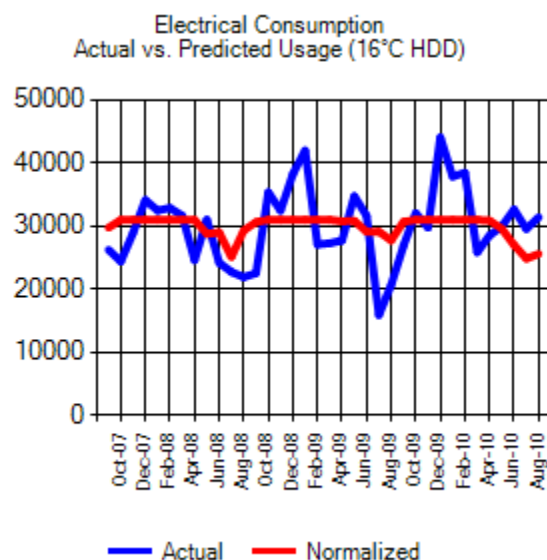


Predicted 1 Consumption = $-428.2 \text{ kWh/HDD} \times x + 46,581.8$; $R^2=55.6 \%$

Blessed Sacrament

Locations:

Main [367 The Country Way]



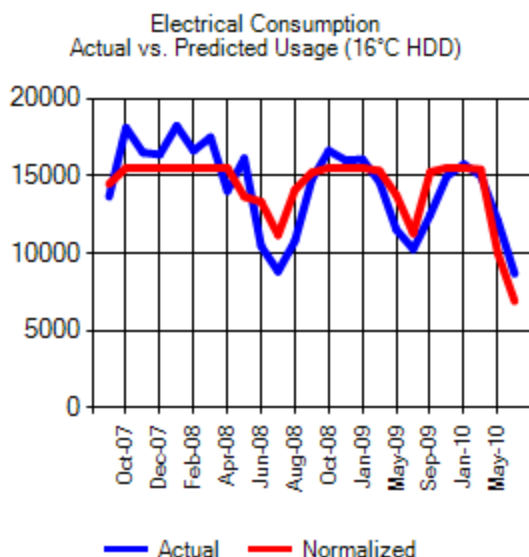
Predicted 1 Consumption = $-70.9 \text{ kWh/HDD} \times x + 30,969.9$; $R^2=8.7 \%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

Canadian Martyrs

Locations:

Main [50 Confederation Dr.]

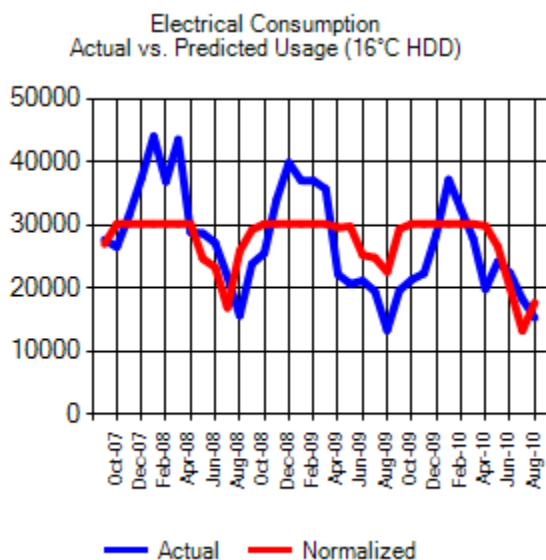


Predicted 1 Consumption = -59.1 kWh/HDD
 $x + 15,498.6$; $R^2=59.4 \%$

Christ The King

Locations:

Main [70 Acorn Way]

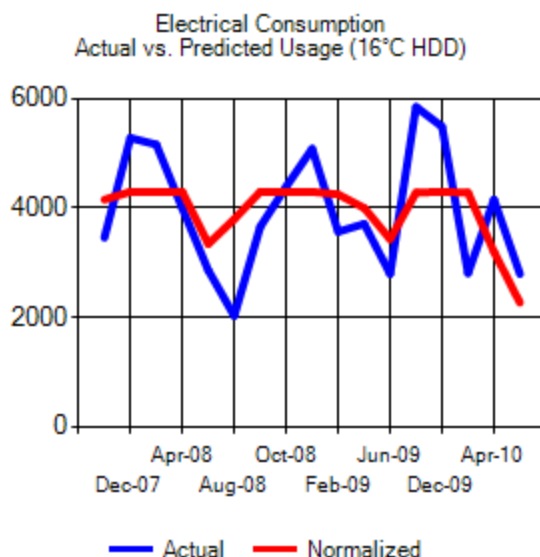


Predicted 1 Consumption = -180.4
 $\text{kWh/HDD } x + 30,159.4$; $R^2=29.7 \%$

Complex (WCDSB)

Locations:

Main [14 Braun St.]

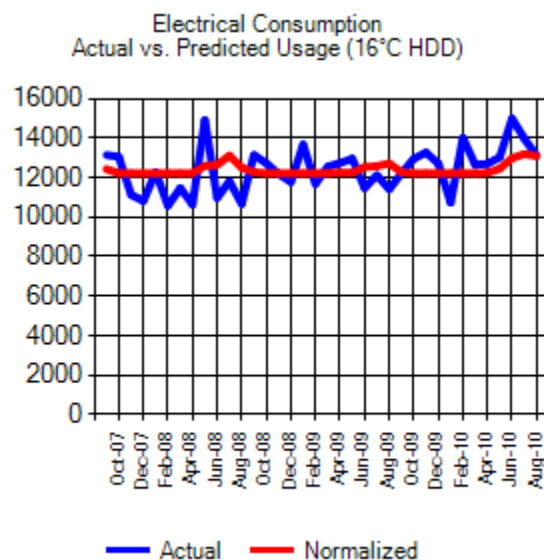


Predicted 1 Consumption = -8.5 kWh/HDD
 $x + 4,289.7$; $R^2=26.1 \%$

Holy Family

Locations:

Main [313 Huron St.]



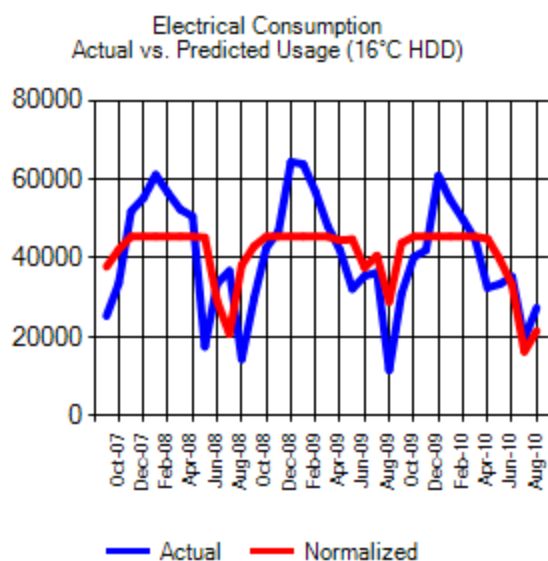
Predicted 1 Consumption = 12.0 kWh/HDD
 $x + 12,211.6$; $R^2=6.4 \%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

Holy Rosary

Locations:

Main [485 Thorndale Dr.]

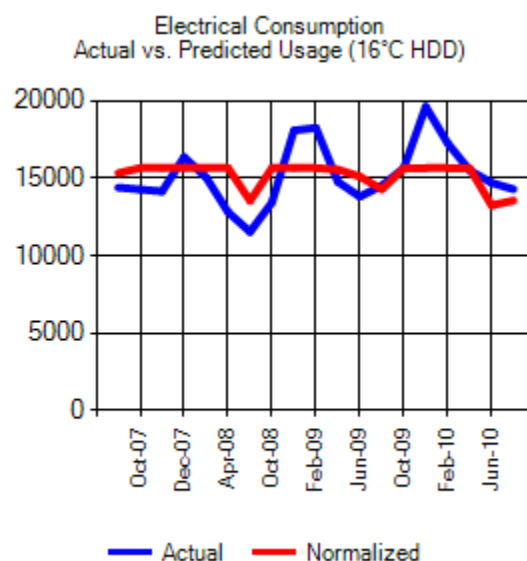


Predicted 1 Consumption = -298.0
kWh/HDD x + 45,450.1; $R^2=31.9\%$

IT Facility (WCDSB)

Locations:

Main [91 Moore Ave]

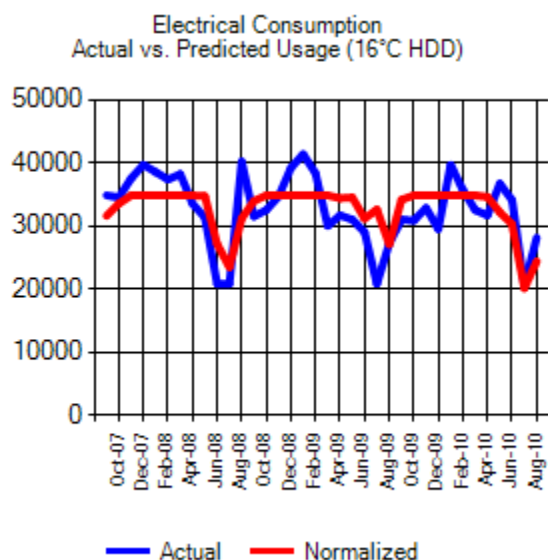


Predicted 1 Consumption = -18.9 kWh/HDD
x + 15,640.4; $R^2=17.8\%$

Holy Spirit

Locations:

Main [15 Gatehouse Dr.]

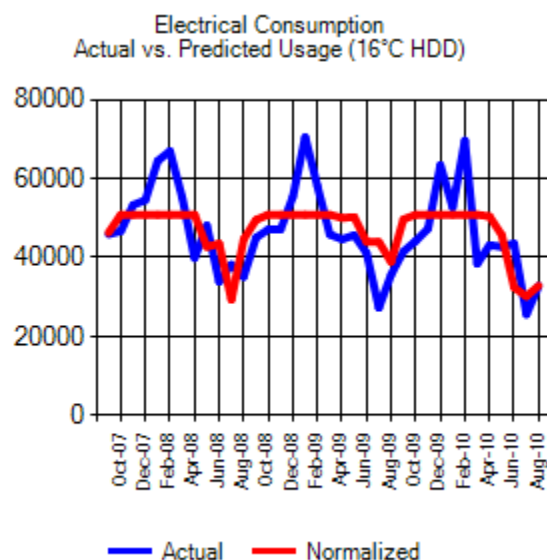


Predicted 1 Consumption = -138.2
kWh/HDD x + 34,819.8; $R^2=43.5\%$

John Sweeney

Locations:

Main [185 Activa Ave.]



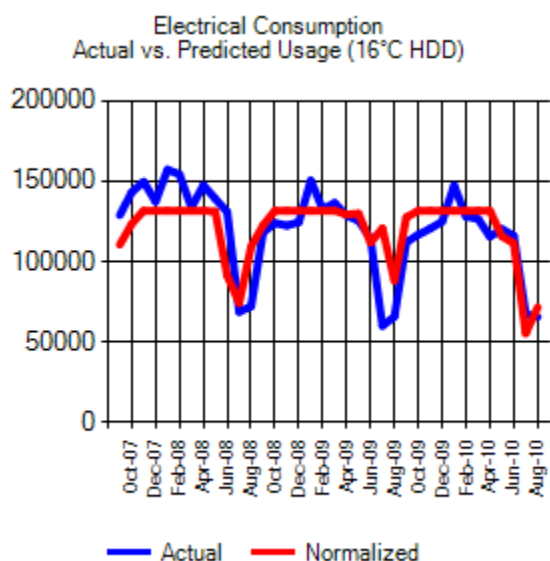
Predicted 1 Consumption = -260.8
kWh/HDD x + 50,855.2; $R^2=34.4\%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

Monsignor Doyle C.S.S.

Locations:

Main [185 Myers Rd.]

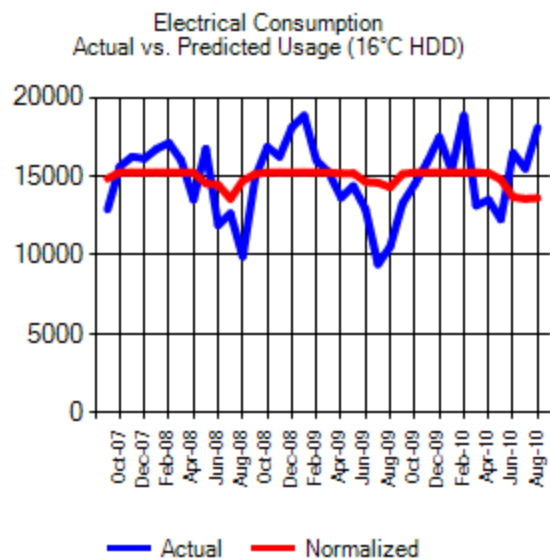


Predicted 1 Consumption = -756.5
kWh/HDD $x + 131,647.9$; $R^2=54.0$ %

Monsignor Gleason

Locations:

Main [155 Westwood Dr.]

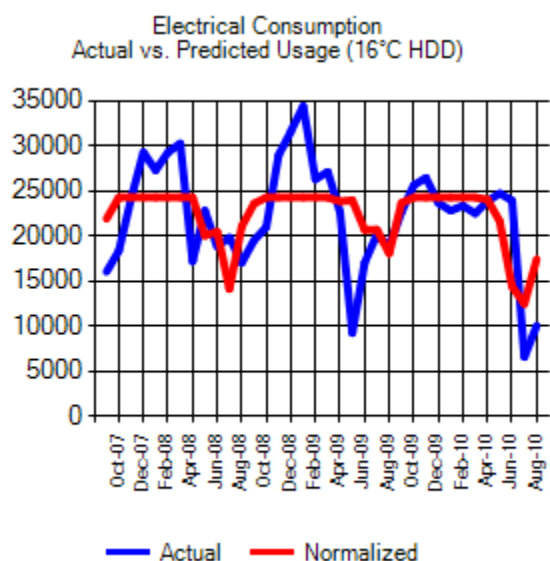


Predicted 1 Consumption = -22.2 kWh/HDD
 $x + 15,238.6$; $R^2=5.1$ %

Monsignor Haller

Locations:

Main [118 Shea Cr.]

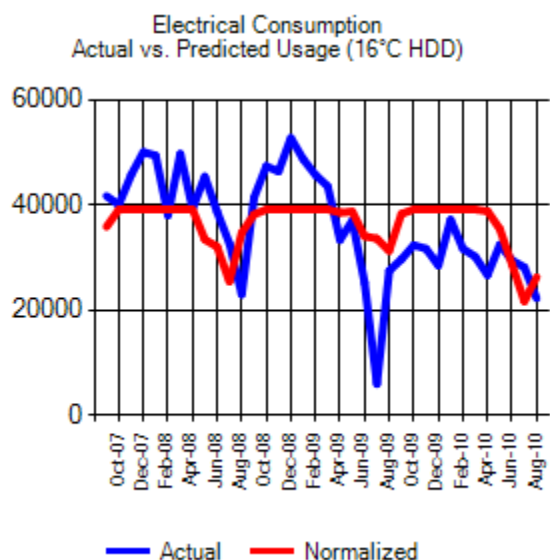


Predicted 1 Consumption = -134.7
kWh/HDD $x + 24,261.8$; $R^2=28.5$ %

Mother Teresa

Locations:

Main [520 Saginaw Pky.]



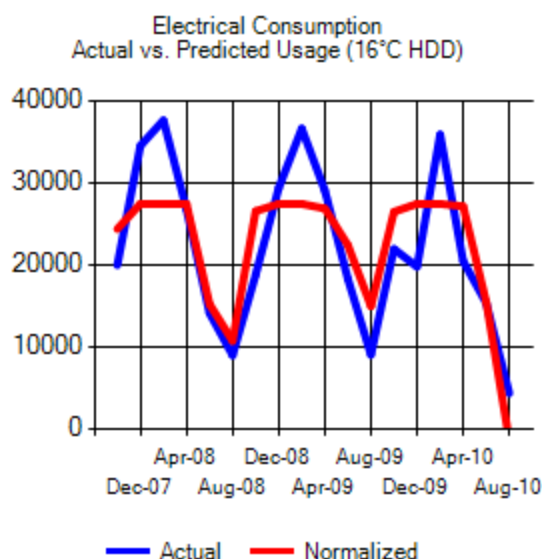
Predicted 1 Consumption = -186.2
kWh/HDD $x + 39,120.4$; $R^2=20.9$ %

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

Notre Dame

Locations:

Main [142 Rosemount Dr.]

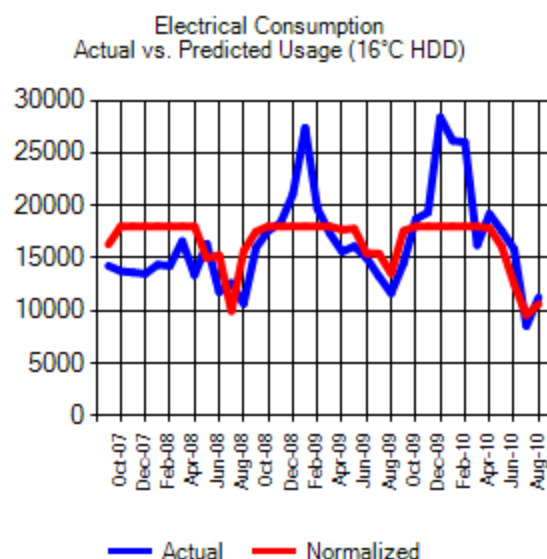


Predicted 1 Consumption = -174.3
kWh/HDD x + 27,370.9; $R^2=64.5\%$

Our Lady of Grace

Locations:

Main [70 Gracefield Cres.]

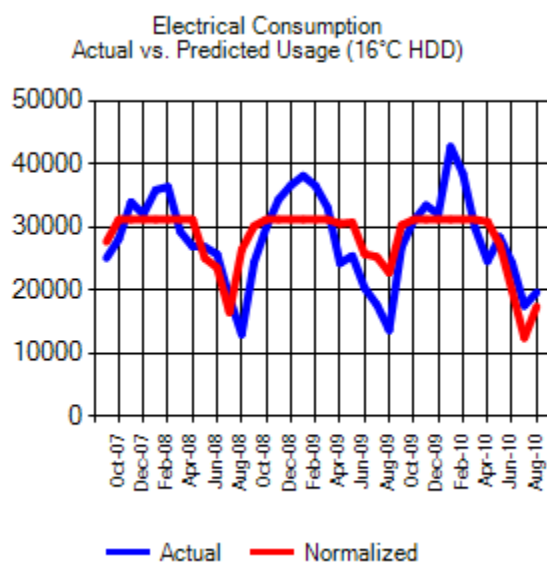


Predicted 1 Consumption = -97.3 kWh/HDD
x + 18,013.8; $R^2=27.4\%$

Our Lady of Fatima

Locations:

Main [55 Hammet St.]

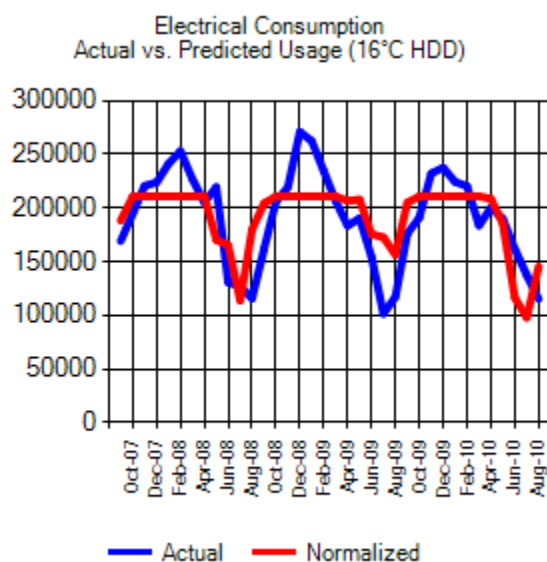


Predicted 1 Consumption = -199.8
kWh/HDD x + 31,165.7; $R^2=46.5\%$

Resurrection C.S.S.

Locations:

Main [455 University Ave.]



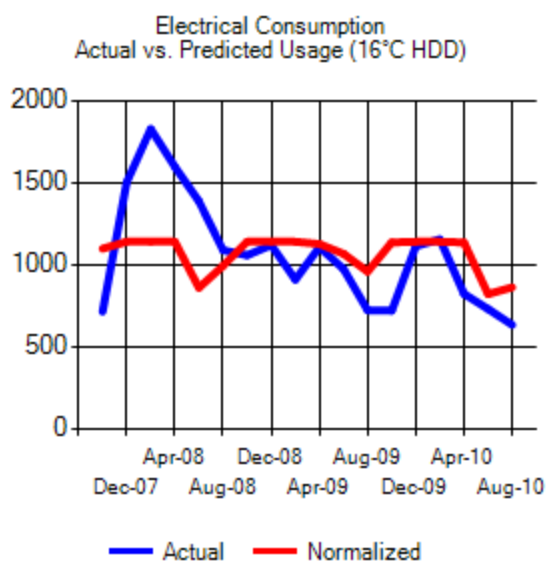
Predicted 1 Consumption = -1,288.7
kWh/HDD x + 210,764.4; $R^2=48.2\%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

Sacred Heart

Locations:

Main [81 Moore Ave.]

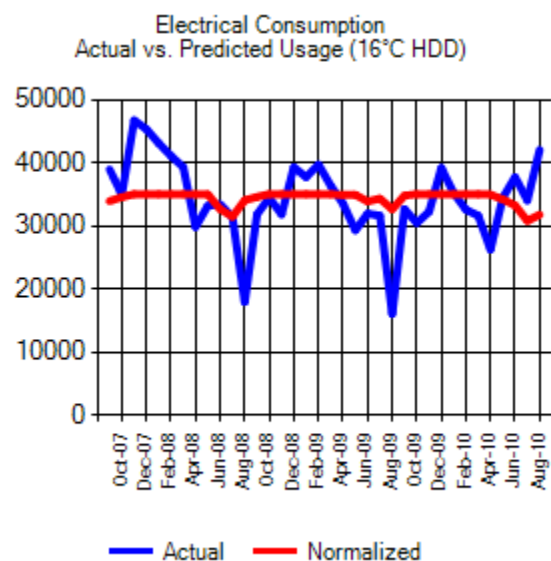


Predicted 1 Consumption = -2.5 kWh/HDD
 $x + 1,137.9$; $R^2=11.4 \%$

Sir Edgar Bauer

Locations:

Main [660 Glen Forrest Blvd.]

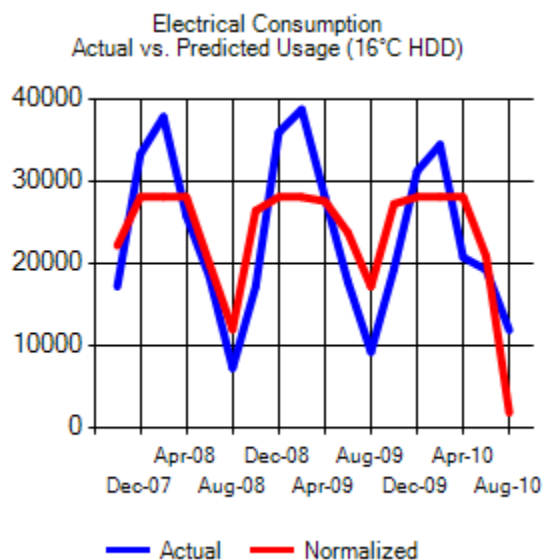


Predicted 1 Consumption = -43.1 kWh/HDD
 $x + 35,027.5$; $R^2=3.2 \%$

St. Agatha

Locations:

Main [1869 Notre Dame]

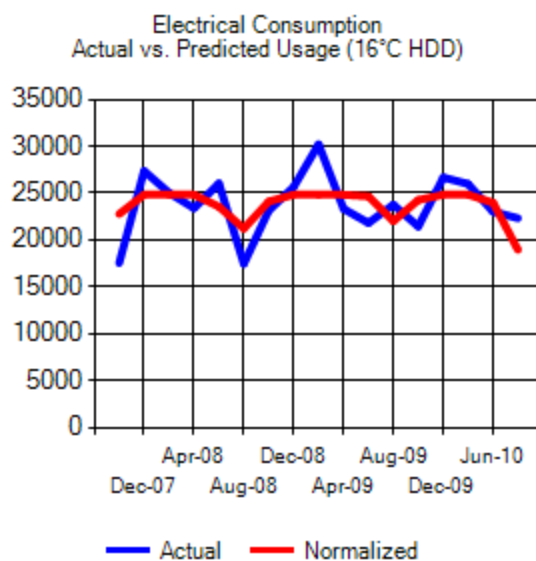


Predicted 1 Consumption = -151.6
 $\text{kWh/HDD} \times x + 27,998.8$; $R^2=51.9 \%$

St. Agnes

Locations:

Main [254 Neilson Ave.]



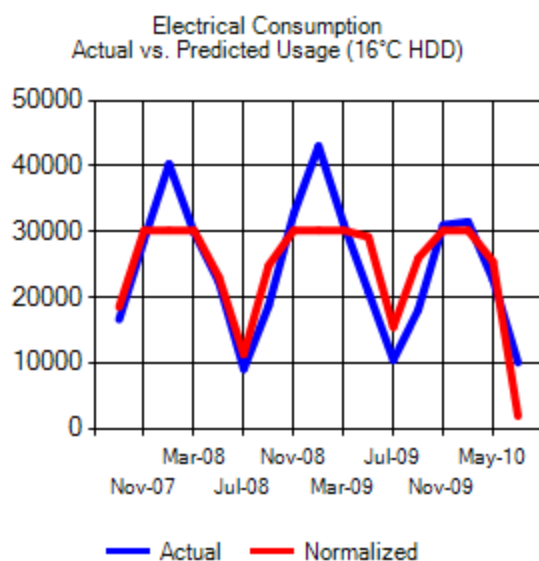
Predicted 1 Consumption = -32.8 kWh/HDD
 $x + 24,824.8$; $R^2=26.1 \%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

St. Aloysius

Locations:

Main [504 Connaught St.]

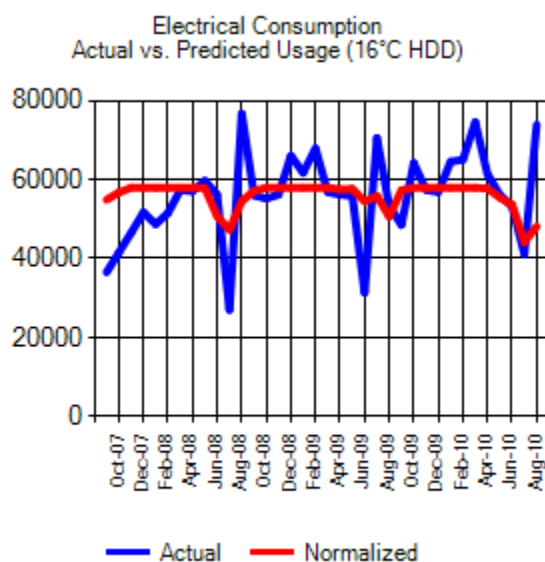


Predicted 1 Consumption = -183.1
kWh/HDD x + 30,180.8; $R^2=66.2\%$

St. Ambrose

Locations:

Main [25 Chalmers St. S.]

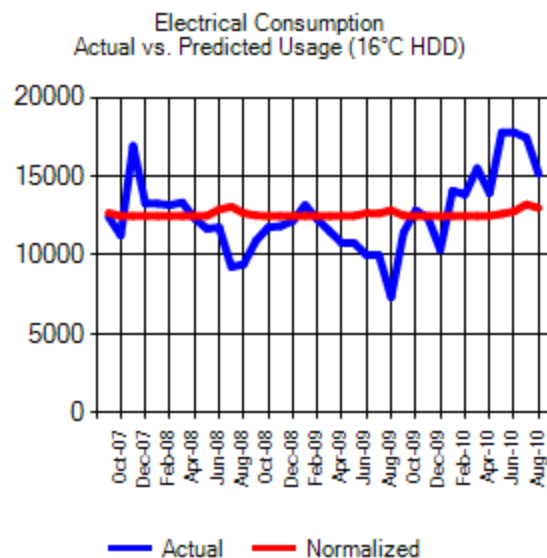


Predicted 1 Consumption = -129.8
kWh/HDD x + 57,919.1; $R^2=9.8\%$

St. Anne (Cambridge)

Locations:

Main [127 Elgin St. N.]

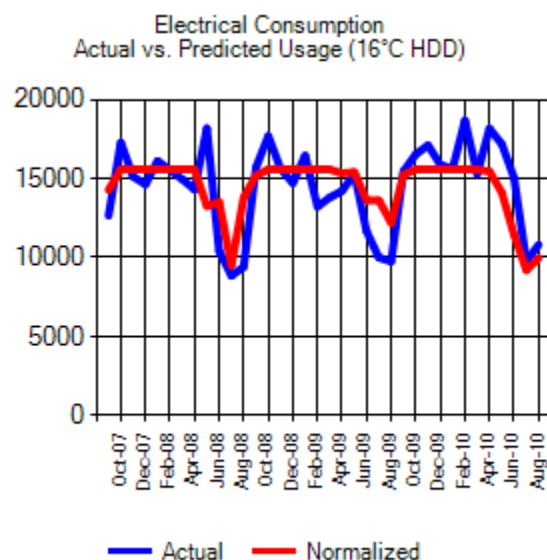


Predicted 1 Consumption = 7.2 kWh/HDD x
+ 12,470.8; $R^2=0.6\%$

St. Anne (Kitchener)

Locations:

Main [250 East Ave.]



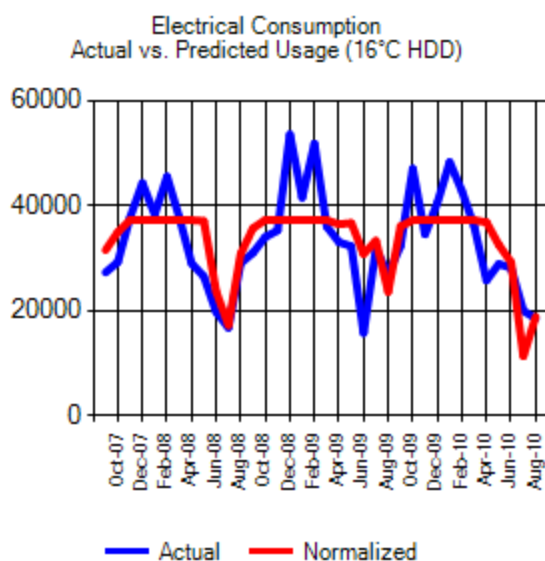
Predicted 1 Consumption = -73.6 kWh/HDD
x + 15,570.5; $R^2=44.9\%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

St. Augustine

Locations:

Main [177 Bismarck Dr.]

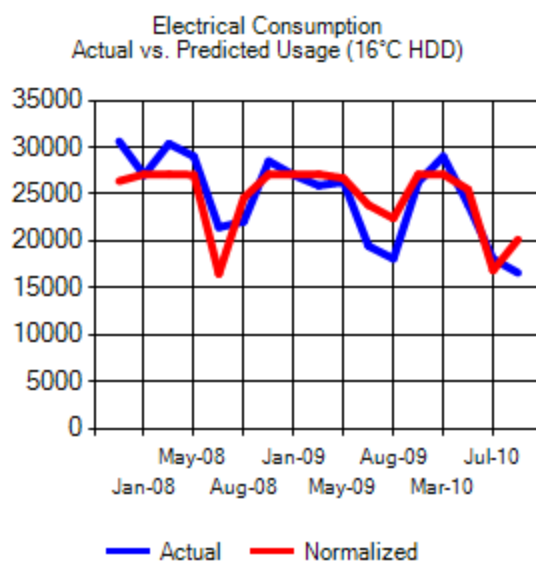


Predicted 1 Consumption = -243.6
kWh/HDD x + 37,225.2; $R^2=47.5\%$

St. Bernadette

Locations:

Main [245 Lorne Ave.]

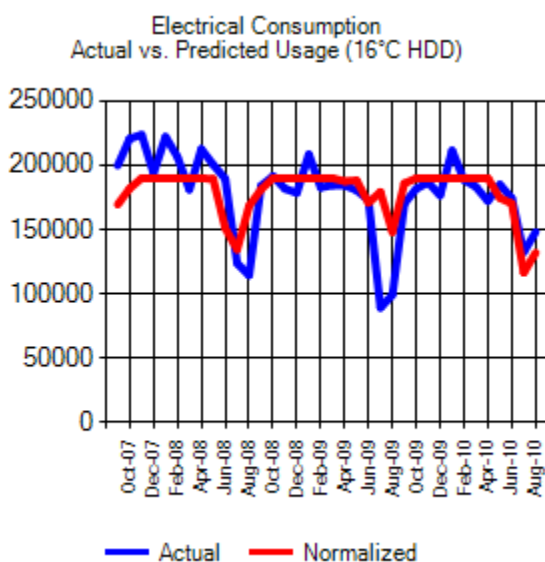


Predicted 1 Consumption = -77.1 kWh/HDD
x + 27,104.8; $R^2=62.5\%$

St. Benedict C.S.S.

Locations:

Main [50 Saginaw Parkway]

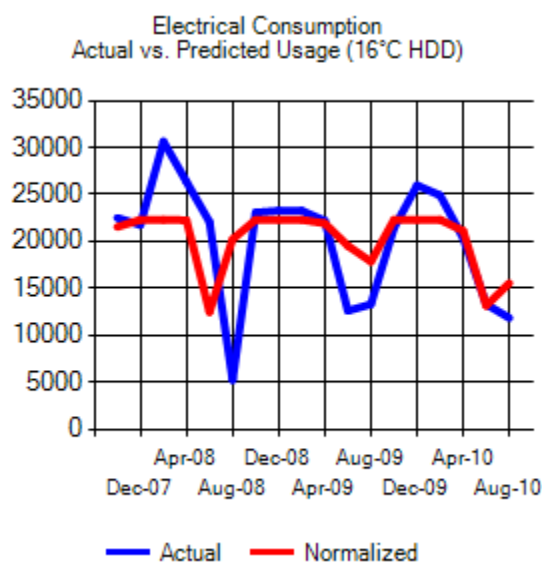


Predicted 1 Consumption = -728.4
kWh/HDD x + 189,681.4; $R^2=35.4\%$

St. Boniface

Locations:

Main [1354 Maryhill Rd.]



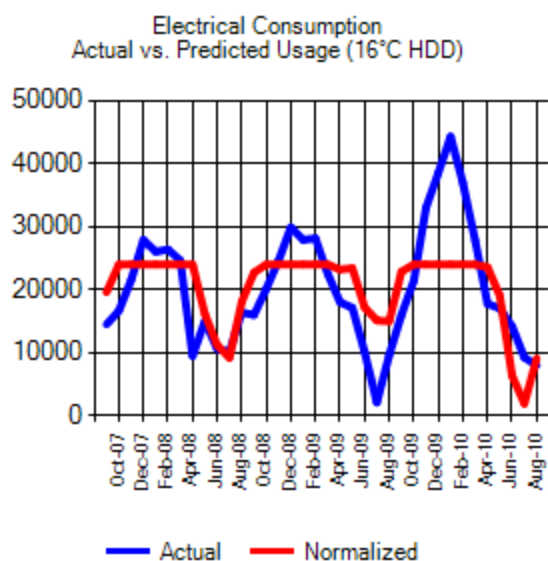
Predicted 1 Consumption = -69.9 kWh/HDD
x + 22,301.8; $R^2=26.3\%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

St. Brigid

Locations:

Main [50 Broom St.]

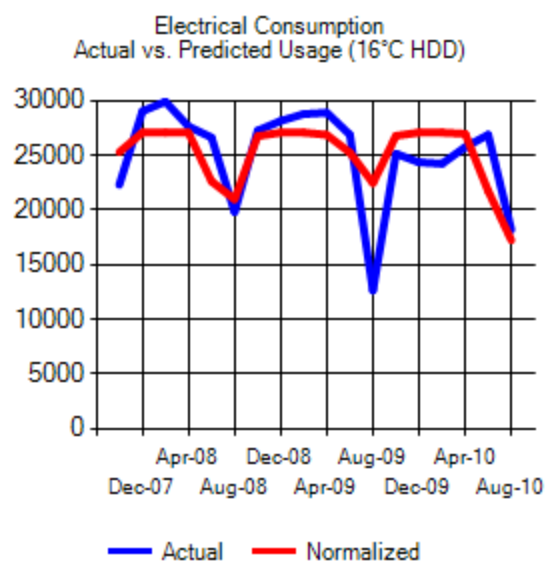


Predicted 1 Consumption = -249.1
kWh/HDD x + 23,984.6; $R^2=40.2\%$

St. Clements (S.C.)

Locations:

Main [3639 Lobsinger Line]

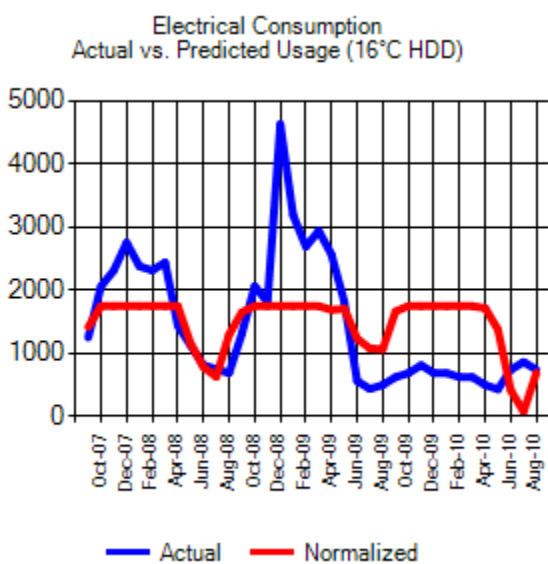


Predicted 1 Consumption = -63.6 kWh/HDD
x + 27,044.7; $R^2=42.5\%$

St. Clements (C)

Locations:

Main [291 Westminster Dr. N.]

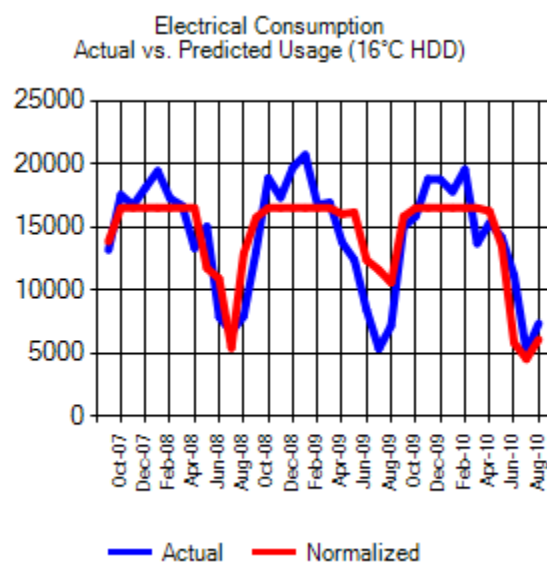


Predicted 1 Consumption = -18.9 kWh/HDD
x + 1,748.0; $R^2=19.6\%$

St. Daniel

Locations:

Main [39 Midland Dr.]



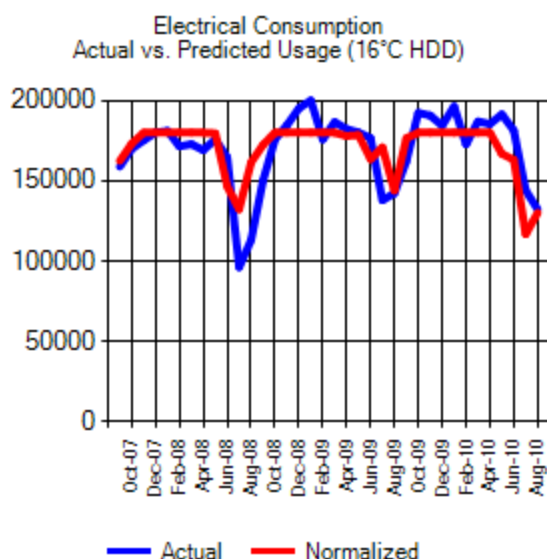
Predicted 1 Consumption = -150.8
kWh/HDD x + 16,497.7; $R^2=64.3\%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

St. David C.S.S.

Locations:

Main [4 High St.]

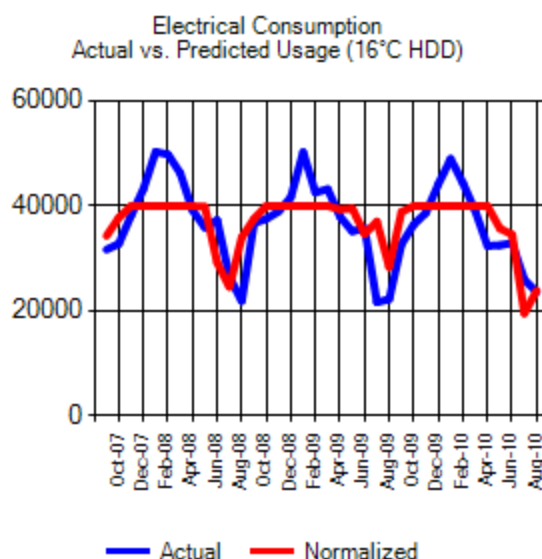


Predicted 1 Consumption = -627.3
kWh/HDD $x + 179,868.1$; $R^2=50.3$ %

St. Elizabeth

Locations:

Main [50 Adler St.]

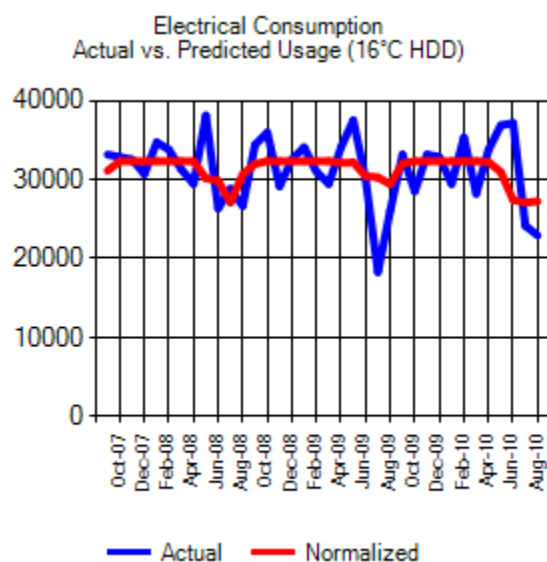


Predicted 1 Consumption = -202.9
kWh/HDD $x + 39,899.9$; $R^2=44.6$ %

St. Dominic

Locations:

Main [3 Westforest Trail]

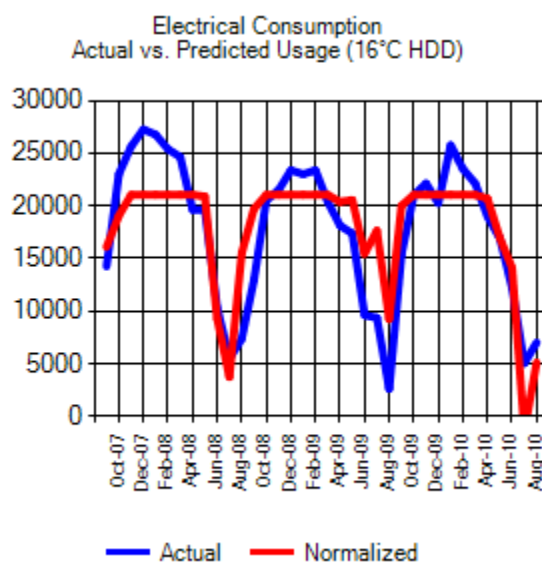


Predicted 1 Consumption = -69.7 kWh/HDD
 $x + 32,326.3$; $R^2=15.1$ %

St. Francis (Cambridge)

Locations:

Main [60 McDonald Ave]



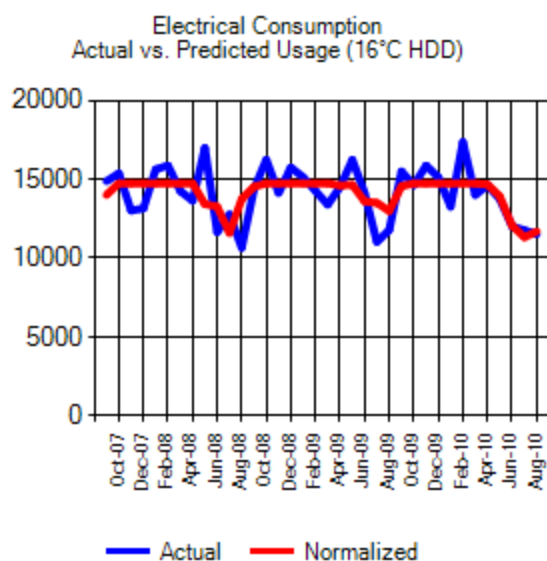
Predicted 1 Consumption = -210.9
kWh/HDD $x + 21,048.4$; $R^2=67.6$ %

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

St. Francis (Kitchener)

Locations:

Main [154 Gatewood Rd.]

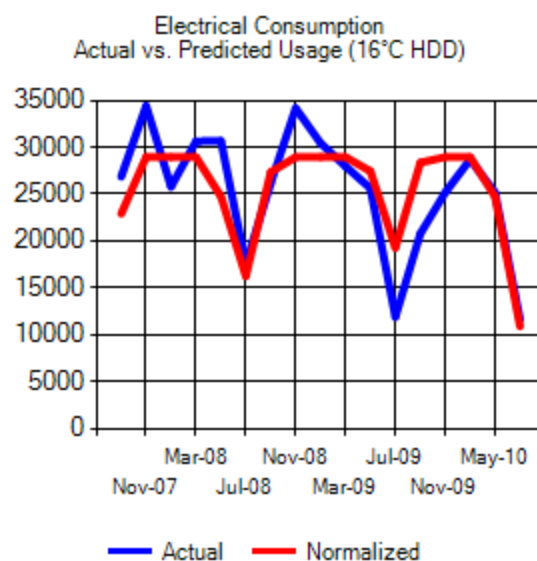


Predicted 1 Consumption = -41.8 kWh/HDD
 $x + 14,739.7$; $R^2=35.9 \%$

St. John

Locations:

Main [99 Strange St.]

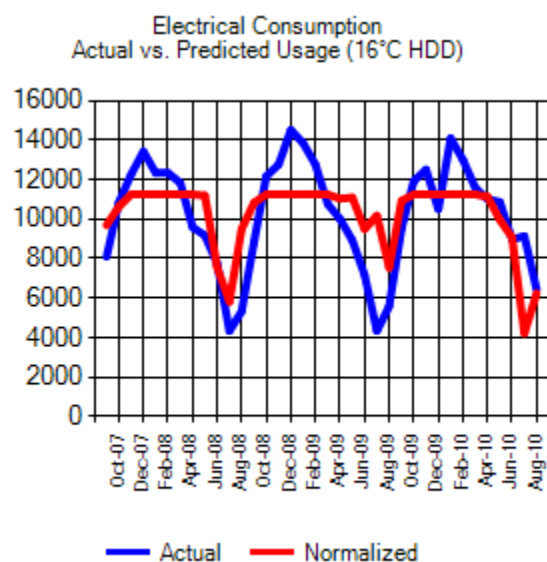


Predicted 1 Consumption = -108.0
 $\text{kWh/HDD } x + 28,940.4$; $R^2=63.9 \%$

St. Gregory

Locations:

Main [34 Osbourne St.]

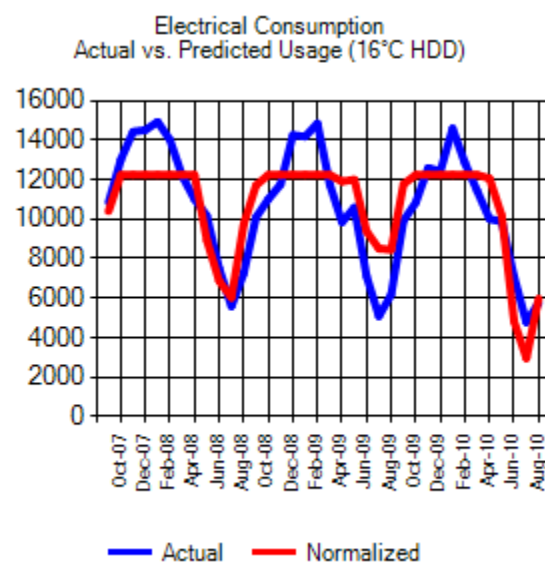


Predicted 1 Consumption = -66.2 kWh/HDD
 $x + 11,240.7$; $R^2=41.8 \%$

St. Joseph (Cambridge)

Locations:

Main [980 Westminster Dr. S.]



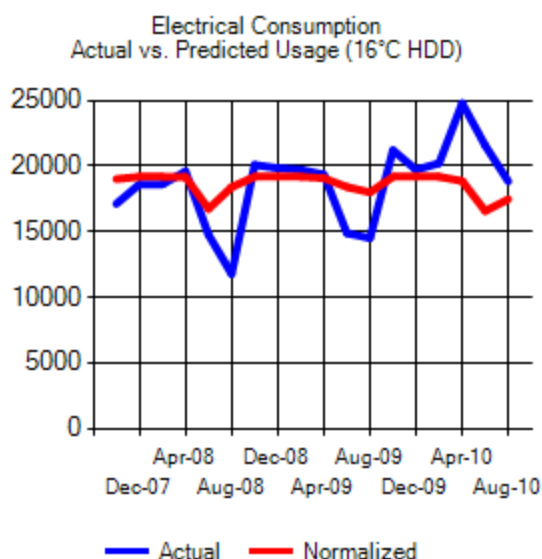
Predicted 1 Consumption = -104.9
 $\text{kWh/HDD } x + 12,235.7$; $R^2=68.2 \%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

St. Joseph (Kitchener)

Locations:

Main [160 Courtland Ave. E.]

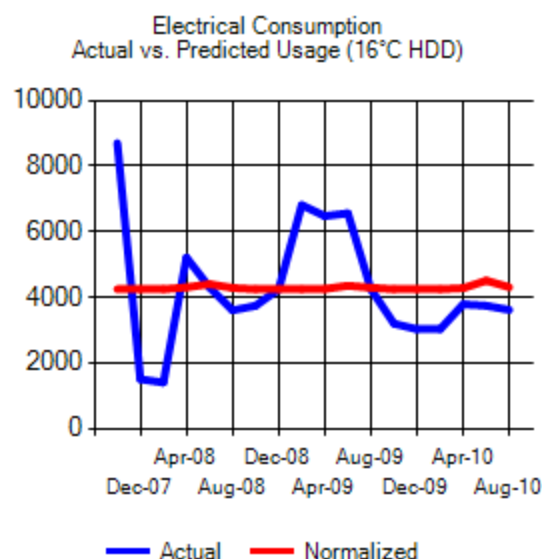


Predicted 1 Consumption = -19.0 kWh/HDD
 $x + 19,173.7$; $R^2=8.1 \%$

St. Louis (Waterloo)

Locations:

Main [75 Allen St. E.]

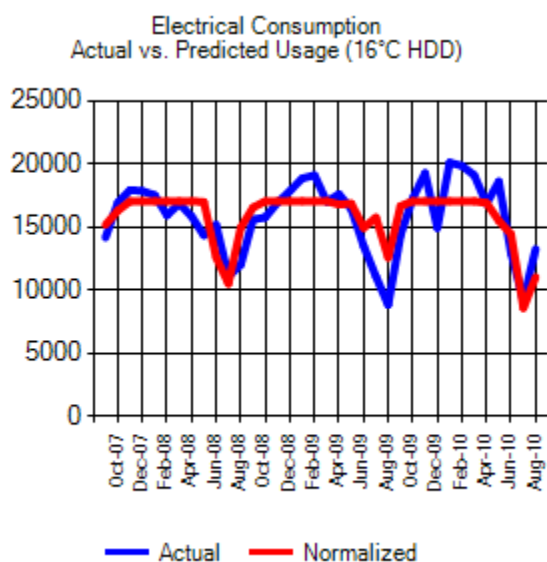


Predicted 1 Consumption = 1.5 kWh/HDD x
 $+ 4,243.4$; $R^2=0.1 \%$

St. Louis (Cambridge)

Locations:

Main [82 Beverly St.]

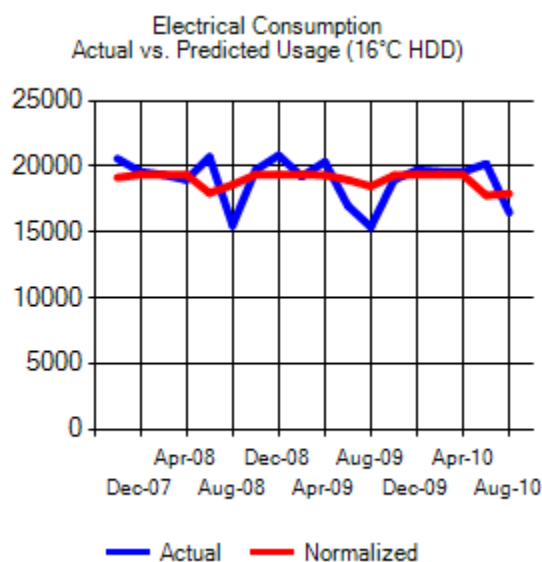


Predicted 1 Consumption = -79.6 kWh/HDD
 $x + 17,034.2$; $R^2=55.1 \%$

St. Louis (West Campus)

Locations:

Main [77 Young St.]



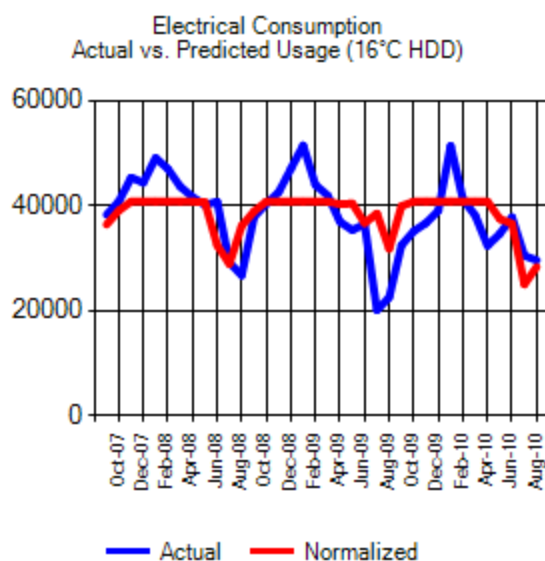
Predicted 1 Consumption = -12.7 kWh/HDD
 $x + 19,354.6$; $R^2=11.1 \%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

St. Luke

Locations:

Main [550 Cheasapeake Dr.]

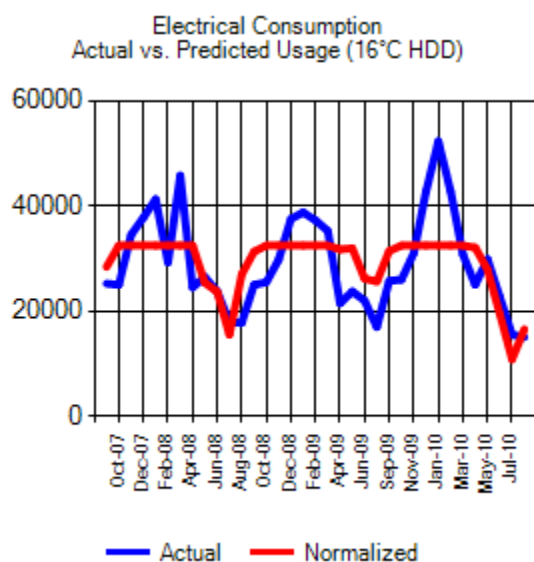


Predicted 1 Consumption = -156.7
kWh/HDD x + 40,750.4; $R^2=31.5\%$

St. Margaret

Locations:

Main [210 Cowan Blvd.]

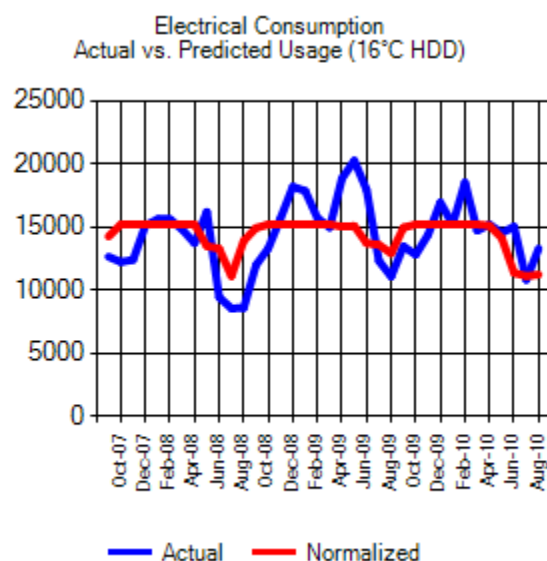


Predicted 1 Consumption = -230.4
kWh/HDD x + 32,469.2; $R^2=38.3\%$

St. Mark

Locations:

Main [240 Autumn Hill Cres.]

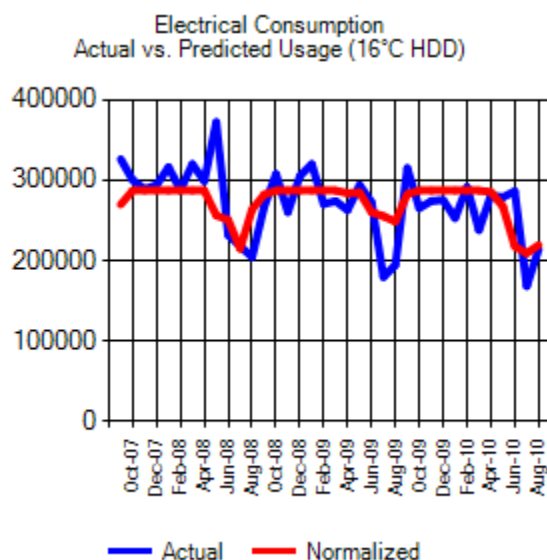


Predicted 1 Consumption = -54.3 kWh/HDD
x + 15,196.0; $R^2=22.2\%$

St. Mary C.S.S.

Locations:

Main [1500 Blockline Rd.]



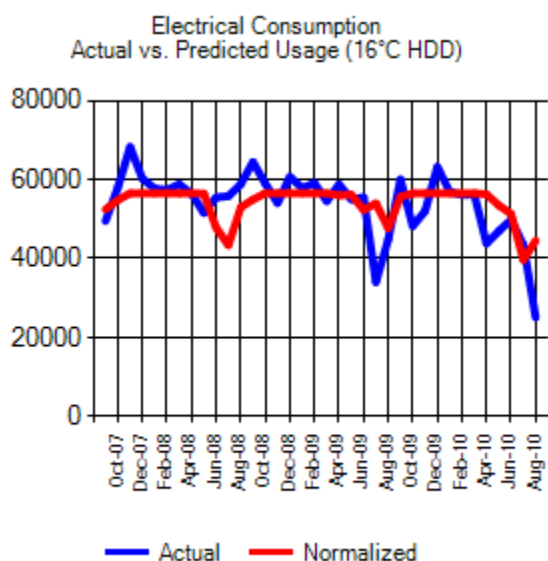
Predicted 1 Consumption = -979.7
kWh/HDD x + 286,952.1; $R^2=29.4\%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

St. Matthew

Locations:

Main [405 Pastern Trail]

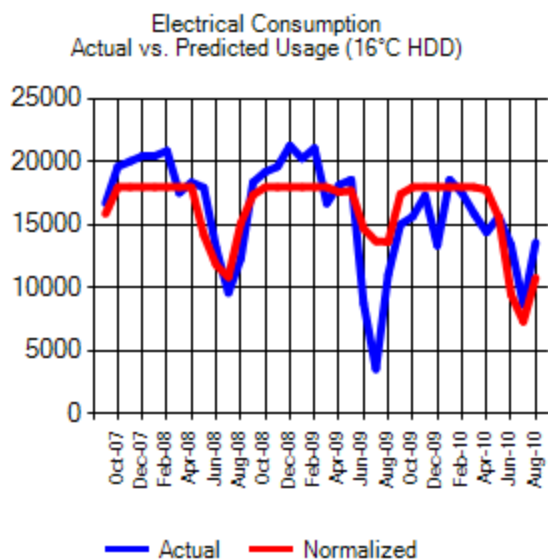


Predicted 1 Consumption = -158.7
kWh/HDD x + 56,515.7; $R^2=26.7\%$

St. Michael

Locations:

Main [1150 Concession Rd.]

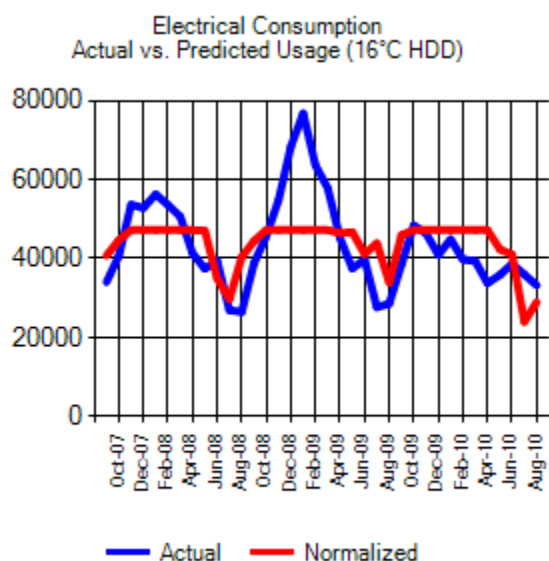


Predicted 1 Consumption = -120.3
kWh/HDD x + 17,957.0; $R^2=48.8\%$

St. Nicholas

Locations:

Main [525 Laurelwood Dr.]

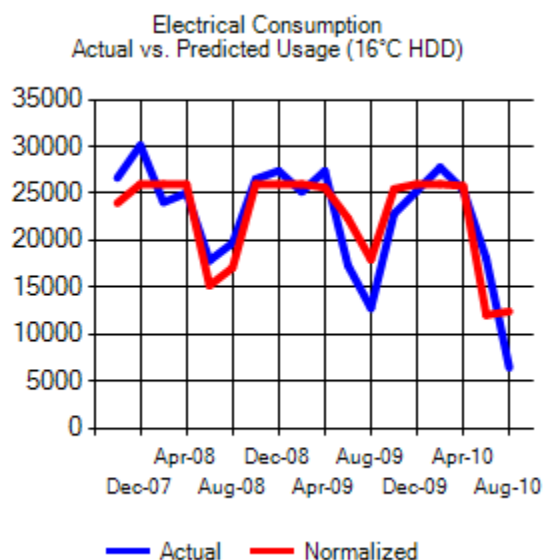


Predicted 1 Consumption = -230.5
kWh/HDD x + 47,193.8; $R^2=27.3\%$

St. Patrick (Kitchener)

Locations:

Main [50 Thaler Ave.]



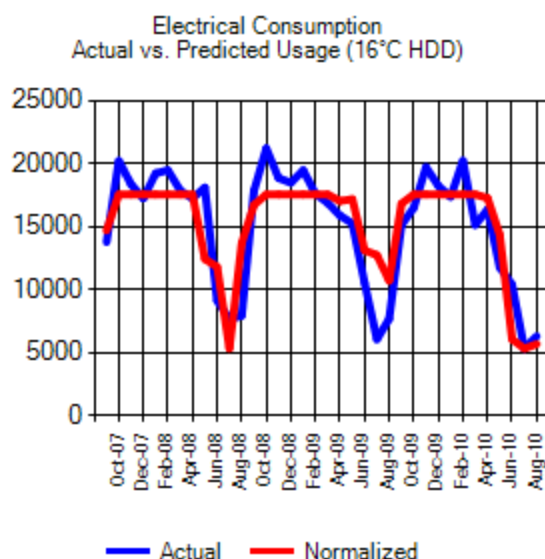
Predicted 1 Consumption = -115.2
kWh/HDD x + 25,986.5; $R^2=70.7\%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

St. Paul

Locations:

Main [45 Birchcliff Ave.]

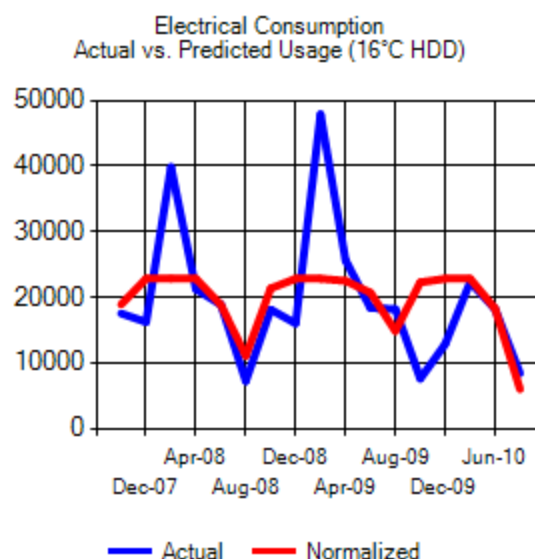


Predicted 1 Consumption = -162.3
kWh/HDD x + 17,540.3; $R^2=70.3\%$

St. Teresa (Elmira)

Locations:

Main [69 First St. W.]

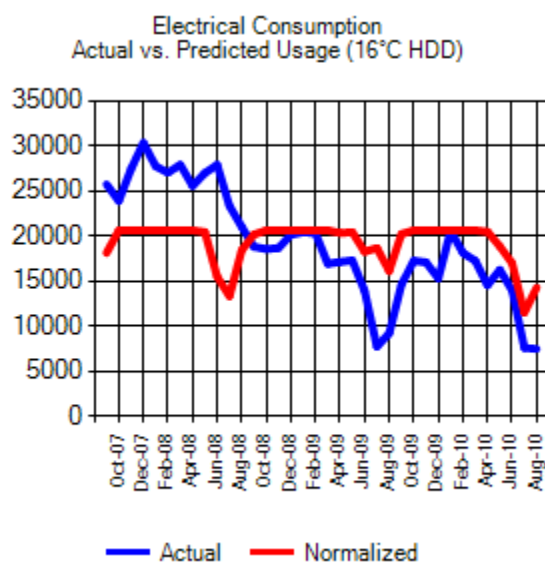


Predicted 1 Consumption = -100.7
kWh/HDD x + 22,820.0; $R^2=21.4\%$

St. Peter

Locations:

Main [92 Avenue Rd.]

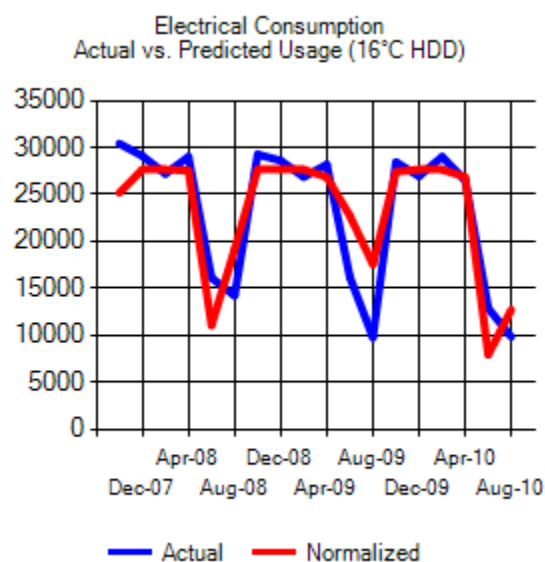


Predicted 1 Consumption = -89.0 kWh/HDD
x + 20,617.2; $R^2=14.8\%$

St. Teresa (Kitchener)

Locations:

Main [270 Edwin St.]



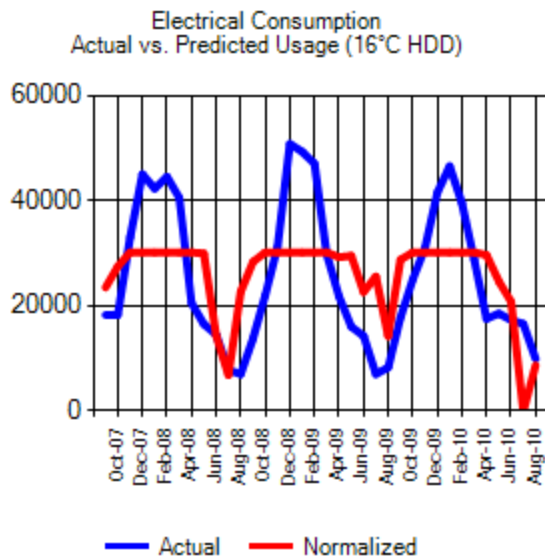
Predicted 1 Consumption = -147.4
kWh/HDD x + 27,645.7; $R^2=76.6\%$

CUSUM: Sep 2007 to Aug 2010 (Electrical): Waterloo Catholic District School Board

St. Vincent de Paul

Locations:

Main [30 Faial Rd.]



Predicted 1 Consumption = -284.3

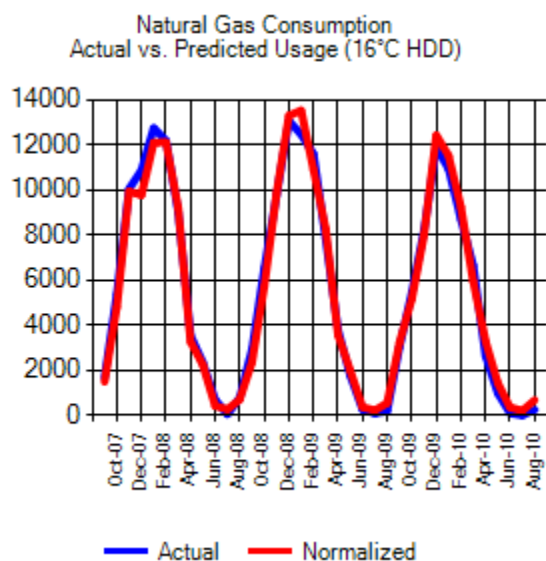
kWh/HDD x + 30,133.2; $R^2=31.4\%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

Waterloo Catholic District School Board

Locations:

Facility Services [480 Dutton Dr.]

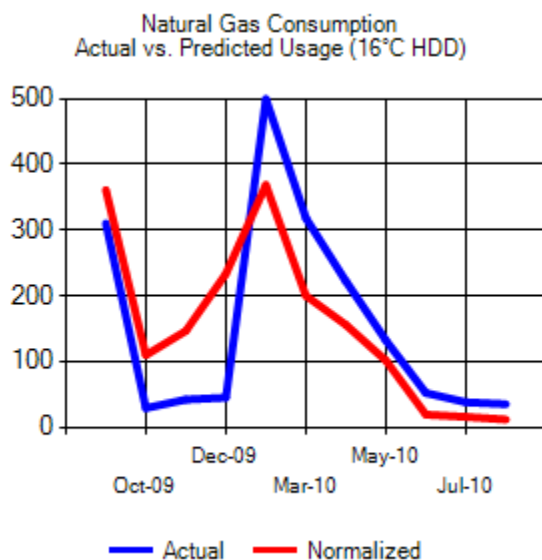


Predicted 2 Consumption = $18.0 \text{ m}^3/\text{HDD} \times$
+ 205.6; $R^2=99.0 \%$

104 Ontario Street North

Locations:

Main [104 Ontario St. North]

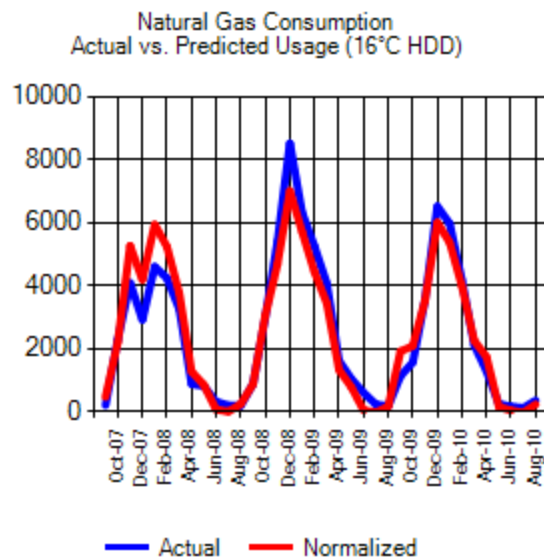


Predicted 2 Consumption = $0.5 \text{ m}^3/\text{HDD} \times$
+ 11.3; $R^2=62.9 \%$

Blessed Kateri

Locations:

Main [560 Pioneer Dr.]

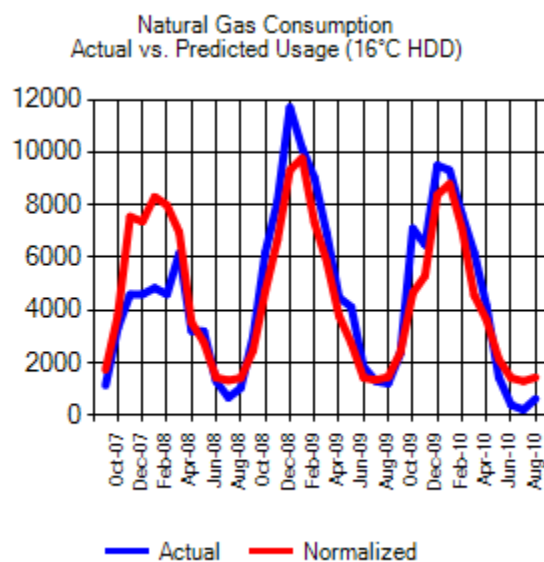


Predicted 2 Consumption = $8.5 \text{ m}^3/\text{HDD} \times$ -
28.8; $R^2=92.9 \%$

Blessed Sacrament

Locations:

Main [367 The Country Way]



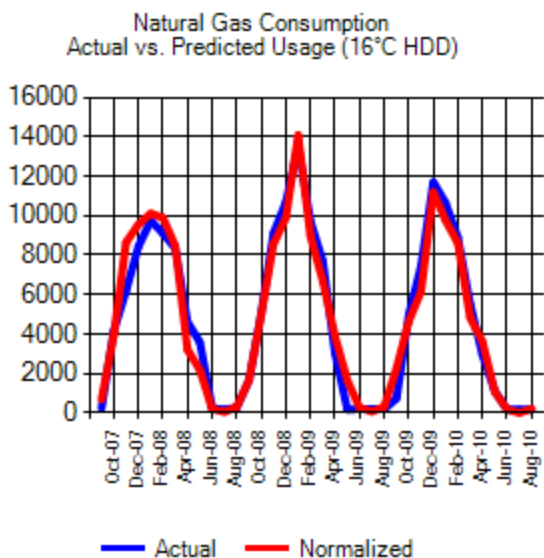
Predicted 2 Consumption = $10.9 \text{ m}^3/\text{HDD} \times$
+ 1,302.9; $R^2=78.6 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

Canadian Martyrs

Locations:

Main [50 Confederation Dr.]

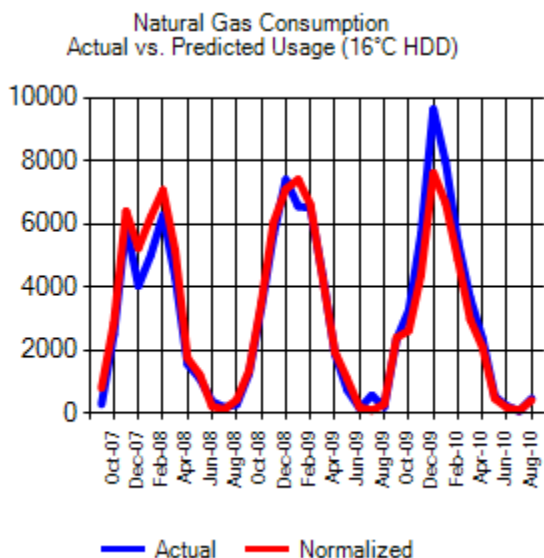


Predicted 2 Consumption = $16.1 \text{ m}^3/\text{HDD} \times -2.9$; $R^2=96.1 \%$

Christ The King

Locations:

Main [70 Acorn Way]

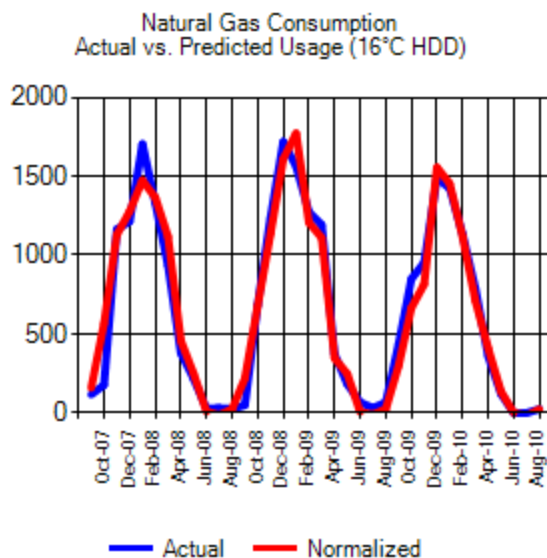


Predicted 2 Consumption = $10.3 \text{ m}^3/\text{HDD} \times +94.9$; $R^2=94.2 \%$

Complex (WCDSB)

Locations:

Main [14 Braun St.]

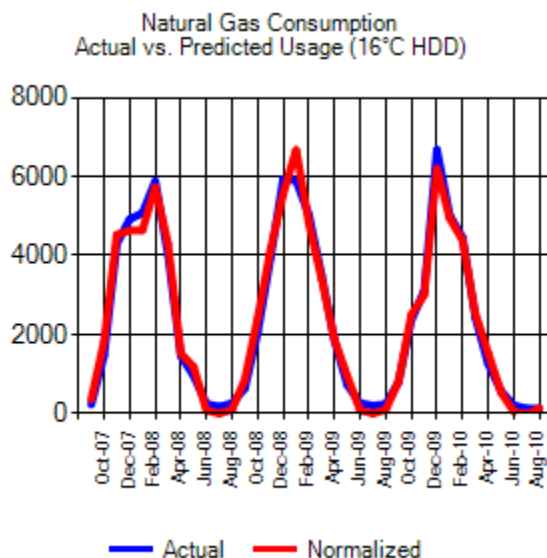


Predicted 2 Consumption = $2.3 \text{ m}^3/\text{HDD} \times -20.1$; $R^2=96.3 \%$

Holy Family

Locations:

Main [313 Huron St.]



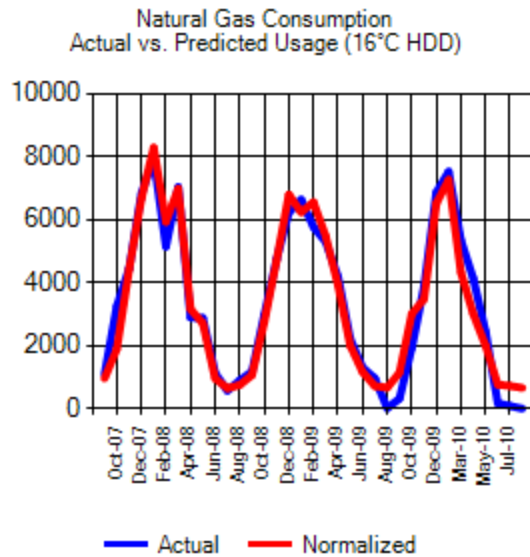
Predicted 2 Consumption = $8.2 \text{ m}^3/\text{HDD} \times -22.4$; $R^2=98.6 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

Holy Rosary

Locations:

Main [485 Thorndale Dr.]

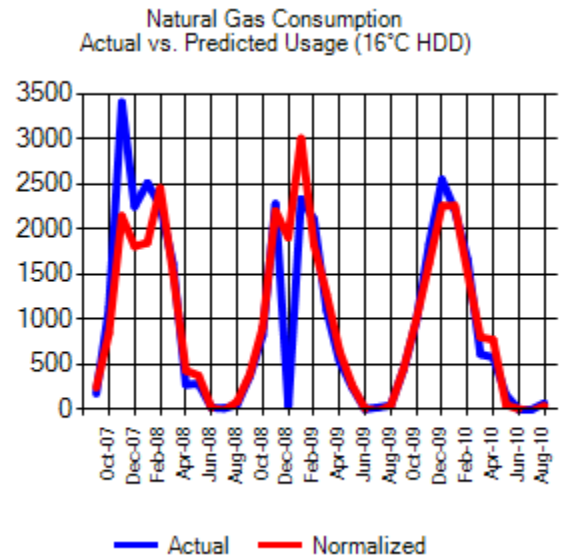


Predicted 2 Consumption = $9.6 \text{ m}^3/\text{HDD} \times + 646.5$; $R^2=95.1 \%$

IT Facility (WCDSB)

Locations:

Main [91 Moore Ave]

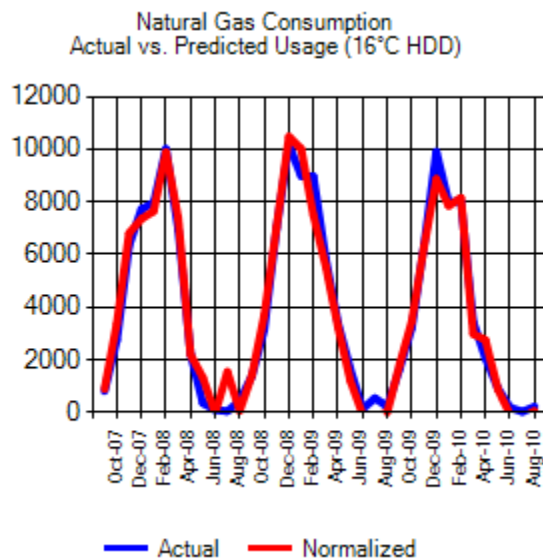


Predicted 2 Consumption = $3.4 \text{ m}^3/\text{HDD} \times - 23.3$; $R^2=80.8 \%$

Holy Spirit

Locations:

Main [15 Gatehouse Dr.]

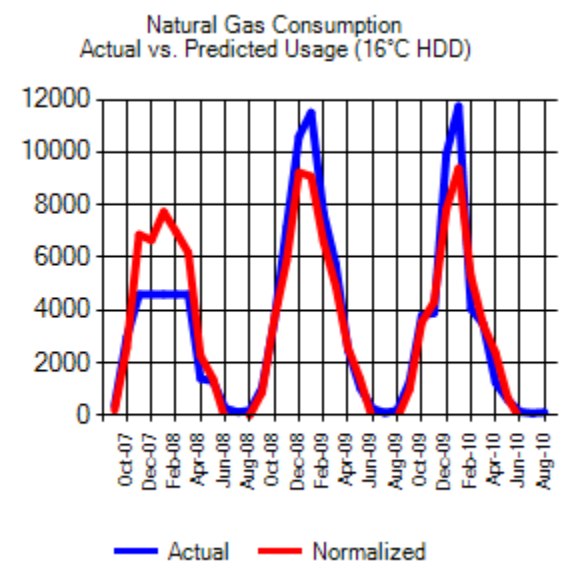


Predicted 2 Consumption = $13.8 \text{ m}^3/\text{HDD} \times - 198.9$; $R^2=97.5 \%$

John Sweeney

Locations:

Main [185 Activa Ave.]



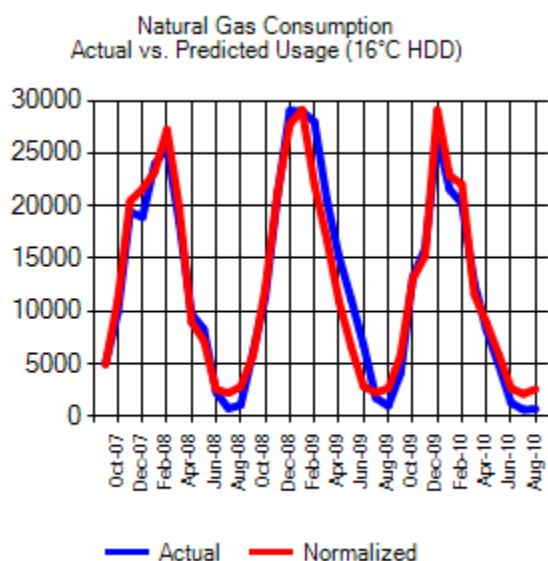
Predicted 2 Consumption = $12.5 \text{ m}^3/\text{HDD} \times - 287.6$; $R^2=87.1 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

Monsignor Doyle C.S.S.

Locations:

Main [185 Myers Rd.]

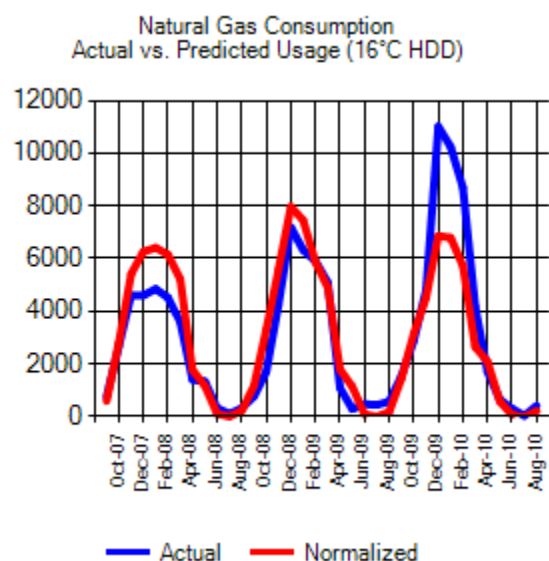


Predicted 2 Consumption = $35.6 \text{ m}^3/\text{HDD} \times$
+ 2,129.3; $R^2=94.9 \%$

Monsignor Haller

Locations:

Main [118 Shea Cr.]

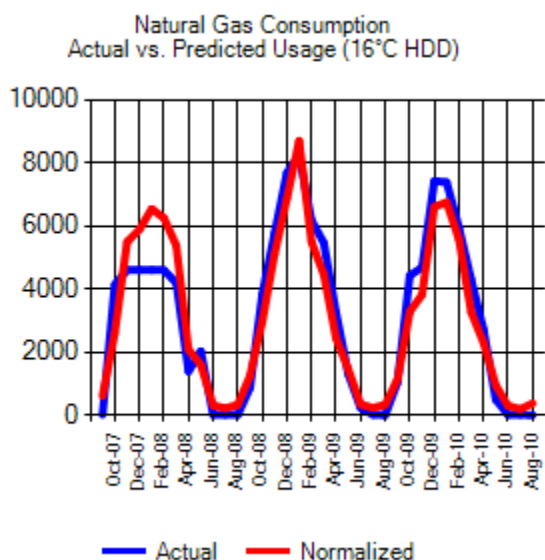


Predicted 2 Consumption = $10.5 \text{ m}^3/\text{HDD} \times$
- 25.6; $R^2=80.5 \%$

Monsignor Gleason

Locations:

Main [155 Westwood Dr.]

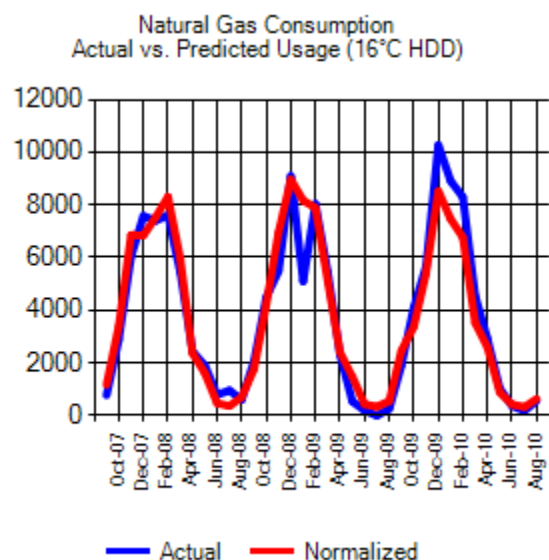


Predicted 2 Consumption = $9.9 \text{ m}^3/\text{HDD} \times$
+ 199.1; $R^2=90.6 \%$

Mother Teresa

Locations:

Main [520 Saginaw Pky.]



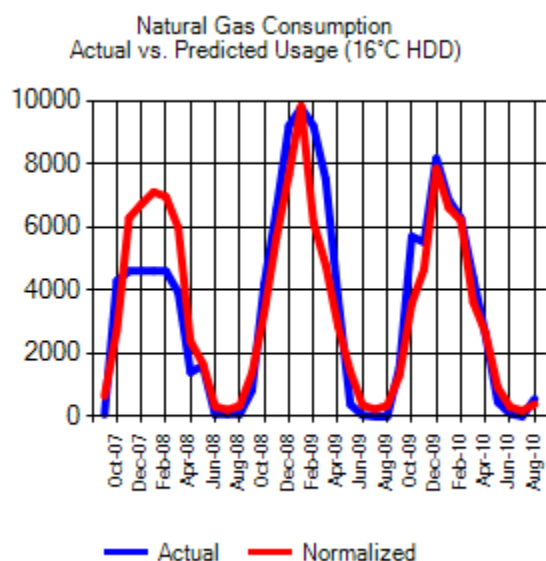
Predicted 2 Consumption = $11.8 \text{ m}^3/\text{HDD} \times$
+ 320.3; $R^2=92.5 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

Notre Dame

Locations:

Main [142 Rosemount Dr.]

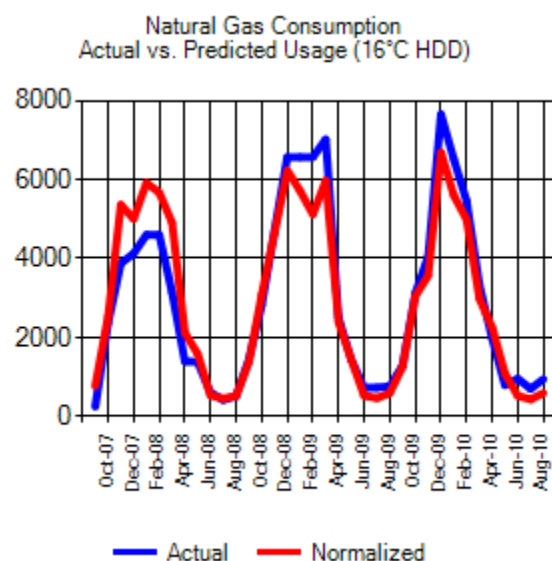


Predicted 2 Consumption = $11.0 \text{ m}^3/\text{HDD} \times$
+ 179.6; $R^2=83.3 \%$

Our Lady of Grace

Locations:

Main [70 Gracefield Cres.]

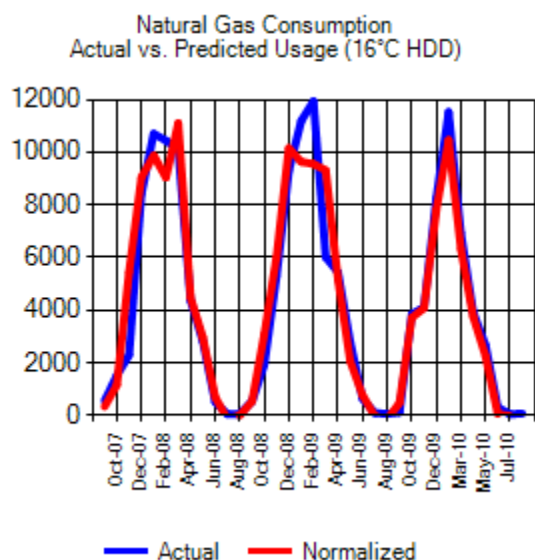


Predicted 2 Consumption = $8.5 \text{ m}^3/\text{HDD} \times$ +
430.4; $R^2=90.6 \%$

Our Lady of Fatima

Locations:

Main [55 Hammet St.]

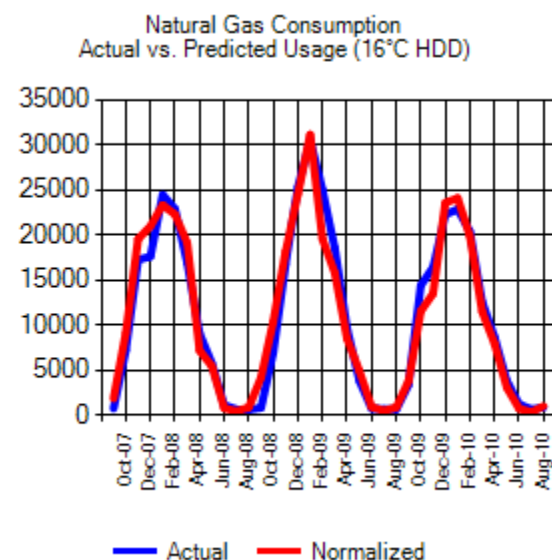


Predicted 2 Consumption = $15.4 \text{ m}^3/\text{HDD} \times$
- 146.7; $R^2=93.1 \%$

Our Lady of Lourdes

Locations:

Main [55 Roslin Ave. S.]



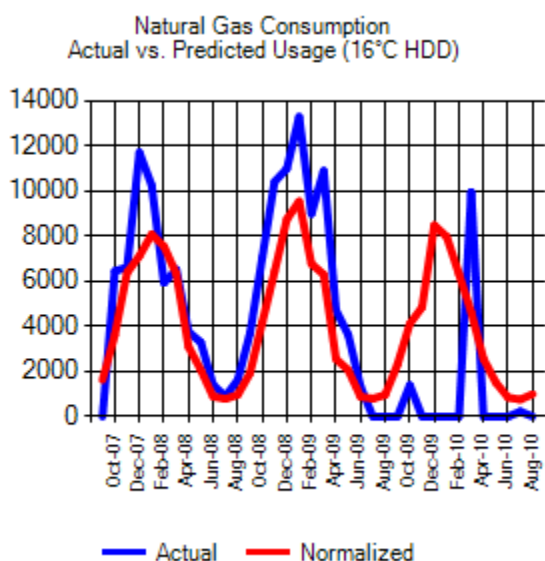
Predicted 2 Consumption = $35.7 \text{ m}^3/\text{HDD} \times$
+ 379.2; $R^2=96.1 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

Sacred Heart

Locations:

Main [81 Moore Ave.]

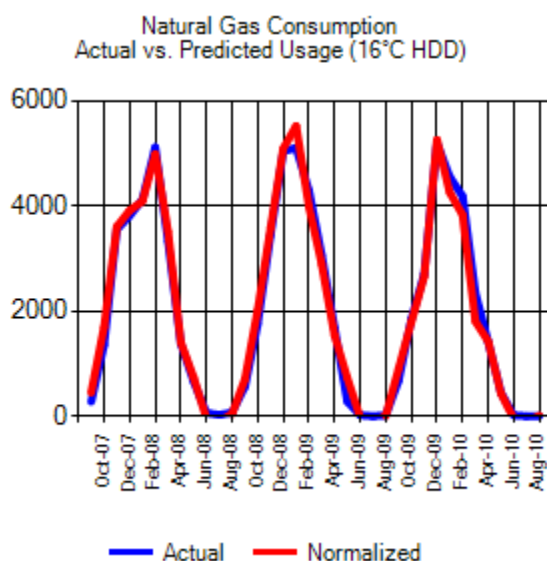


Predicted 2 Consumption = $11.1 \text{ m}^3/\text{HDD} \times$
+ 746.4; $R^2=43.2 \%$

St. Agatha

Locations:

Main [1869 Notre Dame]

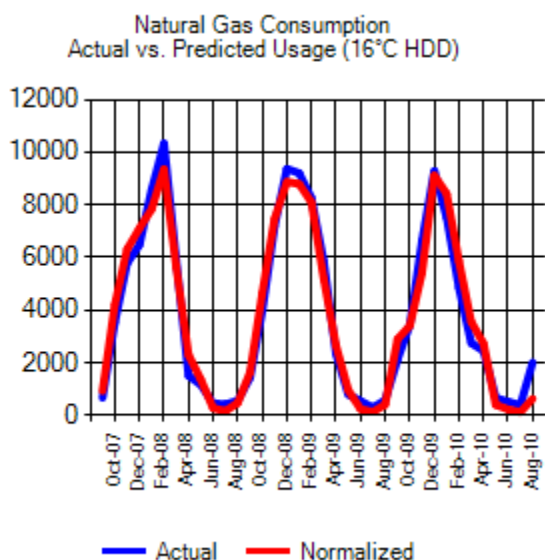


Predicted 2 Consumption = $7.2 \text{ m}^3/\text{HDD} \times$ -
119.0; $R^2=98.8 \%$

Sir Edgar Bauer

Locations:

Main [660 Glen Forrest Blvd.]

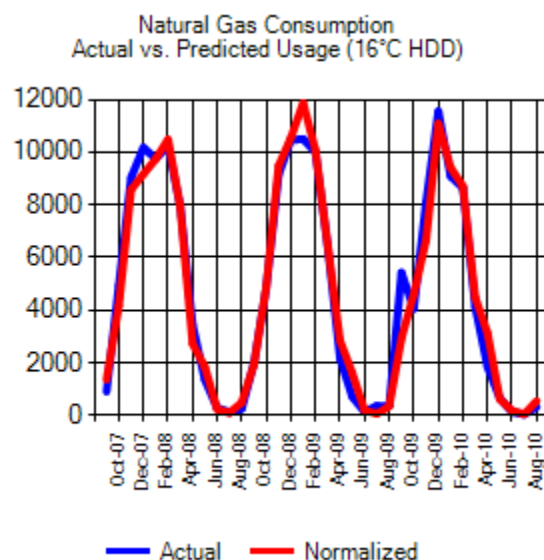


Predicted 2 Consumption = $12.6 \text{ m}^3/\text{HDD} \times$
+ 126.1; $R^2=96.8 \%$

St. Agnes

Locations:

Main [254 Neilson Ave.]



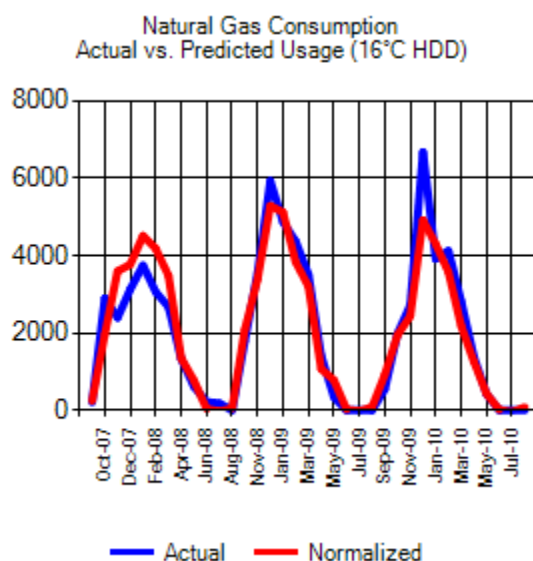
Predicted 2 Consumption = $15.8 \text{ m}^3/\text{HDD} \times$
+ 47.6; $R^2=97.1 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

St. Aloysius

Locations:

Main [504 Connnaught St.]

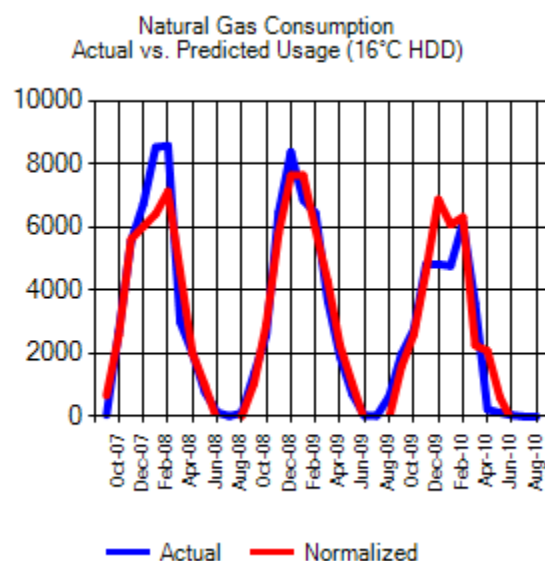


Predicted 2 Consumption = $6.9 \text{ m}^3/\text{HDD} \times -49.0$; $R^2=91.0 \%$

St. Anne (Cambridge)

Locations:

Main [127 Elgin St. N.]

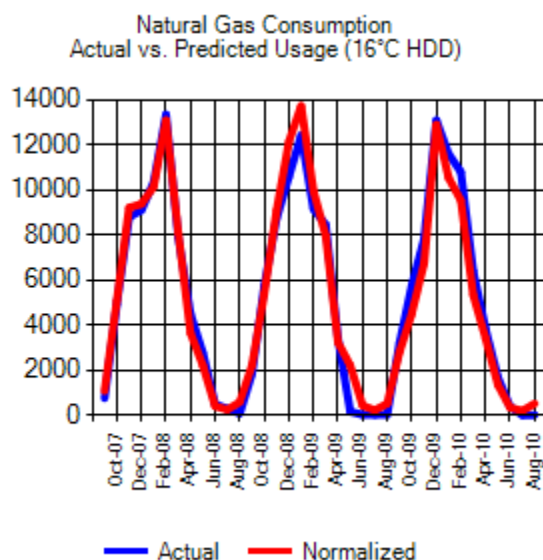


Predicted 2 Consumption = $10.9 \text{ m}^3/\text{HDD} \times -240.5$; $R^2=91.3 \%$

St. Ambrose

Locations:

Main [25 Chalmers St. S.]

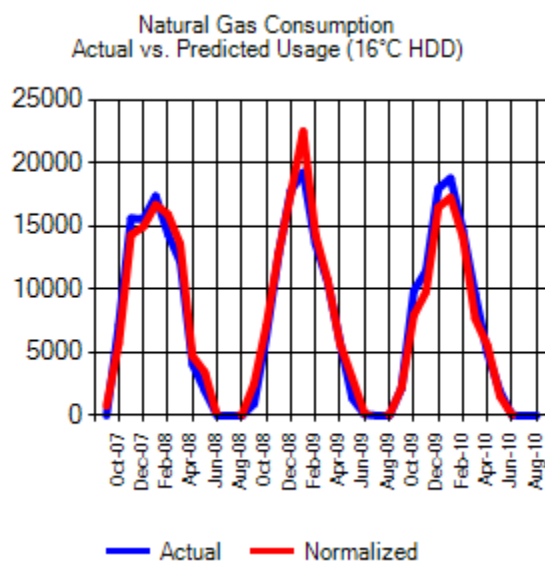


Predicted 2 Consumption = $17.1 \text{ m}^3/\text{HDD} \times +202.0$; $R^2=97.3 \%$

St. Anne (Kitchener)

Locations:

Main [250 East Ave.]



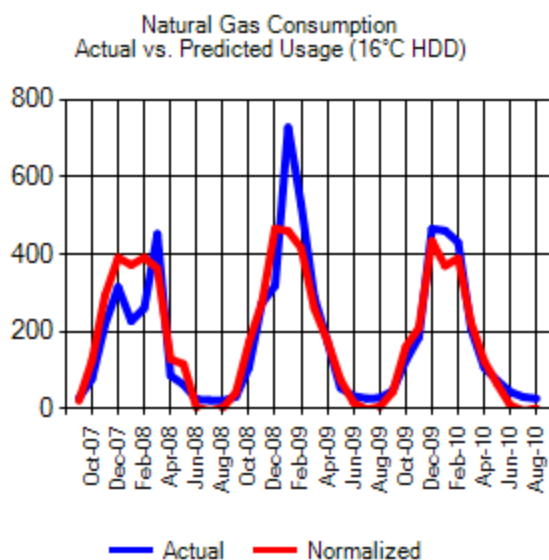
Predicted 2 Consumption = $26.5 \text{ m}^3/\text{HDD} \times -364.3$; $R^2=97.4 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

St. Augustine

Locations:

Main [177 Bismarck Dr.]

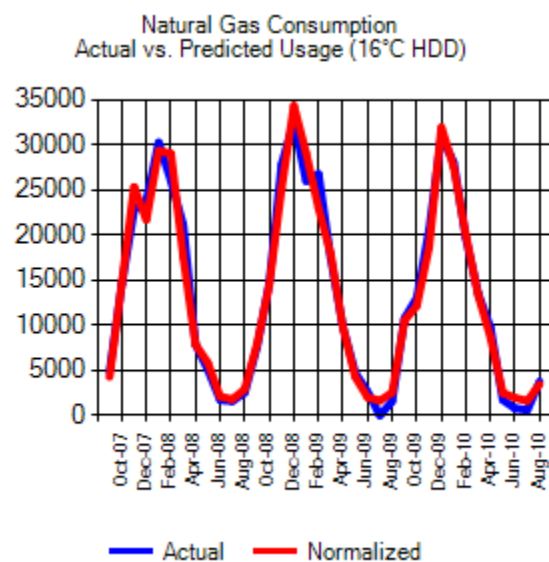


Predicted 2 Consumption = $0.6 \text{ m}^3/\text{HDD} \times -5.4$; $R^2=82.6 \%$

St. Benedict C.S.S.

Locations:

Main [50 Saginaw Parkway]

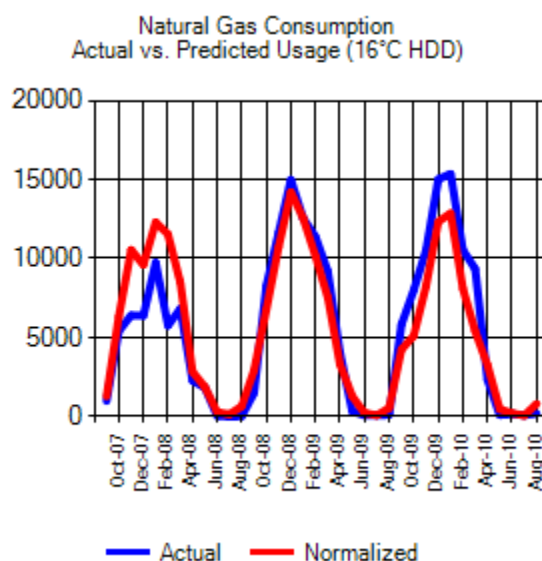


Predicted 2 Consumption = $40.4 \text{ m}^3/\text{HDD} \times -1,610.2$; $R^2=97.9 \%$

St. Bernadette

Locations:

Main [245 Lorne Ave.]

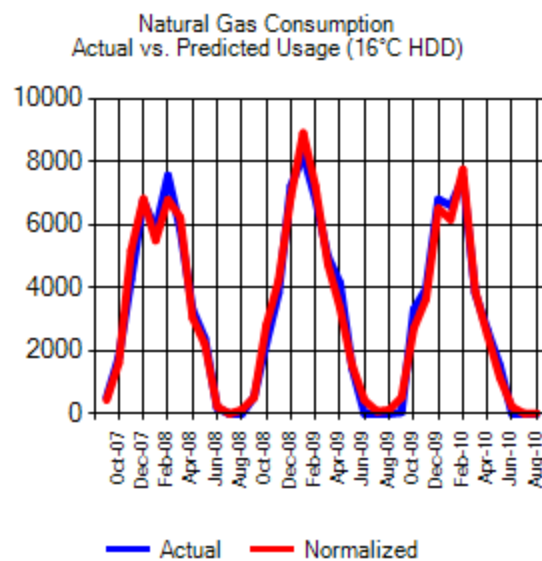


Predicted 2 Consumption = $18.4 \text{ m}^3/\text{HDD} \times +55.4$; $R^2=85.0 \%$

St. Boniface

Locations:

Main [1354 Maryhill Rd.]



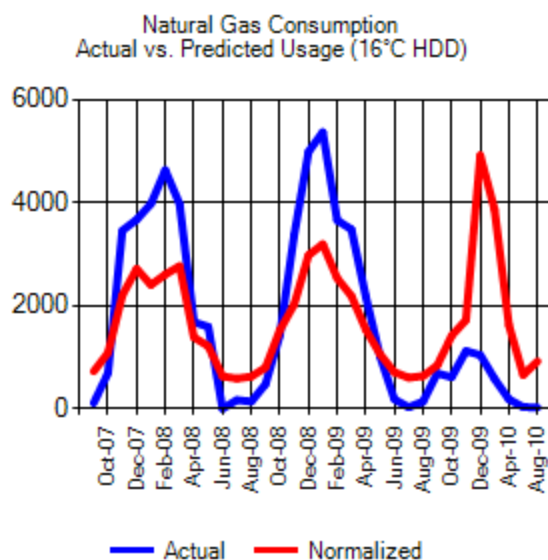
Predicted 2 Consumption = $10.8 \text{ m}^3/\text{HDD} \times -0.4$; $R^2=98.1 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

St. Brigid

Locations:

Main [50 Broom St.]

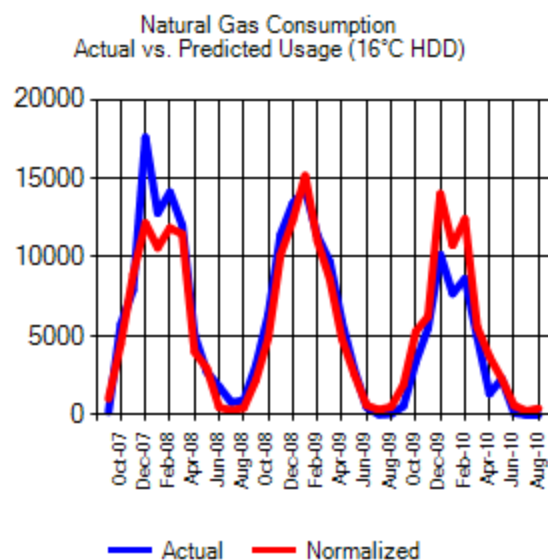


Predicted 2 Consumption = $3.4 \text{ m}^3/\text{HDD} \times + 581.8$; $R^2=38.7 \%$

St. Clements (S.C.)

Locations:

Main [3639 Lobsinger Line]

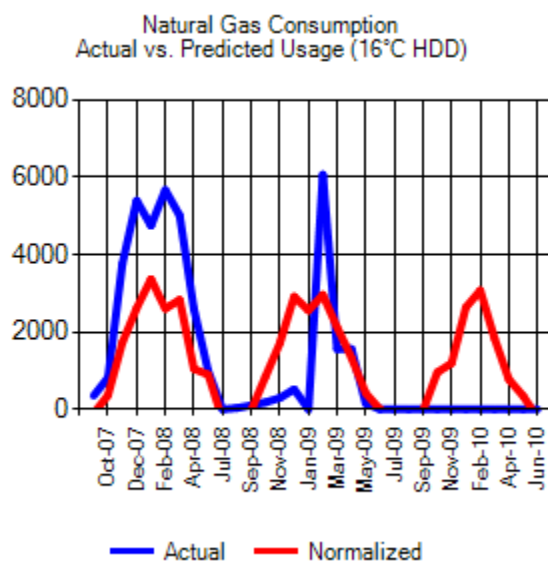


Predicted 2 Consumption = $18.6 \text{ m}^3/\text{HDD} \times + 241.8$; $R^2=88.4 \%$

St. Clements (C)

Locations:

Main [291 Westminster Dr. N.]

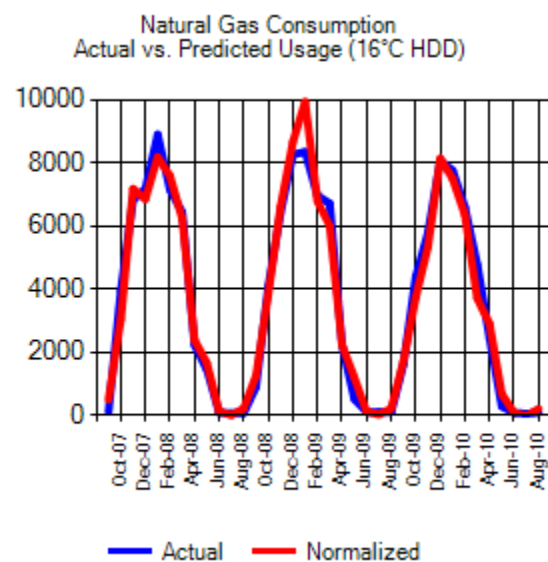


Predicted 2 Consumption = $4.9 \text{ m}^3/\text{HDD} \times - 265.7$; $R^2=36.6 \%$

St. Daniel

Locations:

Main [39 Midland Dr.]



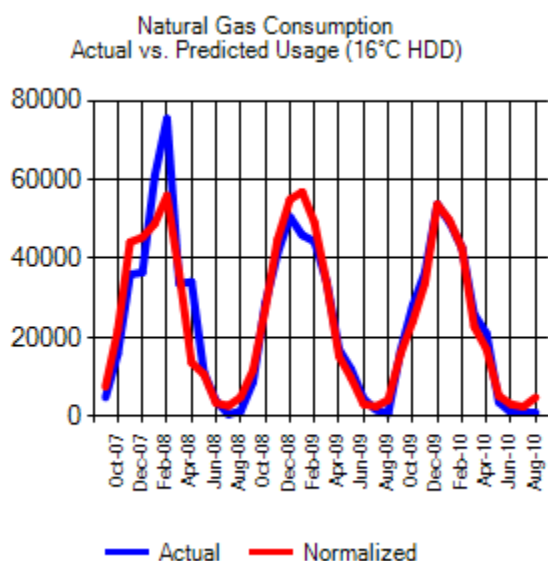
Predicted 2 Consumption = $12.5 \text{ m}^3/\text{HDD} \times - 21.1$; $R^2=97.7 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

St. David C.S.S.

Locations:

Main [4 High St.]

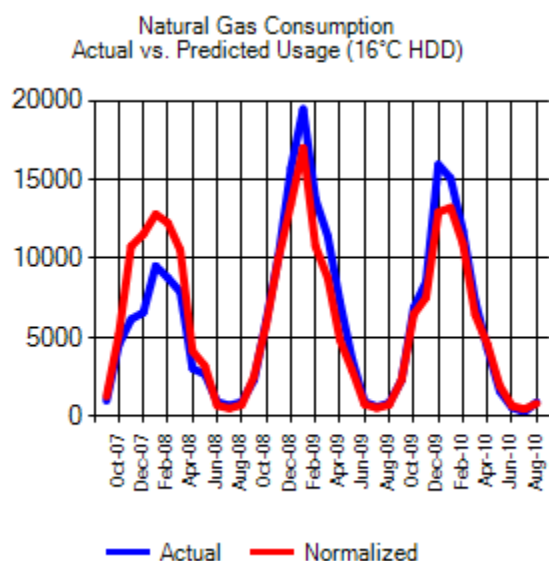


Predicted 2 Consumption = $75.2 \text{ m}^3/\text{HDD} \times$
+ 2,453.0; $R^2=90.1 \%$

St. Dominic

Locations:

Main [3 Westforest Trail]

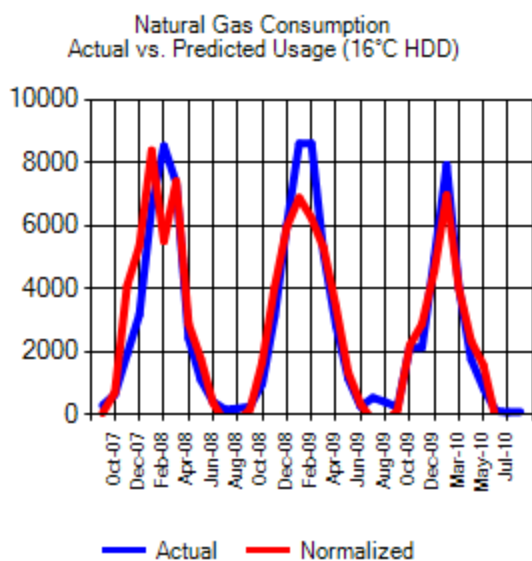


Predicted 2 Consumption = $19.2 \text{ m}^3/\text{HDD} \times$
+ 464.6; $R^2=87.1 \%$

St. Elizabeth

Locations:

Main [50 Adler St.]

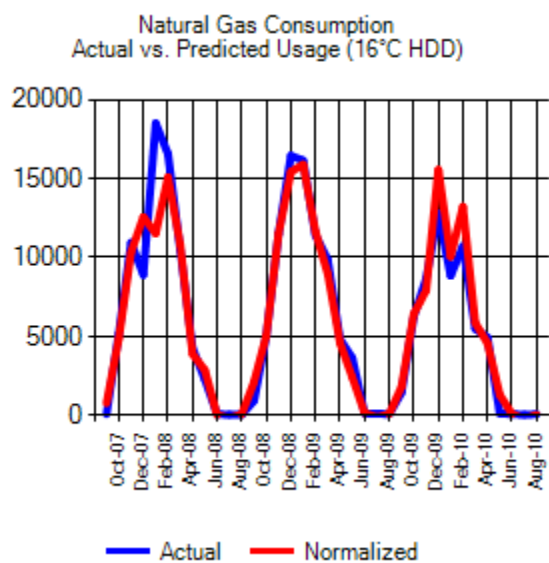


Predicted 2 Consumption = $10.5 \text{ m}^3/\text{HDD} \times$
- 275.8; $R^2=86.9 \%$

St. Francis (Cambridge)

Locations:

Main [60 McDonald Ave]



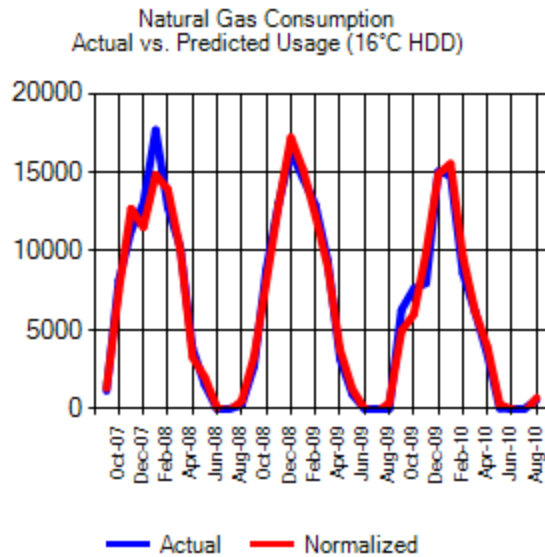
Predicted 2 Consumption = $21.3 \text{ m}^3/\text{HDD} \times$
- 233.9; $R^2=92.3 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

St. Francis (Kitchener)

Locations:

Main [154 Gatewood Rd.]

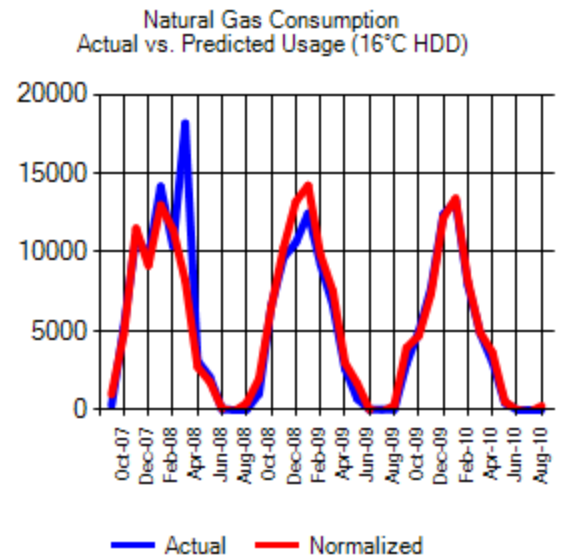


Predicted 2 Consumption = $22.7 \text{ m}^3/\text{HDD} \times -232.4$; $R^2=97.7 \%$

St. John

Locations:

Main [99 Strange St.]

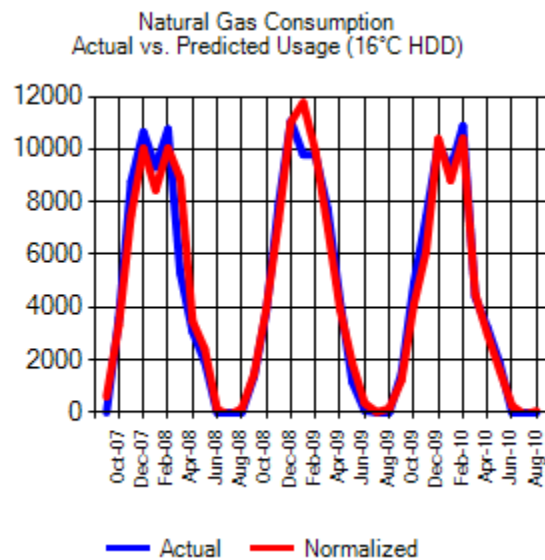


Predicted 2 Consumption = $18.6 \text{ m}^3/\text{HDD} \times -162.6$; $R^2=87.3 \%$

St. Gregory

Locations:

Main [34 Osbourne St.]

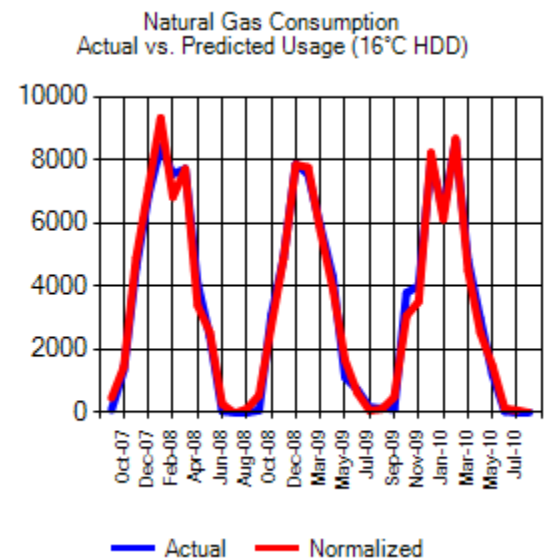


Predicted 2 Consumption = $15.7 \text{ m}^3/\text{HDD} \times -81.3$; $R^2=95.7 \%$

St. Joseph (Cambridge)

Locations:

Main [980 Westminster Dr. S.]



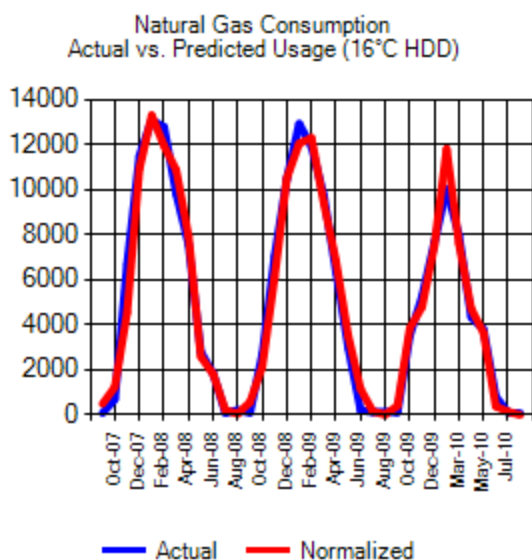
Predicted 2 Consumption = $12.0 \text{ m}^3/\text{HDD} \times -29.5$; $R^2=98.6 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

St. Joseph (Kitchener)

Locations:

Main [160 Courtland Ave. E.]

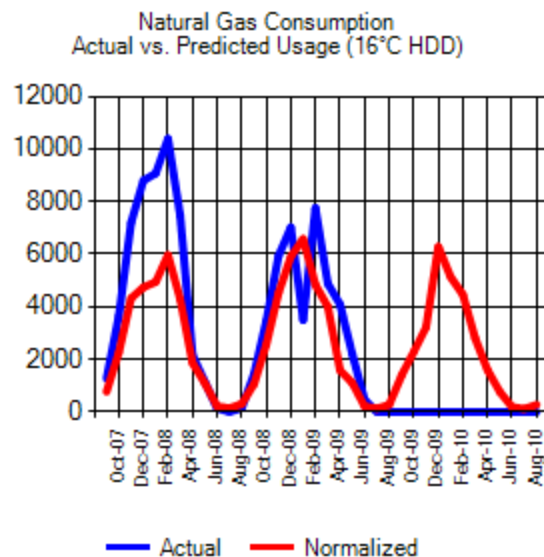


Predicted 2 Consumption = $17.4 \text{ m}^3/\text{HDD} \times$
- 10.0; $R^2=97.9 \%$

St. Louis (Waterloo)

Locations:

Main [75 Allen St. E.]

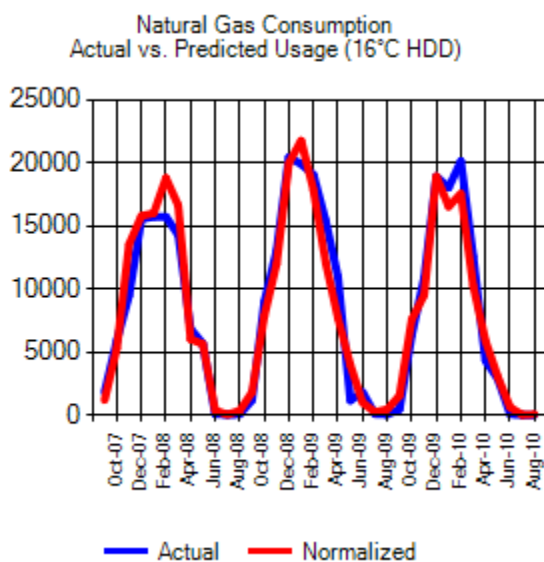


Predicted 2 Consumption = $8.3 \text{ m}^3/\text{HDD} \times$
+ 109.2; $R^2=42.0 \%$

St. Louis (Cambridge)

Locations:

Main [82 Beverly St.]

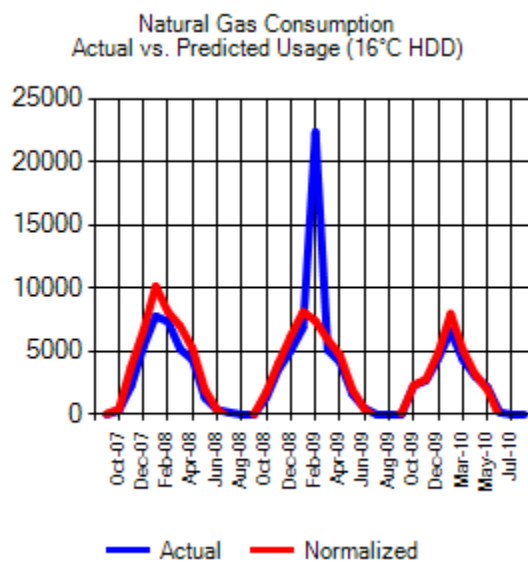


Predicted 2 Consumption = $28.0 \text{ m}^3/\text{HDD} \times$
+ 58.9; $R^2=95.1 \%$

St. Louis (West Campus)

Locations:

Main [77 Young St.]



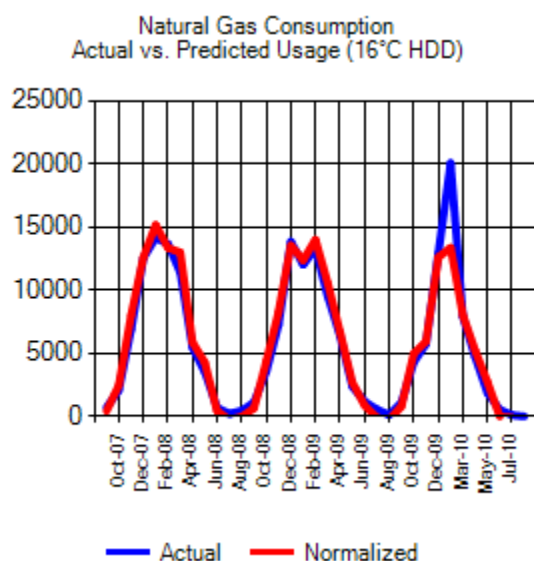
Predicted 2 Consumption = $12.4 \text{ m}^3/\text{HDD} \times$
- 392.8; $R^2=58.1 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

St. Luke

Locations:

Main [550 Cheasapeake Dr.]

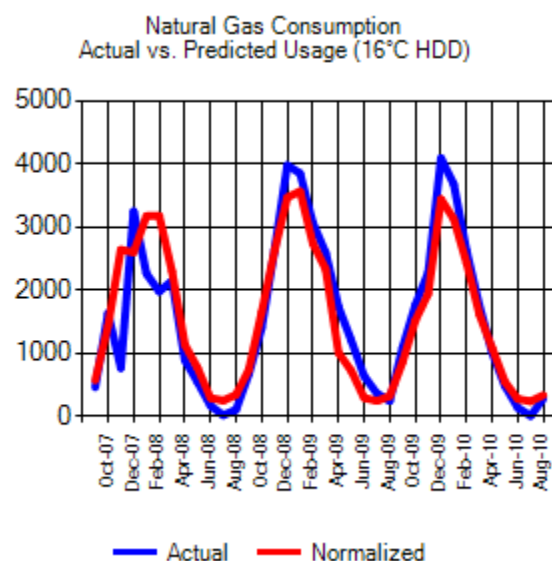


Predicted 2 Consumption = $21.1 \text{ m}^3/\text{HDD} \times$
- 261.2; $R^2=94.4 \%$

St. Mark

Locations:

Main [240 Autumn Hill Cres.]

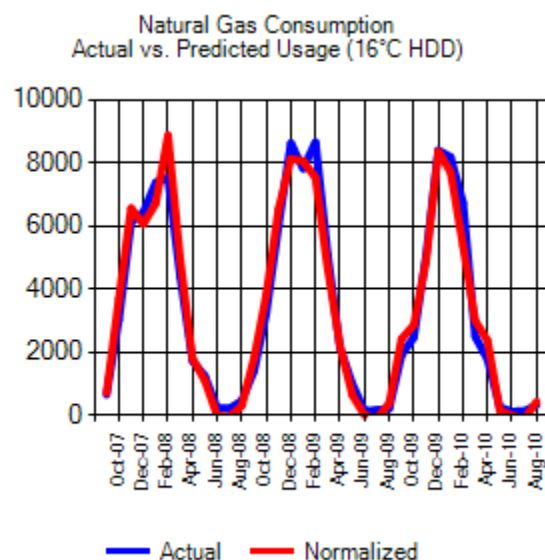


Predicted 2 Consumption = $4.5 \text{ m}^3/\text{HDD} \times$ +
239.6; $R^2=83.3 \%$

St. Margaret

Locations:

Main [210 Cowan Blvd.]

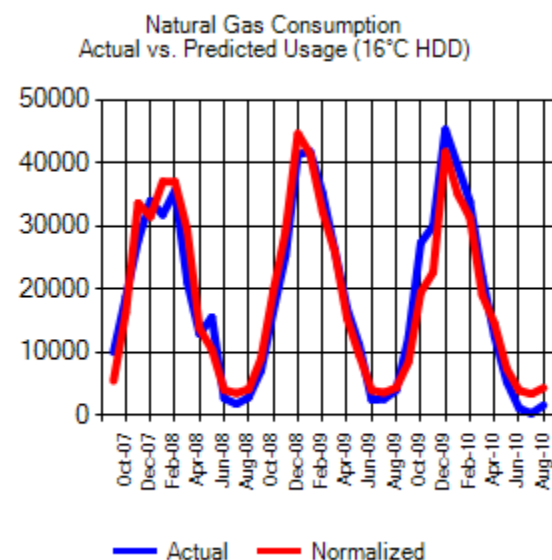


Predicted 2 Consumption = $11.9 \text{ m}^3/\text{HDD} \times$
- 103.9; $R^2=97.2 \%$

St. Mary C.S.S.

Locations:

Main [1500 Blockline Rd.]



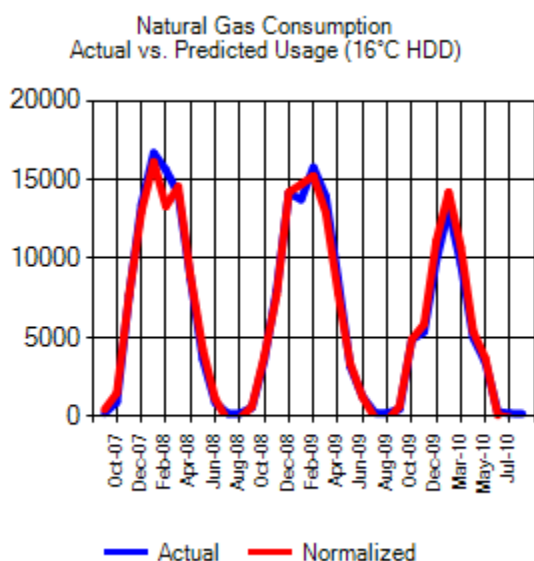
Predicted 2 Consumption = $52.3 \text{ m}^3/\text{HDD} \times$
+ 3,392.9; $R^2=93.2 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

St. Matthew

Locations:

Main [405 Pastern Trail]

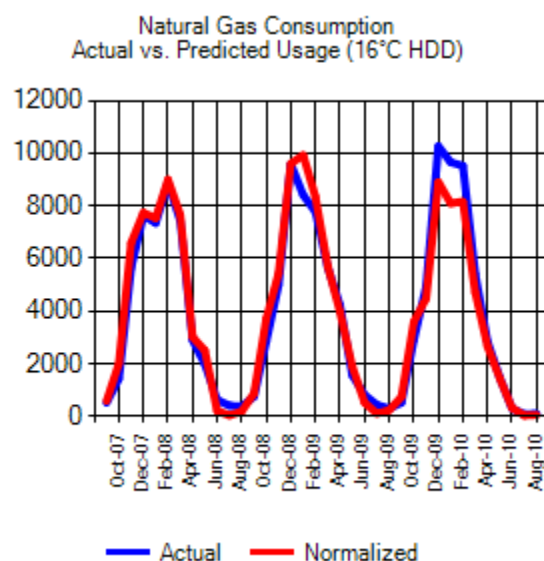


Predicted 2 Consumption = $22.7 \text{ m}^3/\text{HDD} \times -269.6$; $R^2=98.7 \%$

St. Nicholas

Locations:

Main [525 Laurelwood Dr.]

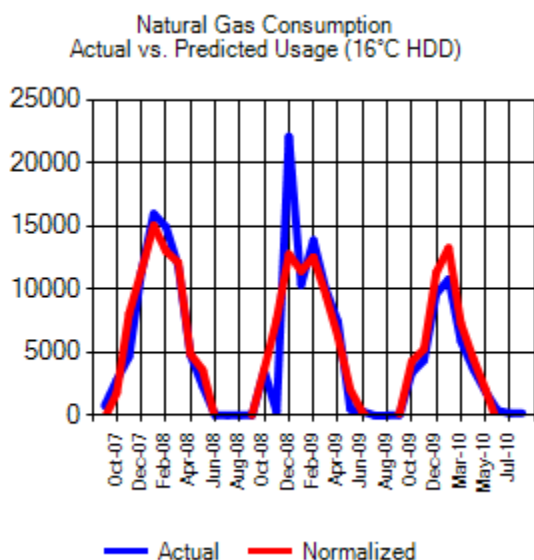


Predicted 2 Consumption = $13.1 \text{ m}^3/\text{HDD} \times +42.9$; $R^2=96.8 \%$

St. Michael

Locations:

Main [1150 Concession Rd.]

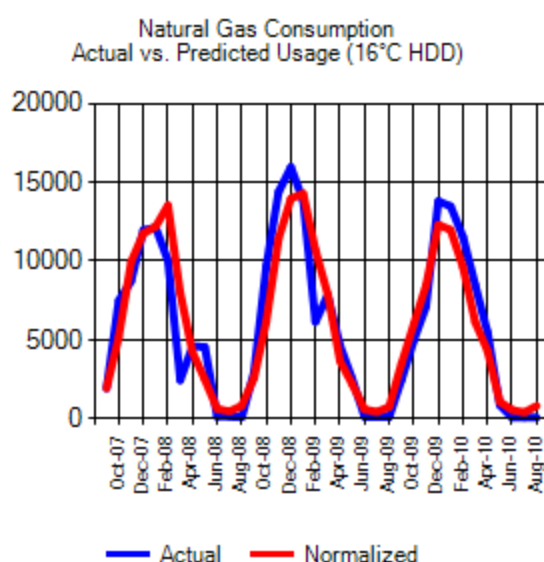


Predicted 2 Consumption = $20.9 \text{ m}^3/\text{HDD} \times -898.3$; $R^2=83.8 \%$

St. Patrick (Kitchener)

Locations:

Main [50 Thaler Ave.]



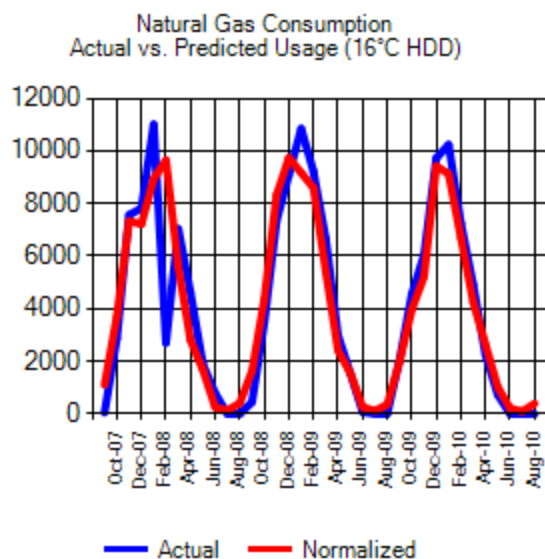
Predicted 2 Consumption = $18.5 \text{ m}^3/\text{HDD} \times +407.5$; $R^2=86.5 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

St. Paul

Locations:

Main [45 Birchcliff Ave.]

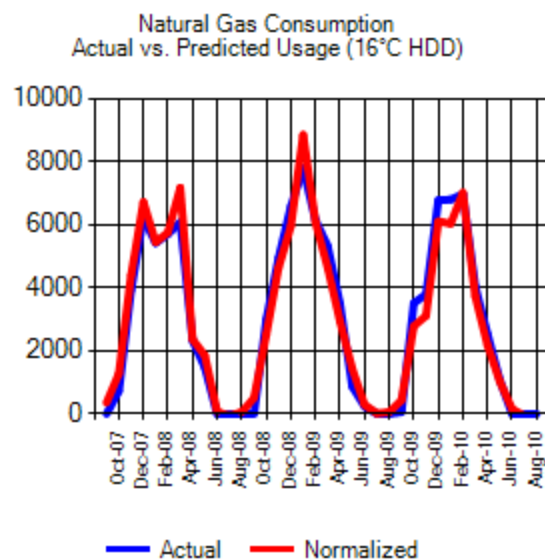


Predicted 2 Consumption = $13.4 \text{ m}^3/\text{HDD} \times$
+ 91.7; $R^2=85.2 \%$

St. Teresa (Elmira)

Locations:

Main [69 First St. W.]

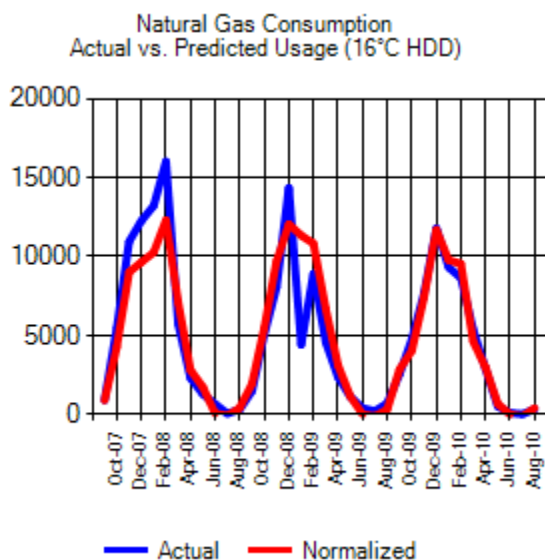


Predicted 2 Consumption = $10.2 \text{ m}^3/\text{HDD} \times$
- 63.6; $R^2=96.9 \%$

St. Peter

Locations:

Main [92 Avenue Rd.]

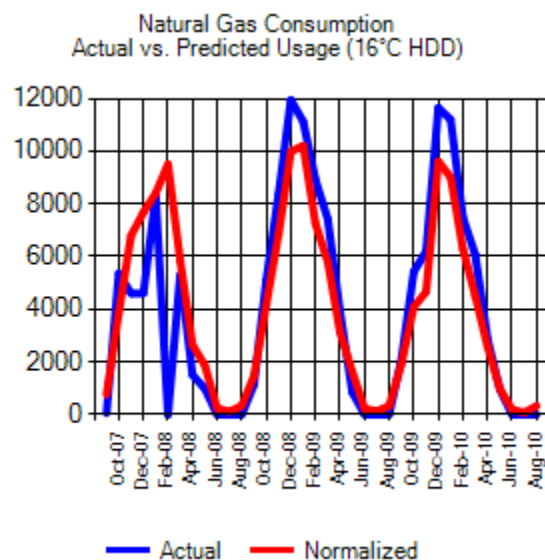


Predicted 2 Consumption = $17.0 \text{ m}^3/\text{HDD} \times$
- 130.7; $R^2=86.5 \%$

St. Teresa (Kitchener)

Locations:

Main [270 Edwin St.]



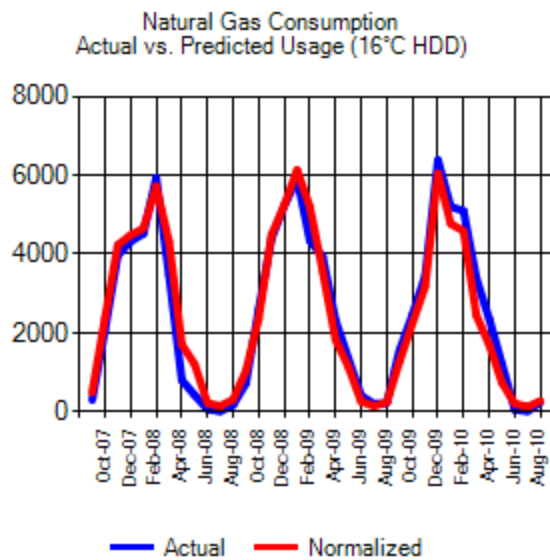
Predicted 2 Consumption = $13.3 \text{ m}^3/\text{HDD} \times$
+ 70.7; $R^2=74.1 \%$

CUSUM: Sep 2007 to Aug 2010 (Natural Gas): Waterloo Catholic District School Board

St. Vincent de Paul

Locations:

Main [30 Faial Rd.]



Predicted 2 Consumption = $8.0 \text{ m}^3/\text{HDD} \times +$
 123.6 ; $R^2=95.9 \%$



Appendix B

Sample Carbon Neutral Action Report

Vancouver Board of Education

Carbon Neutral Action Report School District No. 39 (Vancouver)

Executive Summary

The Vancouver Board of Education has long been recognized as one of the lowest energy users by area of any school district in the province. This achievement is largely the result of an on-going commitment to energy and resource conservation spanning more than two decades.

Since 2005, with support from BC Hydro and Natural Resources Canada, this commitment has involved energy upgrade projects at our two largest campuses (Vancouver Technical Secondary and Britannia Complex - totalling 600,000 sq.ft.) as well as numerous others. In 2008 we opened Dickens Elementary, our first LEEDs Silver elementary school, and incorporated sustainability design elements into the curriculum.

In the transition from a focus on energy management to a more encompassing focus on sustainability, the district is supporting students and staff in various endeavours. For example, in April 2008, the district supported a student led summit on sustainability which led to the inclusion of sustainability in the district plan.

This transition will continue in 2009 with an enhanced district wide recycling program and pilot composting programs at specific sites.

In 2009, the district has shown their commitment towards sustainability by hiring a Sustainability Coordinator to work with schools on various programs including incorporating sustainability into the curriculum. The district continues to work in partnership with BC Hydro to acquire a Manager of Facilities - Climate Action. This position will be the district's liaison to outside agencies to manage and report on greenhouse gas and carbon footprint reduction strategies.

The district will continue with a variety of sustainability projects, including energy and resource conservation projects.

Objectives

- Develop a culture of sustainability and environmental awareness throughout the organization involving students and staff
- Set a living example of social responsibility for students
- Improve the learning and working environment for students and staff
- Coordinate energy and resource upgrade projects with seismic projects to reduce the impact on schools
- Reduce expenditures for energy and resources

Part 1: Actions Taken to Reduce Greenhouse Gas Emissions in 2008

Overview

Construction of the district's first new LEEDs Silver school, Dickens Elementary, was completed in Spring 2008.

A number of student programs that promote sustainability were supported including "Destination Conservation", "Power Smart Students", "Check Your Head", and "Sustainable Schools".

Alternative methods of travel for staff and students were encouraged including "Walk to School Week", "One Day, One School", "Commuter Cycling Skills" workshops and the "Employee Bus Pass" program.

Composting and recycling programs continue to operate at various sites throughout the district.

Energy upgrade programs, including lighting and mechanical upgrades, were implemented at various schools. An outside agency was utilized to identify energy reduction opportunities and district staff completed upgrades to 13 schools. In addition, lighting upgrades were completed at 4 other schools. Various washroom upgrades and water conservation initiatives were completed at 11 schools.

1.1 Mobile Fuel Combustion

Action	Action Taken	Outcome/Performance Measure	Notes Clarifying Action Taken
Replaced # of TYPE OF VEHICLE with MORE EFFICIENT VEHICLE Hybrid	In progress		Purchased larger capacity delivery trucks to reduce number of visits
Provided driver training to reduce fuel use	In progress		"Mission Possible" training program to educate drivers on driving safely, fuel efficiently and responsibly
Initiated new fleet maintenance program (could include - changing filters, checking tire pressure, regular check-ups)	In progress		Done on an on-going basis
Established anti-idling behaviour change program (e.g. signs, stickers, messages)	Complete		Installed signs and GPS monitoring devices to track idling in district vehicles
Encouraged car pooling in fleet vehicles	In progress		Routes for trades people have been created to minimize travel within specified areas
Encouraged use of public transit/active transportation	In progress	Reduce the amount of vehicles being driven to school or work	Employee Bus Pass program, "Walk to Work Week"
Changed to manual lawn and yard maintenance equipment	In progress		Manual weeding is done instead of using pesticides
Installation of GPS units in fleet vehicles	Complete		
Replaced a number of inefficient grounds equipment with more environmentally friendly equipment	In progress		
All diesel powered district vehicles have been switched to bio-diesel	In progress		
Promoted commuter cycling skills	In progress	Reduce the amount of vehicles being driven to school or work	Held "Commuter Cycling Skills" workshops

1.2 Stationary fuel combustion and electricity

Action	Action Taken	Outcome/Performance Measure	Notes Clarifying Action Taken
Supplied power bars – to turn off power to non-essential items when not in use (e.g. phone chargers)	In Progress	Save electricity through the reduction of phantom power	
Undertaken Monitor turn-off challenge	In Progress	Save electricity	
Replaced # computers with EnergyStar models	In Progress	Save electricity	
Asked staff to close blinds daily	In Progress	Save energy through a reduction in thermal gain	
Turned off lights in unused rooms	In Progress	Save electricity	
Replaced Refrigerators (EnergyStar rated appliance)	In Progress	Save electricity	
Replaced other appliances (with EnergyStar rated appliance)	In Progress	Save electricity	
Installed multi-function devices (and removed stand-alone printers/faxes)	In Progress	Save electricity	
Replaced standard bulbs with CFLs	In Progress	Save electricity	
Installed motion activated lights	In Progress	Save electricity	3 schools: Dickens, Cook, Vancouver Technical
Undertaken lighting retrofit	In Progress	To reduce the district's overall hydro consumption by more than 1,000,000 kwh.	17 schools: Nootka, Southlands, Wolfe, Churchill, Hamber, Tecumseh, Trudeau, Van Horne, Hastings, King George, U-Hill Elementary, Magee, Roberts, Waverly, False Creek, Thunderbird and Fraser
Implemented server virtualization	In Progress		Implemented in Education Centre
Utilized desk-top power management settings on computer	In Progress	Save electricity	Shutdown software has been installed on all computer labs in schools
Initiated corporate computer shut-down/wake-up for maintenance	In Progress	Save electricity	Shutdown software has been installed on all computer labs in schools
Unplugged unused equipment	In Progress	Save electricity	Shut Down Checklist is followed by building engineers during school breaks
Undertaken building energy audit at LOCATION(s)	In Progress	This was done to allow the district to apply for funding for energy upgrades through PSECA. Since we were not successful we are looking at other funding sources.	4 schools: Windermere, Point Grey, Templeton, Norquay
Installed auto dimming lights responding to outside lighting	In Progress	To test newer more efficient equipment for future projects	Churchill Sec.
Installation of web-based DDC's for heating plants	In Progress		13 schools - Begbie, Dickens, Churchill, Collingwood, Elsie Roy, Hastings, Magee, Roberts, Thunderbird, Trudeau, University Hill Elementary, VanHorne, Van Tech + 10 more over the next year - Grenfell, McKechnie, Osler, Brock, Nelson, Cook, Grandview, Ecole Bilingue, Beaconsfield, Maple Gove
Upgrades of heating plants	In Progress	Save natural gas	2 schools: Vancouver Technical, Trafalgar
Installation of new Dryatron	In Progress	Save natural gas	Britannia pool
Installed additional insulation	In Progress	Save natural gas	Nelson attic

1.3 Supplies

Action	Action Taken	Outcome/Performance Measure	Notes Clarifying Action Taken
Committed to use 30% recycled paper	In Progress	Reduce the use of virgin paper	
Initiated automatic double sided printing	In Progress	Reduce the use of paper	New equipment is being purchased with double sided functionality
Developed document library (online and one printed copy) for large documents	In Progress	Reduce the reliance on hard copies.	Building Standards Manual, Operations Handbook, Training Manuals, etc.
Used collaborative software to edit on-line	In Progress	Reduce paper	
Re-used non-confidential scrap paper	In Progress	Reduce paper	Made into note pads
Used laptops/tablets	In Progress	Reduce paper	
Actions on non-paper related supplies:			
Purchased cradle to cradle goods	In Progress	Ensure materials are recycled in a proper manner.	Added to RFPs - assessed on each occasion
Encouraged re-use of furniture and equipment	In Progress	Reduce the amount of new equipment purchased.	Available through VSB Stores
Switched to soy based inks and water based chemicals	In Progress	Reduce the amount of harmful chemicals introduced into the waste stream.	

1.4 Travel

Action	Action Taken	Outcome/Performance Measure	Notes Clarifying Action Taken
Trained staff in the use of Live Meeting (or other desktop collaborative software)	In progress		
Installed Video Conferencing facilities	In progress		Smart Boards have been installed in 3 meeting rooms at the Education Centre, and over 100 have been purchased for elementary and secondary schools
Car pool incentive on monthly parking charge	In progress		

1.5 Employee Engagement

Action	Action Taken	Outcome/Performance Measure	Notes Clarifying Action Taken
National Resources Canada training for building engineers	Complete	Allow building operators to find ways to reduce energy at each facility.	"Spot the Energy" training

1.6 Sustainability Actions (others)

Action	Action Taken	Outcome/Performance Measure	Notes Clarifying Action Taken
Took water conservation measures – low flow showers or toilets, fix leaks	In Progress	Reduce water consumption in the district.	Upgrades at various schools
Reduced/replaced bottled water with filtered or refrigerated water	In Progress	Reduce the amount of water bottles brought into the Ed Centre.	Water coolers in the Education Centre
Improved recycling measures	In Progress	Reduce the amount of solid waste going to the landfill	Pilot program at Education Centre
Supported composting	In Progress	Reduce the amount of solid waste going to the landfill	
Used re-usable dishes	In Progress	Reduce the amount of solid waste going to the landfill	
Purchased green cleaning products	In Progress	The use of safer less harmful chemicals and the use of more recycled paper products reduces the impact on the environment.	Custodial cleaning supplies

Used green (low-e paints)	In Progress		
Supported sustainable procurement practices	In Progress		
Adopted low-carbon contracting practices	In Progress		Sustainability is one of the components of the vendor evaluation process
Reduction of VOC's in gym finishes	In Progress	Reduce strong chemicals improving staff and student safety.	
Student Sustainability Summit	Complete	Attended by over 100 students and staff. This resulted in sustainability being included in district directions	A sustainability summit was run by students which also involved trustees and district decision makers to promote sustainability within the district.
Destination Conservation	In Progress	a pilot project which promotes awareness of conservation issues	13 schools: Beaconsfield, Begbie, Elsie Roy, Franklin, Henderson Annex, Kerrisdale, Killarney, Byng, Tennyson, McBride, Nootka, Q. Elizabeth, Tecumseh
Check Your Head	In Progress		11 schools involved in this pilot sustainability project - King George, Roberts, Roberts Adult Centre, Elsie Roy, Roberts Anx, Byng, Q. Eliz, Kitchener, Q. Eliz Anx, Q. Mary, Jules Quesnel
Changed the sprayer nozzles in all school lunchroom kitchens	Complete	Reduced the amount of water use.	

Part 2: Plans to Continue Reducing Greenhouse Gas Emissions 2009 – 2011

Overview	<p>The district continues to research and implement new strategies that promote sustainability. A Sustainability Coordinator has been hired and a Manager of Facilities - Climate Action will be hired in 2009. The two positions will form the basis of a district sustainability team to work with schools on promoting sustainable initiatives and to incorporate sustainability into the educational curriculum.</p> <p>A number of student programs that promote sustainability will continue to be supported including "Destination Conservation", "Power Smart Students", "Check Your Head", and "Sustainable Schools".</p> <p>Alternative methods of travel for staff and students continue to be encouraged including "Walk to School Week", "One Day, One</p>		
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2.1 Mobile Fuel Combustion

Action	Action Planned	Outcome/Performance Measure	Notes Clarifying Action Taken	Timeframe
Replace # of TYPE OF VEHICLE with MORE EFFICIENT VEHICLE Hybrid	In progress		Will replace gas powered vehicles with hybrids wherever possible	as vehicles are replaced
Provide driver training to reduce fuel use	In progress			
Initiate new fleet maintenance program (could include - changing filters, checking tire pressure, regular check-ups)	In Progress			
Establish anti-idling behaviour change program (e.g. signs, stickers, messages)	In Progress			
Encourage use of public transit/active transportation	In Progress	Reduce the number of vehicles being driven to work/school	Employee bus pass program	
Change to manual lawn and yard maintenance equipment	In Progress			
Replacement of propane Zamboni to electric	In progress	Reduce the amount of carbon produced by changing from propane to electricity.		for the Olympics
Promoted commuter cycling skills	In Progress	Reduced the amount of vehicles being driven to schools and work	"Commuter Cycling Skills" workshops	2008-2009

2.2 Stationary Fuel Combustion (including electricity)

Action	Action Planned	Outcome/Performance Measure	Notes Clarifying Action Taken	Timeframe
Supply power bars – to turn off power to non-essential items when not in use (e.g. phone chargers)	In Progress	Reduce the consumption of electricity by reducing phantom power		
Undertaken Monitor turn-off challenge	In Progress	Reduce the consumption of electricity		
Replace # computers with EnergyStar models	In Progress	Reduce the consumption of electricity		
Ask staff to close blinds daily	In Progress	Reduce heat loss and improve security		
Use air dry setting on dishwashers				
Encourage staff to use stairs	In Progress	Improve the health of staff	"10,000 Steps per Day" challenge	Mar-09
Turn off lights in unused rooms	In Progress	Reduce the consumption of electricity		
Replace Refrigerators (EnergyStar rated appliance)	In Progress	Reduce the consumption of electricity		
Replace other appliances (with EnergyStar rated appliance)	In Progress	Reduce the consumption of electricity		
Install multi-function devices (and remove stand-alone printers/faxes)	In Progress			
Replace standard bulbs with CFLs	In Progress	Reduce the consumption of electricity		
Install motion activated lights	In Progress	Reduce the consumption of electricity		
Undertake lighting retrofit	In Progress		We hope to undertake lighting retrofits at 9 additional schools	
Implement server virtualization	Planned		Roll out to schools	2009-2011
Utilize desk-top power management settings on computer	Planned	Reduce the consumption of electricity	Reviewing SMS software for installation on all computers	2009-2011
Initiate corporate computer shut-down/wake-up for maintenance	In Progress	Reduce the consumption of electricity	Shutdown software to be installed on all administrative computers	2009-2010
Unplug unused equipment	In Progress	Reduce the consumption of electricity		
Apply for LEED existing building rating	Planned		Depending on information produced by "Facility Conditional" audits	2010-2011
Undertake building energy audit at LOCATION(s)	Planned		As part of the "Facility Conditional" audits at 60 schools	2009
Initiate or complete a building energy retrofit	In progress		As funds and information becomes available	2010-2011
Upgrade of heating plant	In Progress		Trafalgar Elem.	2009
Installation of web-based ODC's for heating plants	In Progress		10 over the next year - Grenfell, McKechnie, Osler, Brock, Nelson, Cook, Grandview, Ecole Bilingue, Beaconsfield, Maple Gove	2010

2.3 Supplies

Action	Action Planned	Outcome/Performance Measure	Notes Clarifying Action Taken	Timeframe
Commit to use 30% recycled paper	In Progress			
Initiate automatic double sided printing	In Progress			
Develop document library (online and one printed copy) for large documents	In Progress		Building Standards Manual, Operations Handbook, Training Manuals, Contractor Safety Manual, etc.	
Re-use non-confidential scrap paper	In Progress			
Use laptops/tablets	In Progress			
Actions on non-paper related supplies:				
Purchase cradle to cradle goods	In Progress			
Encourage re-use of furniture and equipment	In Progress			
expanding the recycling program to district-wide	In progress			2009-2010
provide information on paper usage and comparison to other schools	In progress			2009-2010

2.4 Employee Engagement

Action	Action Planned	Outcome/Performance Measure	Notes Clarifying Action Taken	Timeframe
Provide conservation education	In Progress		"Spot the Energy" seminar for custodial staff	2009
Develop Green Teams	In progress		Upon filling Sustainability Coordinator and Climate Action Manager positions	2009-2011
Support Green Teams (resources)	In progress		Upon filling Sustainability Coordinator and Climate Action Manager positions	2009-2011
Provide green tips	In progress		Upon filling Sustainability Coordinator and Climate Action Manager positions	2009-2011
Support professional development	In progress		Upon filling Sustainability Coordinator and Climate Action Manager positions	2009-2011
Add a green work goal to performance management	In progress		Upon filling Sustainability Coordinator and Climate Action Manager positions	2009-2011
Two new positions have been created to lead the district sustainability team	In progress		Sustainability Coordinator and Climate Action Manager positions	2009

2.5 Sustainability Actions (others)

Action	Action Planned	Outcome/Performance Measure	Notes Clarifying Action Taken	Timeframe
Take water conservation measures – low flow showers or toilets, fix leaks	In progress			
Reduce/replace bottled water with filtered or refrigerated water	In progress			
Improve recycling measures	In progress	Pilot program with full implementation by June 2009	17 Schools: Beaconsfield, Byng, Carleton, Churchill, Elsie Roy, Franklin, Kerrisdale, King George, MacCorkindale, Point Grey, Q. Elizabeth Annex, Quesnel, Roberts, South Hill E.C., Templeton, Tennyson, Windermere	2009
Support composting	In progress		3 schools to be identified	2009
Use re-usable dishes	In progress			
Purchase green cleaning products	In progress			
Use green (low-e paints)	In progress			
Support sustainable procurement practices	In progress			
Destination Conservation	In Progress	a pilot project which promotes awareness of conservation issues	13 schools: Beaconsfield, Begbie, Elsie Roy, Franklin, Henderson Annex, Kerrisdale, Killarney, Byng, Tennyson, McBride, Nootka, Q. Elizabeth, Tecumseh	
Check Your Head	In Progress		11 schools will continue with this pilot sustainability project - King George, Roberts, Roberts Adult Centre, Elsie Roy, Roberts Anx, Byng, Q. Eliz, Kitchener, Q. Eliz Anx, Q. Mary, Jules Quesnel	



Appendix C

Memorandum APF-011

Appliances, Home Furnishings and Carpets



Waterloo Catholic
District School Board



Administrative Procedures Memorandum

#: APF 011

Appliances, Home Furnishings and Carpets

DATE OF ISSUE: October 19, 2010

Revised: N/A

MEMO TO: All Staff

FROM: Director of Education

PURPOSE: To regulate the acceptance of donated items and the use of small appliances, home furnishings and area carpets in all board facilities. The objective is to promote energy conservation, healthy learning environments and full compliance with safety requirements.

1. Rationale

It has been a practice in some schools to accept the donation of home furnishings and appliances, or to have these items brought in by staff for their use in schools. This practice poses several concerns related to the health and safety of students and staff.

Some home furnishings (such as couches, desks, chairs, bookshelves, etc.) add to the combustible load in the rooms. The additional furnishings may obstruct the proper cleaning of the rooms and the egress for fire exiting. Furnishings may also be the home for airborne allergens (mould), insects, and rodents.

There is an increased health and safety risk with the use of small appliances in classrooms. The small electrical appliances would include (but is not limited to) the following: electric kettles, coffee makers, electric hot plates, microwave ovens, space heaters, crock pots, mini fridges, etc. These devices are not recommended by OSBIE for classroom use as they pose a burn/scalding or electrical malfunction hazard.

Appliances and home furnishings are not maintained by Facility Services. In addition, there is a direct environmental impact with the increased amount of energy consumption.

2. Appliances

- 2.1 Small appliances must be removed from classrooms and kept only in areas where there is constant adult supervision and where they are inaccessible to students (i.e. staff rooms). Departmental offices in secondary schools may contain only one set of appliances, as approved by the principal.
- 2.2 Only appliances related to the programming needs of the students will be allowed in classrooms. Proper safety precautions need to be in place.
- 2.3 Appliances that are approved for use in staff rooms, departmental offices in secondary schools, or for programming needs of students must be in good working condition (e.g. cords, plugs, etc.), and must have either CSA or ULC labels and also they must be EnergyStar rated.

It is advised that prior to the purchase of any appliance and or audio visual electronics, the appropriate Board level department (i.e. Purchasing, Media and IT) be consulted to ensure standards are met.

- 2.4 Appliances must not be on moveable carts (such as AV carts), and must not be taken from room to room.
- 2.5 All refrigerators and freezers shall be emptied out before the end of school year annually and unplugged.

3. Home Furnishings

- 3.1 No home furnishings are permitted in our schools without permission. Permission will be granted by the principal who when in doubt will consult the Board Health and Safety Officer.
- 3.2 All existing furnishings (including area carpets, couches, desks, bookshelves, etc.) must be clean, in new condition, without odours and known infestations or they will not be accepted for use in the school and will be removed at school cost.
- 3.3 In the event that students or staff members have allergic reactions which might be attributed to home furnishing material, mould or organisms in the upholstered home furnishings, the principal must notify the Health and Safety Officer.

4. Carpet Installation and Replacement

- 4.1 The acceptable standard for area carpets as defined by Facility Services is Commercial Wear carpet, 950 – 1017 g/m² pile weight, 4.0 – 4.8mm level loop pile height, Nylon fibre construction with extra wide edge binding.

- 4.2 Wall-to-wall carpet installations and replacements shall be restricted to library areas (except entrance and circulation areas), offices, music rooms, staff rooms (except kitchen areas) and drama rooms.
- 4.3 All classrooms and portables shall be provided with a fully tiled floor.
- 4.4 Area carpets will be maintained and/or replaced by Facility Services according to the following procedures:
 - 4.4.1 when an area carpet is heavily soiled, it may be removed from the classroom to allow for the floor to be scrubbed and waxed;
 - 4.4.2 the area carpet will be relocated to a central area, cleaned and dried;
 - 4.4.3 a replacement carpet will be provided whenever an area carpet is removed from a school.
- 4.5 All carpet materials shall comply with the Ontario Building Code flame spread and smoke generation limits. Carpet shall meet or exceed these Canadian Flammability regulations: CGSB 4GP-129 and CAN 4-S102.2
- 4.6 In the event that students or staff members have allergic reactions which might be attributed to the carpet material or mould or organisms in the carpet, the principal must notify the Health and Safety Officer.

The WCDSB reserves the right to remove and or amend any appliance, furnishing that is deemed unsafe, or may potentially have a negative impact on the classroom learning environment.



Appendix D

Ontario Regulation 103/94

Industrial, Commercial and Institutional Source Separation Programs



ServiceOntario

e-Laws

Environmental Protection Act
Loi sur la protection de l'environnement

ONTARIO REGULATION 103/94

INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL SOURCE SEPARATION
PROGRAMS

Consolidation Period: From March 3, 1994 to the [e-Laws currency date](#).

No amendments.

This Regulation is made in English only.

SOURCE SEPARATION PROGRAMS

1. In this Regulation,

“Northern Ontario” means the territorial districts of Algoma, Cochrane, Kenora, Manitoulin, Nipissing, Parry Sound, Rainy River, Sudbury, Thunder Bay and Timiskaming and The Regional Municipality of Sudbury;

“source separation program” means a program to facilitate the source separation of waste for reuse or recycling. O. Reg. 103/94, s. 1.

2. (1) A source separation program required under this Regulation must include,

(a) the provision of facilities for the collection, handling and storage of source separated wastes described in subsection (2) adequate for the quantities of anticipated wastes;

(b) measures to ensure that the source separated wastes that are collected are removed;

(c) the provision of information to users and potential users of the program,

(i) describing the performance of the program,

(ii) encouraging effective source separation of waste and full use of the program,

(d) reasonable efforts to ensure that full use is made of the program and that the separated waste is reused or recycled.

(2) The source separated waste referred to in clause (1) (a) is waste that has been source separated from other kinds of waste and that consists solely of waste from one or more of the following categories:

1. The categories of waste set out in the part of the Schedule applicable to the person

required to implement the source separation program.

2. The categories of waste set out in Schedule 1, 2 or 3 of Ontario Regulation 101/94 that the source separation program accepts.

(3) A source separation program required under this Regulation must provide for all the categories of waste set out in the part of the Schedule applicable to the person required to implement the program except for categories of waste that cannot be reasonably anticipated. O. Reg. 103/94, s. 2.

3. Source separation programs required by this Regulation are exempt from sections 27, 40 and 41 of the Act. O. Reg. 103/94, s. 3.

4. (1) A source separation program that is not required by this Regulation is exempt from sections 27, 40 and 41 of the Act if,

- (a) the program is restricted to waste generated at a single site;
- (b) the program only accepts waste that has been source separated from other kinds of waste and that consists solely of waste from one or more of the categories of waste set out in Schedule 1, 2 or 3 of Ontario Regulation 101/94;
- (c) the program includes everything set out in subsection 2 (1).

(2) For the purposes of clause (1) (c), the reference to source separated waste in clause 2 (1) (a) shall be deemed to be a reference to the waste described in clause (1) (b). O. Reg. 103/94, s. 4.

RETAIL SHOPPING ESTABLISHMENTS

5. (1) This section applies to the owner of an establishment that sells goods or services at retail to persons who come to the establishment if,

- (a) the establishment occupies premises with a floor area of at least 10,000 square metres; or
- (b) the establishment occupies premises in a complex in respect of which section 6 applies and the owner of the establishment is solely responsible for the establishment's waste management.

(2) The owner shall implement a source separation program for the wastes generated by the establishment or shall ensure that such a program is implemented.

(3) This section applies only in respect of an establishment located within a local municipality that has a population of at least 5,000.

(4) This section takes effect with respect to an establishment in Northern Ontario on July 1, 1996. O. Reg. 103/94, s. 5.

RETAIL SHOPPING COMPLEXES

6. (1) This section applies to the owner of a complex that contains premises occupied by establishments that sell goods or services at retail to persons who come to the establishments if the total floor area of such premises is at least 10,000 square metres.

(2) The owner shall implement a source separation program for the wastes generated at the complex or shall ensure that such a program is implemented.

(3) The source separation program need not provide for the waste generated in the operation of an establishment in the complex if section 5 applies to the owner of the establishment.

(4) This section applies only in respect of a complex located in a local municipality that has a population of at least 5,000.

(5) This section takes effect with respect to a complex in Northern Ontario on July 1, 1996. O. Reg. 103/94, s. 6.

LARGE CONSTRUCTION PROJECTS

7. (1) A person who undertakes, on their own behalf or on behalf of another person, a construction project consisting of the construction of one or more buildings with a total floor area of at least 2,000 square metres shall implement a source separation program for the waste that will be generated in the construction of the structure or shall ensure that such a program is implemented.

(2) In addition to the requirements set out in section 2, the source separation program required under this section shall,

- (a) deal separately with each of the categories of waste set out in Part III of the Schedule that have been source separated from other kinds of waste and also from each other category of waste in Part III; or
- (b) provide for removal from the building site of any commingled categories of waste set out in Part III of the Schedule and for the immediate separation of such waste from all other kinds of waste and also from each other category of waste in Part III, at,
 - (i) permanent premises of the person undertaking the construction project,
 - (ii) permanent premises of the person on whose behalf the construction project is undertaken, or
 - (iii) a waste disposal site operating under the authority of a certificate of approval or provisional certificate of approval.

(3) The source separation program shall be implemented before construction work begins at the site. O. Reg. 103/94, s. 7.

LARGE DEMOLITION PROJECTS

8. (1) A person who undertakes, on their own behalf or on behalf of another person, a demolition project consisting of the demolition of one or more buildings with a total floor area of at least 2,000 square metres shall implement a source separation program for the waste that will be generated in the demolition of the structure or shall ensure that such a program is implemented.

(2) In addition to the requirements set out in section 2, the source separation program required under this section shall,

- (a) deal separately with each of the categories of waste set out in Part IV of the Schedule that have been source separated from other kinds of waste and also from each other category of waste in Part IV; or
- (b) provide for removal from the demolition site of any commingled categories of waste

set out in Part IV of the Schedule and for the immediate separation of such waste from all other kinds of waste and also from each other category of waste in Part IV, at,

- (i) permanent premises of the person undertaking the demolition project,
- (ii) permanent premises of the person on whose behalf the demolition project is undertaken, or
- (iii) a waste disposal site operating under the authority of a certificate of approval or provisional certificate of approval.

(3) The source separation program shall be implemented before demolition work begins at the site. O. Reg. 103/94, s. 8.

OFFICE BUILDINGS

9. (1) The owner of a building or group of buildings that has at least 10,000 square metres of floor area for use as offices shall implement a source separation program for the waste generated at the building or shall ensure that such a program is implemented.

(2) For purposes of subsection (1),

“group of buildings” means two or more buildings where,

- (a) each of the buildings has the same ownership, and
- (b) each of the buildings is in proximity to at least one other of the buildings such that there is at most one building or other real property of different ownership located between the two.

(3) For purposes of determining, under subsection (2), whether there is at most one building or other real property of different ownership located between two buildings, the following properties shall not be counted: public roads; public parks; and any land over which the public has a general right of access.

(4) This section applies only in respect of a building located within a local municipality that has a population of at least 5,000.

(5) This section takes effect with respect to a building in Northern Ontario on July 1, 1996. O. Reg. 103/94, s. 9.

MULTI-UNIT RESIDENTIAL BUILDINGS

10. (1) The owner of a building that contains six or more dwelling units shall implement a source separation program for the waste generated at the building.

(2) In subsection (1),

“owner” includes a condominium corporation created under the *Condominium Act*.

(3) This section applies only in respect of a building located within a local municipality that has a population of at least 5,000.

(4) This section takes effect with respect to a building in Northern Ontario on July 1, 1996. O. Reg. 103/94, s. 10.

RESTAURANTS

- 11.** (1) This section applies to the owner of a restaurant, including a take-out restaurant.
- (2) The owner shall implement a source separation program for the waste generated by the operation of the restaurant or ensure that such a program is implemented.
- (3) This section does not apply with respect to a restaurant that occupies premises in,
- (a) an establishment in respect of which section 5 applies;
 - (b) a complex in respect of which section 6 applies;
 - (c) a building in respect of which section 9 applies;
 - (d) a hotel or motel in respect of which section 12 applies;
 - (e) a hospital in respect of which section 13 applies;
 - (f) a location or campus of an educational institution in respect of which section 14 applies.
- (4) This section does not apply to an owner of a restaurant in a particular calendar year if,
- (a) during the two preceding calendar years there was no year in which the gross sales for all restaurants operated by the owner in Ontario equalled or exceeded \$3,000,000; and
 - (b) the owner is able to demonstrate this fact, within seven days of a request from the Director, through evidence satisfactory to the Director.
- (5) Copies of the records related to purchase and sale maintained under subsection 5 (1) of Regulation 1013 of the Revised Regulations of Ontario, 1990 shall be deemed to be sufficient evidence of the gross sales of a restaurant if the copies are certified by the owner or the owner's representative as to the accuracy of the records.
- (6) This section applies only in respect of a restaurant located within a local municipality that has a population of at least 5,000.
- (7) This section takes effect with respect to a restaurant in Northern Ontario on July 1, 1996. O. Reg. 103/94, s. 11.

HOTELS AND MOTELS

- 12.** (1) The owner of a hotel or motel that has more than seventy-five units shall implement a source separation program for the wastes generated by the operation of the hotel or motel or shall ensure that such a program is implemented.
- (2) This section applies only in respect of a hotel or motel located within a local municipality that has a population of at least 5,000.
- (3) This section takes effect with respect to a hotel or motel in Northern Ontario on July 1, 1996. O. Reg. 103/94, s. 12.

HOSPITALS

- 13.** (1) The operator of a public hospital classified as a class A, B or F hospital in Regulation 964 of the Revised Regulations of Ontario, 1990 shall implement a source separation program for the wastes generated by the operation of the hospital or shall ensure that such a program is implemented.
- (2) This section applies only in respect of a public hospital located within a local

municipality that has a population of at least 5,000.

(3) This section takes effect with respect to a public hospital in Northern Ontario on July 1, 1996. O. Reg. 103/94, s. 13.

EDUCATIONAL INSTITUTIONS

14. (1) This section applies to the operator of an educational institution in respect of a location or campus of the institution if, at the location or campus, at any time during the calendar year, more than 350 persons are enrolled.

(2) The operator shall implement a source separation program for the waste generated by the operation of the institution at the location or campus or shall ensure that such a program is implemented.

(3) This section continues to apply in respect of a location or campus for the two calendar years following the last year in which more than 350 persons were enrolled at the location or campus.

(4) This section applies only in respect of a location or campus located within a local municipality that has a population of at least 5,000.

(5) This section takes effect with respect to a location or campus in Northern Ontario on July 1, 1996. O. Reg. 103/94, s. 14.

LARGE MANUFACTURING ESTABLISHMENTS

15. (1) This section applies to the owner or operator of a site that is a manufacturing establishment.

(2) The owner shall implement a source separation program for the waste generated by the operation of the establishment at the site or shall ensure that such a program is implemented.

(3) This section does not apply to an owner of a site in a particular calendar year if,

(a) during the two preceding calendar years there was no calendar month in which the hours worked by the persons employed at the site exceeded 16,000 hours; and

(b) the owner is able to demonstrate this fact, within seven days of a request from the Director, through evidence satisfactory to the Director.

(4) Copies of the records related to hours of employment maintained under section 11 of the *Employment Standards Act* shall be deemed to be sufficient evidence of hours worked at a site if the copies are certified by the owner or the owner's representative as to the accuracy of the records.

(5) In this section,

"owner" includes the operator of a manufacturing establishment but does not include a landlord;

"site" means one property and includes nearby properties owned or leased by the same person where passage from one property to another involves crossing, but not travelling along, a public highway. O. Reg. 103/94, s. 15.

TRANSITION

16. Except as otherwise provided, a person who, upon the coming into force of this Regulation, or at any time within twelve months after the coming into force of this Regulation, becomes subject to an obligation with respect to the implementation of a source separation program shall fulfil the obligation within twelve months after the coming into force of this Regulation. O.Reg. 103/94, s. 16.

SCHEDULE
WASTES TO BE PROVIDED FOR IN SOURCE SEPARATION PROGRAMS

PART I
RETAIL SHOPPING ESTABLISHMENTS

(referred to in section 5)

1. Aluminum food or beverage cans (including cans made primarily of aluminum).
2. Cardboard (corrugated).
3. Fine paper.
4. Glass bottles and jars for food or beverages.
5. Newsprint.
6. Steel food or beverage cans (including cans made primarily of steel).

PART II
RETAIL SHOPPING COMPLEXES

(referred to in section 6)

1. Aluminum food or beverage cans (including cans made primarily of aluminum).
2. Cardboard (corrugated).
3. Fine paper.
4. Glass bottles and jars for food or beverages.
5. Newsprint.
6. Steel food or beverage cans (including cans made primarily of steel).

PART III
LARGE CONSTRUCTION PROJECTS

(referred to in section 7)

1. Brick and Portland cement concrete.
2. Cardboard (corrugated).
3. Drywall (unpainted).
4. Steel.
5. Wood (not including painted or treated wood or laminated wood).

PART IV
LARGE DEMOLITION PROJECTS

(referred to in section 8)

1. Brick and Portland cement concrete.
2. Steel.
3. Wood (not including painted or treated wood or laminated wood).

PART V
OFFICE BUILDINGS

(referred to in section 9)

1. Aluminum food or beverage cans (including cans made primarily of aluminum).
2. Cardboard (corrugated).
3. Fine paper.
4. Glass bottles and jars for food or beverages.
5. Newsprint.
6. Steel food or beverage cans (including cans made primarily of steel).

PART VI
MULTI-UNIT RESIDENTIAL BUILDINGS

(referred to in section 10)

1. Aluminum food or beverage cans (including cans made primarily of aluminum).
2. Glass bottles and jars for food or beverages.
3. Newsprint.
4. Polyethylene terephthalate bottles for food or beverages (including bottles made primarily of polyethylene terephthalate).
5. Steel food or beverage cans (including cans made primarily of steel).
6. The categories of waste that are collected or accepted by the blue box waste management system, if any, of the municipality where the building is located.

PART VII
RESTAURANTS

(referred to in section 11)

1. Aluminum food or beverage cans (including cans made primarily of aluminum).
2. Cardboard (corrugated).
3. Fine paper.
4. Glass bottles and jars for food or beverages.
5. Newsprint.
6. Polyethylene terephthalate bottles for food or beverages (including bottles made primarily of polyethylene terephthalate).

7. Steel food or beverage cans (including cans made primarily of steel).

PART VIII
HOTELS AND MOTELS

(referred to in section 12)

1. Aluminum food or beverage cans (including cans made primarily of aluminum).
2. Cardboard (corrugated).
3. Fine paper.
4. Glass bottles and jars for food or beverages.
5. Newsprint.
6. Polyethylene terephthalate bottles for food or beverages (including bottles made primarily of polyethylene terephthalate).
7. Steel food or beverage cans (including cans made primarily of steel).

PART IX
HOSPITALS

(referred to in section 13)

1. Aluminum food or beverage cans (including cans made primarily of aluminum).
2. Cardboard (corrugated).
3. Fine paper.
4. Glass bottles and jars for food or beverages.
5. Newsprint.
6. Steel food or beverage cans (including cans made primarily of steel).

PART X
EDUCATIONAL INSTITUTIONS

(referred to in section 14)

1. Aluminum food or beverage cans (including cans made primarily of aluminum).
2. Cardboard (corrugated).
3. Fine paper.
4. Glass bottles and jars for food or beverages.
5. Newsprint.
6. Steel food or beverage cans (including cans made primarily of steel).

PART XI
LARGE MANUFACTURING ESTABLISHMENTS

(referred to in section 15)

1. Aluminum.
2. Cardboard (corrugated).
3. Fine paper.
4. Glass.
5. Newsprint.
6. Polyethylene (high density) jugs, pails, crates, totes and drums.
7. Polyethylene (linear low density and low density) film.
8. Polystyrene (expanded) foam.
9. Polystyrene trays, reels and spools.
10. Steel.
11. Wood (not including painted or treated wood or laminated wood).

O.Reg. 103/94, Sched.

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Appendix E

Ontario Regulation 102/94

Waste Audits and Waste Reduction Work Plans



ServiceOntario

e-Laws

Environmental Protection Act
Loi sur la protection de l'environnement

ONTARIO REGULATION 102/94

WASTE AUDITS AND WASTE REDUCTION WORK PLANS

Consolidation Period: From March 3, 1994 to the [e-Laws currency date](#).

No amendments.

This Regulation is made in English only.

PART I
GENERAL

1. In this Regulation,

“waste” means municipal waste as defined in Regulation 347 of the Revised Regulations of Ontario, 1990;

“waste audit” means a study relating to waste;

“waste reduction work plan” means a plan to reduce, reuse and recycle waste. O. Reg. 102/94, s. 1.

2. A waste audit required under this Regulation shall address,

- (a) the amount, nature and composition of the waste;
- (b) the manner by which the waste gets produced, including management decisions and policies that relate to the production of waste; and
- (c) the way in which the waste is managed. O. Reg. 102/94, s. 2.

3. (1) A waste reduction work plan required under this Regulation shall include, to the extent that is reasonable, plans to reduce, reuse and recycle waste and shall set out who will implement each part of the plan, when each part will be implemented and what the expected results are.

(2) In developing the work plan, regard shall be had to the following principles:

- 1. Reduction is the first objective.
- 2. If reduction is not possible, then reuse is the next objective.
- 3. If reduction and reuse are not possible, then recycling is the final objective. O. Reg.

102/94, s. 3.

4. A person who is required under this Regulation to prepare a report of a waste audit or a waste reduction work plan shall prepare it on a form provided by the Ministry or in the same format as such a form. O. Reg. 102/94, s. 4.

5. (1) A person who is required under this Regulation to prepare a report of a waste audit or a waste reduction work plan shall retain a copy of the report or plan for at least five years after it was prepared.

(2) A person who is required under this Regulation to prepare a report of a waste audit or a waste reduction work plan shall submit to the Director, on request, the required report or plan, within seven days of the Director requesting them. O. Reg. 102/94, s. 5.

6. (1) A person who becomes subject to an obligation under this Regulation to prepare a report of a waste audit or a waste reduction work plan shall do so within six months of becoming subject to the obligation.

(2) This section does not apply with respect to updated reports or plans.

(3) This section does not apply with respect to obligations of a builder under Part IV or a demolisher under Part V. O. Reg. 102/94, s. 6.

7. (1) A new owner or operator to whom this Regulation applies is not required to conduct a new waste audit or prepare a new waste reduction work plan if an audit or work plan was conducted or prepared by a previous owner or operator and the new owner or operator updates the audit and work plan as required under this Regulation.

(2) This section does not apply with respect to a builder under Part IV or a demolisher under Part V. O. Reg. 102/94, s. 7.

8. (1) A person who has an obligation to conduct a waste audit and prepare a report under Part II, III, VI, VII, VIII, IX, X or XI in respect of more than one retail shopping establishment, retail shopping complex, building, restaurant, hotel or motel, hospital, location or campus of an educational institution, or site of a manufacturing establishment, may conduct a single audit and prepare a single report for two or more of them if it is reasonable to expect that separate audits would have similar findings.

(2) Subsection (1) applies with necessary modifications with respect to updates of waste audits and reports. O. Reg. 102/94, s. 8.

PART II RETAIL SHOPPING ESTABLISHMENTS

9. This Part applies to the owner of an establishment that sells goods or services at retail to persons who come to the establishment if,

(a) the establishment occupies premises with a floor area of at least 10,000 square metres;
or

(b) the establishment occupies premises in a complex in respect of which Part III applies and the owner of the establishment is solely responsible for the establishment's waste management. O. Reg. 102/94, s. 9.

10. (1) The owner shall conduct a waste audit covering the waste generated by the

operation of the establishment. The audit shall also address the extent to which materials or products used or sold consist of recycled or reused materials or products.

(2) After conducting the waste audit, the owner shall prepare a written report of the audit.

(3) In every year following the initial waste audit, the owner shall update the audit and prepare an updated written report. O.Reg. 102/94, s. 10.

11. (1) The owner shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated by the operation of the establishment.

(2) In every year following the preparation of the initial waste reduction work plan, the owner shall prepare an updated written plan. O. Reg. 102/94, s. 11.

12. The owner shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 12.

13. The waste reduction work plan shall include measures for communicating the plan to the owner's employees who work at the establishment and, as a minimum, those measures shall require,

- (a) that the plan or a summary be posted in places where most employees will see it; and
- (b) if a summary is posted, that any employee who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 13.

PART III RETAIL SHOPPING COMPLEXES

14. This Part applies to the owner of a complex that contains premises occupied by establishments that sell goods or services at retail to persons who come to the establishments if the total floor area of such premises is at least 10,000 square metres. O. Reg. 102/94, s. 14.

15. (1) The owner shall conduct a waste audit covering waste generated at the complex other than the waste generated at premises for which the owner is not responsible, either directly or indirectly, for waste management. The audit shall also address the extent to which materials or products used by the owner consist of recycled or reused materials or products.

(2) The waste audit need not cover the waste generated in the operation of an establishment in the complex if Part II applies to the owner of the establishment.

(3) After conducting the waste audit, the owner shall prepare a written report of the audit.

(4) In every year following the initial waste audit, the owner shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 15.

16. (1) The owner shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated at the complex other than the waste generated at premises for which the owner is not responsible, either directly or indirectly, for waste management.

(2) The waste reduction work plan need not cover the waste generated in the operation of an establishment in the complex if Part II applies to the owner of the establishment.

(3) In every year following the preparation of the initial waste reduction work plan, the owner shall prepare an updated written plan. O. Reg. 102/94, s. 16.

17. The owner shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 17.

18. The waste reduction work plan shall include measures for communicating the plan to the owner's employees who work at the complex and to the occupiers of premises in the complex and, as a minimum, those measures shall require,

- (a) that the plan or a summary be posted in places where most employees and occupiers will see it; and
- (b) if a summary is posted, that any employee or occupier who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 18.

PART IV LARGE CONSTRUCTION PROJECTS

19. (1) This Part applies to a person who undertakes, on their own behalf or on behalf of another person, a construction project consisting of the construction of one or more buildings with a total floor area of at least 2,000 square metres.

(2) In this Part,

"builder" means a person described in subsection (1). O. Reg. 102/94, s. 19.

20. (1) The builder shall conduct a waste audit covering the waste that will be generated in the construction project. The audit shall also address the extent to which materials or products used consist of recycled or reused materials or products.

(2) After conducting the waste audit, the builder shall prepare a written report of the audit. O. Reg. 102/94, s. 20.

21. The builder shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated in the construction project. O. Reg. 102/94, s. 21.

22. The builder shall implement the waste reduction work plan. O. Reg. 102/94, s. 22.

23. The waste reduction work plan shall include measures for communicating the plan to the workers at the construction site and, as a minimum, those measures shall require,

- (a) that the plan or a summary be posted at the construction site in a place where most of the workers will see it; and
- (b) if a summary is posted, that any worker who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 23.

24. (1) The report of the waste audit and the waste reduction work plan required under this Part shall be prepared before construction work begins at the site.

(2) If construction work has begun at the site before this Regulation comes into force, the following transitional rules apply with respect to the waste audit, the report and the plan:

- 1. The report and plan shall be prepared within six months after this Regulation comes into force.
- 2. The report and plan need not be prepared if all work is finished within six months after this Regulation comes into force.

3. The waste audit need not cover any waste generated within six months after this Regulation comes into force.
4. The plan need not address any waste generated within six months after this Regulation comes into force. O. Reg. 102/94, s. 24.

PART V LARGE DEMOLITION PROJECTS

25. (1) This Part applies to a person who undertakes, on their own behalf or on behalf of another person, a demolition project consisting of the demolition of one or more buildings with a total floor area of at least 2,000 square metres.

(2) In this Part,

“demolisher” means a person described in subsection(1). O. Reg. 102/94, s. 25.

26. (1) The demolisher shall conduct a waste audit covering the waste that will be generated in the demolition project.

(2) After conducting the waste audit, the demolisher shall prepare a written report of the audit. O. Reg. 102/94, s. 26.

27. The demolisher shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated in the demolition project. O. Reg. 102/94, s. 27.

28. The demolisher shall implement the waste reduction work plan. O. Reg. 102/94, s. 28.

29. The waste reduction work plan shall include measures for communicating the plan to the workers at the demolition site and, as a minimum, those measures shall require,

- (a) that the plan or a summary be posted at the demolition site in a place where most of the workers will see it; and
- (b) if a summary is posted, that any worker who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 29.

30. (1) The report of the waste audit and the waste reduction work plan required under this Part shall be prepared before demolition work begins at the site.

(2) If demolition work has begun at the site before this Regulation comes into force, the following transitional rules apply with respect to the waste audit, the report and the plan:

1. The report and plan shall be prepared within six months after this Regulation comes into force.
2. The report and plan need not be prepared if all work is finished within six months after this Regulation comes into force.
3. The waste audit need not cover any waste generated within six months after this Regulation comes into force.
4. The plan need not address any waste generated within six months after this Regulation comes into force. O. Reg. 102/94, s. 30.

PART VI OFFICE BUILDINGS

31. (1) This Part applies to the owner of a building or group of buildings that has at least 10,000 square metres of floor area for use as offices.

(2) For the purposes of subsection (1),

“group of buildings” means two or more buildings where,

(a) each of the buildings has the same ownership, and

(b) each of the buildings is in proximity to at least one other of the buildings such that there is at most one building or other real property of different ownership located between the two.

(3) For purposes of determining, under subsection (2), whether there is at most one building or other real property of different ownership located between two buildings, the following properties shall not be counted: public roads; public parks; and any land over which the public has a general right of access. O. Reg. 102/94, s. 31.

32. (1) The owner shall conduct a waste audit covering the waste generated at the building. The audit shall also address the extent to which materials or products used by the owner consist of recycled or reused materials or products.

(2) After conducting the waste audit, the owner shall prepare a written report of the audit.

(3) In every year following the initial waste audit, the owner shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 32.

33. (1) The owner shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated at the building.

(2) In every year following the preparation of the initial waste reduction work plan, the owner shall prepare an updated written plan. O. Reg. 102/94, s. 33.

34. The owner shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 34.

35. The waste reduction work plan shall include measures for communicating the plan to the owner’s employees who work at the building and to any persons who occupy premises in the building as tenants of the owner and, as a minimum, those measures shall require,

(a) that the plan or a summary be posted in places where most employees and tenants will see it; and

(b) if a summary is posted, that any employee or tenant who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 35.

PART VII RESTAURANTS

36. (1) This Part applies to the owner of a restaurant, including a take-out restaurant.

(2) This Part does not apply with respect to a restaurant that occupies premises in any of the places set out in subsection (3) if the owner of the restaurant co-operates in the conducting of the waste audit and the preparation of the waste reduction work plan required under this Regulation for the place set out in subsection (3).

(3) The places referred to in subsection (2) are,

- (a) an establishment in respect of which Part II applies;
- (b) a complex in respect of which Part III applies;
- (c) a building in respect of which Part VI applies;
- (d) a hotel or motel in respect of which Part VIII applies;
- (e) a hospital in respect of which Part IX applies;
- (f) a location or campus of an educational institution in respect of which Part X applies.

(4) This Part does not apply to an owner of a restaurant in a particular calendar year if,

- (a) during the two preceding calendar years there was no year in which the gross sales for all restaurants operated by the owner in Ontario equalled or exceeded \$3,000,000; and
- (b) the owner is able to demonstrate this fact, within seven days of a request from the Director, through evidence satisfactory to the Director.

(5) Copies of the records related to purchase and sale maintained under subsection 5 (1) of Regulation 1013 of the Revised Regulations of Ontario, 1990 shall be deemed to be sufficient evidence of the gross sales of a restaurant if the copies are certified by the owner or the owner's representative as to the accuracy of the records. O. Reg. 102/94, s. 36.

37. (1) The owner shall conduct a waste audit covering waste generated by the operation of the restaurant. The audit shall also address the extent to which materials or products used consist of recycled or reused materials or products.

(2) After conducting the waste audit, the owner shall prepare a written report of the audit.

(3) In every year following the initial waste audit, the owner shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 37.

38. (1) The owner shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated by the operation of the restaurant.

(2) In every year following the preparation of the initial waste reduction work plan, the owner shall prepare an updated written plan. O. Reg. 102/94, s. 38.

39. The owner shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 39.

40. The waste reduction work plan shall include measures for communicating the plan to the owner's employees who work at the restaurant and, as a minimum, those measures shall require,

- (a) that the plan or a summary be posted in places where most employees will see it; and
- (b) if a summary is posted, that any employee who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 40.

PART VIII HOTELS AND MOTELS

41. This Part applies to the owner of a hotel or motel that has more than 75 units. O. Reg. 102/94, s. 41.

42. (1) The owner shall conduct a waste audit covering waste generated by the operation

of the hotel or motel. The audit shall also address the extent to which materials or products used consist of recycled or reused materials or products.

(2) After conducting the waste audit, the owner shall prepare a written report of the audit.

(3) In every year following the initial waste audit, the owner shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 42.

43. (1) The owner shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated by the operation of the hotel or motel.

(2) In every year following the preparation of the initial waste reduction work plan, the owner shall prepare an updated written plan. O. Reg. 102/94, s. 43.

44. The owner shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 44.

45. The waste reduction work plan shall include measures for communicating the plan to the owner's employees who work at the hotel or motel and, as a minimum, those measures shall require,

- (a) that the plan or a summary be posted in places where most employees will see it; and
- (b) if a summary is posted, that any employee who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 45.

PART IX HOSPITALS

46. This Part applies to the operator of a public hospital classified as a class A, B or F hospital in Regulation 964 of the Revised Regulations of Ontario, 1990. O. Reg. 102/94, s. 46.

47. (1) The operator shall conduct a waste audit covering the waste generated by the operation of the hospital. The audit shall also address the extent to which materials or products used consist of recycled or reused materials or products.

(2) After conducting the waste audit, the operator shall prepare a written report of the audit.

(3) In every year following the initial waste audit, the operator shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 47.

48. (1) The operator shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated by the operation of the hospital.

(2) In every year following the preparation of the initial waste reduction work plan, the operator shall prepare an updated written plan. O. Reg. 102/94, s. 48.

49. The operator shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 49.

50. The waste reduction work plan shall include measures for communicating the plan to the operator's employees who work at the hospital and, as a minimum, those measures shall require,

- (a) that the plan or a summary be posted in places where most employees will see it; and
- (b) if a summary is posted, that any employee who requests to look at the plan be allowed

to do so. O. Reg. 102/94, s. 50.

PART X EDUCATIONAL INSTITUTIONS

51. (1) This Part applies to the operator of an educational institution in respect of a location or campus of the institution if, at the location or campus, at any time during the calendar year, more than 350 persons are enrolled.

(2) This Part continues to apply in respect of a location or campus for the two calendar years following the last year in which more than 350 persons were enrolled at the location or campus. O. Reg. 102/94, s. 51.

52. (1) The operator shall conduct a waste audit covering the waste generated by the operation of the institution at the location or campus. The audit shall also address the extent to which materials or products used consist of recycled or reused materials or products.

(2) After conducting the waste audit, the operator shall prepare a written report of the audit.

(3) In every year following the initial waste audit, the operator shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 52.

53. (1) The operator shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated by the operation of the institution at the location or campus.

(2) In every year following the preparation of the initial waste reduction work plan, the operator shall prepare an updated written plan. O. Reg. 102/94, s. 53.

54. The operator shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 54.

55. The waste reduction work plan shall include measures for communicating the plan to the operator's employees who work at the location or campus and, as a minimum, those measures shall require,

- (a) that the plan or a summary be posted in places where most employees will see it; and
- (b) if a summary is posted, that any employee who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 55.

PART XI LARGE MANUFACTURING ESTABLISHMENTS

56. (1) This Part applies to the owner or operator of a site that is a manufacturing establishment.

(2) This Part does not apply to an owner of a site in a particular calendar year if,

- (a) during the two preceding calendar years there was no calendar month in which the hours worked by the persons employed at the site exceeded 16,000 hours; and
- (b) the owner is able to demonstrate this fact, within seven days of a request from the Director, through evidence satisfactory to the Director.

(3) Copies of the records related to hours of employment maintained under section 11 of

the *Employment Standards Act* shall be deemed to be sufficient evidence of hours worked at a site if the copies are certified by the owner or the owner's representative as to the accuracy of the records.

(4) In this Part,

"owner" includes the operator of a manufacturing establishment but does not include a landlord;

"site" means one property and includes nearby properties owned or leased by the same person where passage from one property to another involves crossing, but not travelling along, a public highway. O. Reg. 102/94, s. 56.

57. (1) The owner shall conduct a waste audit covering the waste generated by the operation of the establishment at the site. The audit shall also address the extent to which materials or products used or sold consist of recycled or reused materials or products.

(2) After conducting the waste audit, the owner shall prepare a written report of the audit.

(3) In every year following the initial waste audit, the owner shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 57.

58. (1) The owner shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated by the operation of the establishment.

(2) In every year following the preparation of the initial waste reduction work plan, the owner shall prepare an updated written plan. O. Reg. 102/94, s. 58.

59. The owner shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 59.

60. The waste reduction work plan shall include measures for communicating the plan to the owner's employees who work at the site and, as a minimum, those measures shall require,

(a) that the plan or a summary be posted in places where most employees will see it; and

(b) if a summary is posted, that any employee who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 60.

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Appendix F

Active Transportation Charter



Active Transportation Charter

Active transportation consists of human-powered forms of travel such as walking, cycling, in-line skating, skateboarding and manual wheelchairs. Active modes of transportation can be efficient alternatives to automobile travel.

Walking, cycling or other active modes of transportation are a vital part of an individual's daily physical activity. By using active modes of transportation to school, students gain independence that contributes to their social and psychological development. This prepares them for learning and fosters a lifelong habit of using active modes of transportation. By reducing automobile use, air quality around schools can be improved. In order to travel safely, conveniently, directly and comfortably, employees, parents and students require adequate infrastructure, programming and a supportive environment to meet their travel needs. This Charter promotes the principles outlined in Ontario's Foundations for a Healthy School.

To ensure active modes of transportation are safe, comfortable and convenient, the Waterloo Catholic District School Board respects the following principles:

Accessibility

Active modes of transportation are direct means of accessing educational facilities by everyone.

Activity and Learning

Daily physical activity prepares students to learn more effectively.

Equity

Active modes of transportation are the only modes of travel that are universally affordable, and allow the majority of children and youth to travel independently.

Personal and Community Safety

An environment in which people feel safe and comfortable using active modes of transportation increases community safety for all.

Health and Well-Being

Active modes of transportation are proven methods of promoting personal health and well-being.

Environmental Sustainability

Active modes of transportation rely on human power and have negligible environmental impacts.

Community Cohesion and Vitality

A supportive active transportation environment encourages and facilitates local community that is a place for all.

To create an environment in all parts of the region that encourages and supports active modes of travel, the Waterloo Catholic District School Boards will work with the Waterloo Region District School Board, individual citizens, parents, community and school groups, businesses and the local municipalities to:

- Support and encourage the adoption of Active and Safe Routes to School programs in schools across the Board
- Encourage the development of School Travel Plans for every school
- Improve end of trip facilities (e.g., equipment storage and/or bicycle racks, access to showers, provision of sidewalks and shaded areas, etc.) to support active transportation
- Participate in regional and international walk to school day events and other initiatives encouraging active transportation
- Incorporate active transportation encouragement policies in facility planning decisions
- Encourage the Ontario EcoSchools consortium to include school initiatives that encourage active transportation into the Ontario EcoSchools certification requirements
- Support research on active transportation
- Support policies to improve the condition of sidewalks, walkways and pathways
- Advocate for safety enhancements including establishing safe active transportation corridors for travel to school and the workplace
- Encourage interdisciplinary cooperation and collaboration of schools, communities and government agencies
- Develop policies that incorporate these principles into all Board decisions
- Identify needs for retrofitting all neighbourhoods/ communities with more efficient active transportation and transit infrastructure that encourages intermodal travel

Active schools encourage and facilitate active living and support student health, vitality and safety. This will result in decreased automobile dependence and traffic congestion, lead to cleaner air and support student achievement. Such environments improve the quality of life for all school community members, contribute to success for each learner and create a place for all.

