Report to Committee of the Whole
May 12, 2014

Waterloo Region District School Board

Inspired Learners – Tomorrow's Leaders

SUBJECT: **Energy Update**

ORIGINATOR: This report was prepared by Marilyn Allen, Executive Superintendent of Business and Financial Services and Treasurer, Ian Gaudet, Controller of Facility Services, Ron Dallan, Manager of Capital Projects, Lou Lima, Manager of Mechanical, Electrical and Environmental Services, and Steve Feeney, Supervisor of Energy Conservation, in consultation with Executive Committee.

PURPOSE/STRATEGIC PLAN:
The purpose of this report is to update the Board with respect to energy consumption across the Waterloo Region District School Board (WRDSB).

This report relates to the following strategic directions which includes engaging students, families, staff and communities; championing quality public education and promoting forward-thinking.

BACKGROUND:
The Green Energy Act (Ontario Regulation 397/11, or O.Reg. 397/11), formerly the Green Energy and Green Economy Act, came into effect in 2009 in Ontario and repealed the Energy Conservation Leadership Act and the Energy Efficiency Act.

In 2008, the Ministry launched an Energy Management and Conservation Initiative and appointed an energy conservation officer from the education sector to provide the Ministry with advice, provide boards with technical support, and help to implement and manage specific energy initiatives. In 2009, the Ministry launched a project referred to as the Utility Consumption Database (UCD). The UCD reports on utility consumption and greenhouse gas emissions for more than 5,000 schools and administrative buildings across 72 boards.

Phase One of the UCD consisting of a report on energy consumption and greenhouse gas emissions, was completed and submitted to the Ministry of Energy by July 1, 2013 as required under the Act, with the Board making this information available publicly through a report. Phase Two of the UCD, including the annual report on energy consumption and greenhouse gas emissions as well as a conservation and demand management plan is scheduled for completion by July1, 2014 and is intended to be available to the public, again through a report or via the Boards' website.

In school calendar years 2009/2010, 2010/2011 and 2011/2012, Business Services provided energy updates to the board through the Energy Efficient School Funding (EESF) annual capital report. EESF funding was targeted for capital investment into schools that were below the average in terms of energy performance. The program for EESF was discontinued by the Ministry at the end of school year 2011/2012. As such, no capital funding is being provided targeted solely at reducing energy consumption, although this is a founding principal for expenditures of capital from School Renewal (SR), School Condition Improvement (SCI) or new capital investment as Business Services continue to deliver capital projects across the region.

STATUS

Energy Use Intensity and Consumption

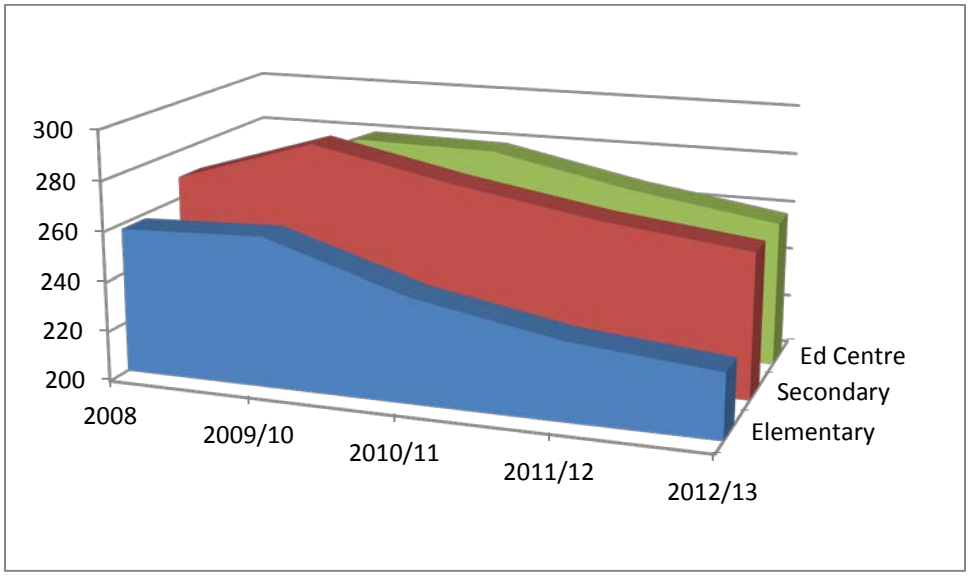
Energy Use Intensity (EUI) measured in equivalent kilowatt hours per square metre (ekWh/m2) is the base unit for comparison purposes. This metric is developed by first weather normalizing gas heating units, often reported as cubic metres of gas or gigajoules. Cubic metres of gas or gigajoules are then converted to equivalent kilowatt hours (ekWh). Total energy consumption is calculated by adding ekWh of gas use to electrical consumption, already reported in kWh.

Determining intensity involves accounting for square footage of all facilities in our inventory including portables and port-a-packs. This produces the EUI measured in ekWh/m2.

Previous reports used a baseline of 2008 (January through December calendar year) as a benchmark. It is important to note that subsequent data is presented on a school calendar year basis.

EUI is presented in Figure 1 as follows.

Figure 1 – Energy Use Intensity (ekWh/m2) versus Year



The Board has experienced an 11.5% reduction in EUI when comparing 2012/13 to 2008 average energy intensity for both elementary and secondary schools combined.

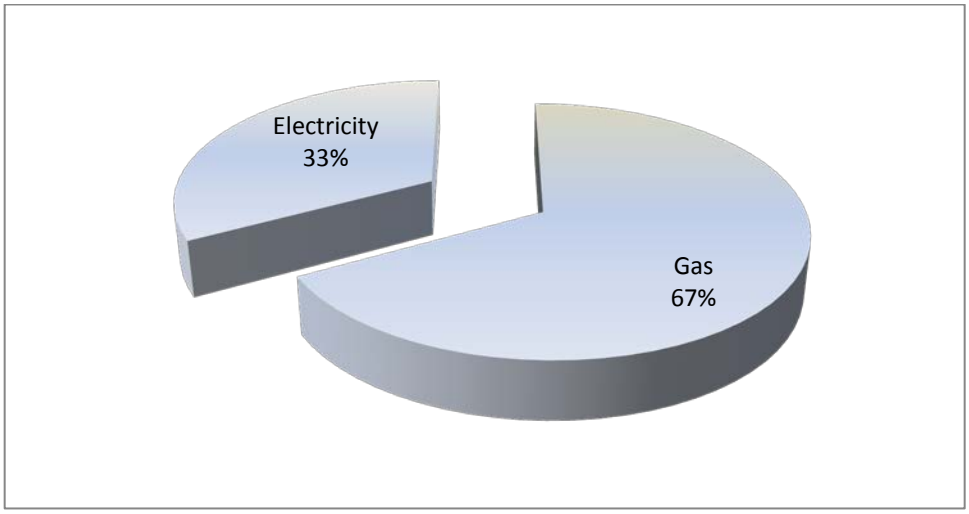
Detailed EUI for each school is presented in Appendix A for elementary and Appendix B for secondary schools and the Education Centre.

It is important to understand fuel sources within our Board. Efforts have been made to remove the reliance on heating oil as a fuel source as this contributes to greater greenhouse gas (GHG) production and is generally more costly. As such, no WRDSB schools currently rely on heating oil as a fuel source.

Consumption by commodity is an important factor that drives expenditures. Gas is at a comparatively low cost to electricity. As such, a greater reliance on gas as a resource is currently beneficial for our operational budget.

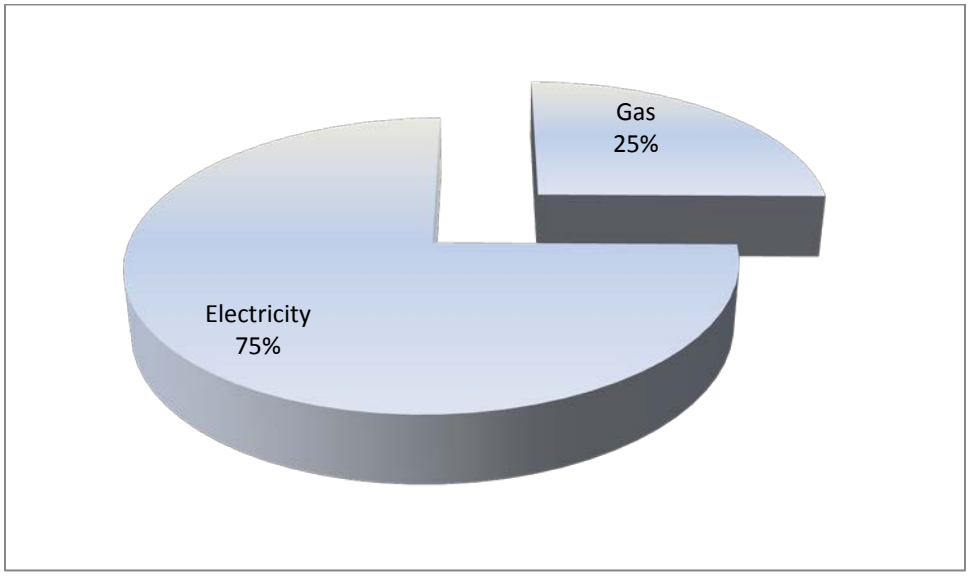
Energy consumption by commodity is presented in Figure 2 for 2012/13.

Figure 2 – Energy Consumption by Commodity (2012/13)



Energy expenditures by commodity are presented in Figure 3 for 2012/13.

Figure 3 – Expenditures by Commodity (2012/13)



On average for 2012/13, gas cost approximately 2.4 cents per ekwh and electricity cost approximately 13.0 cents per ekwh with an average for both estimated at 5.90 cents.

Energy intensity is driven by consumption. Consumption is an aspect over which the Board and its stakeholders have partial control. Factors that are controllable may include:

- Student and staff behaviour
- Waste minimization
- Use of efficient technologies
- Automation and control technologies (Building Automation Systems or BAS)
- Building envelope improvements
- Designated periods of set-back and/or shut down

Consumption is also driven by factors beyond stakeholder control and can include factors such as:

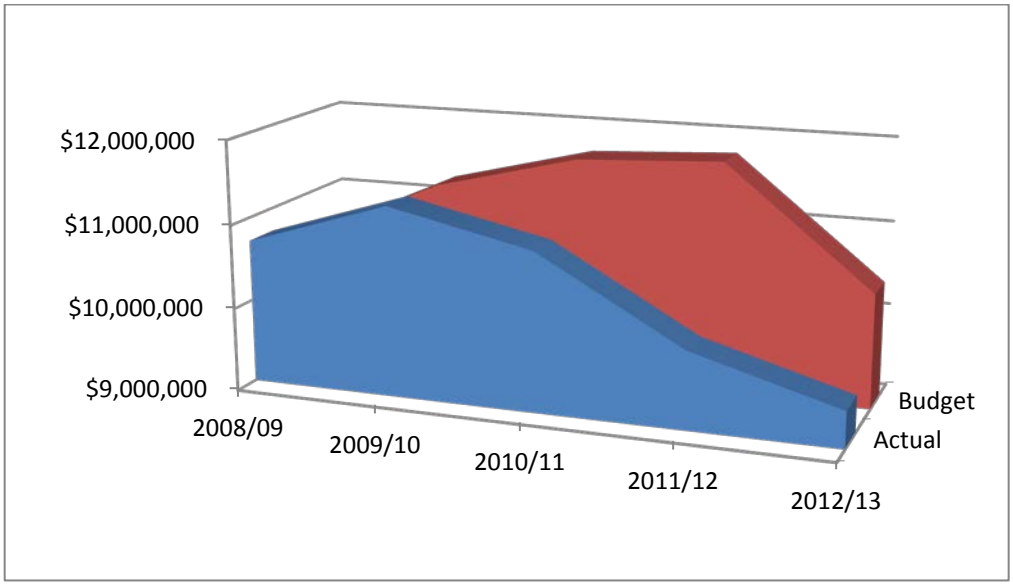
- Weather (colder winter drives heating demand)
- Hours of operation (extended use for Ministry initiatives such as Community Use)
- Growth of region (new schools and additional portables)
- Expansion of facilities and square footage (FDK additions)

It is important to note that use of renewables (wind and photovoltaic for example) does not impact consumption but it can reduce GHG emissions.

Energy Budget and Expenditure
A five year history of board budgets and expenditures for electricity and gas are presented in Appendix C. The WRDSB utility budget for 2012/13 was $10.4M and the approved budget for 2013/14 is $10.8M.

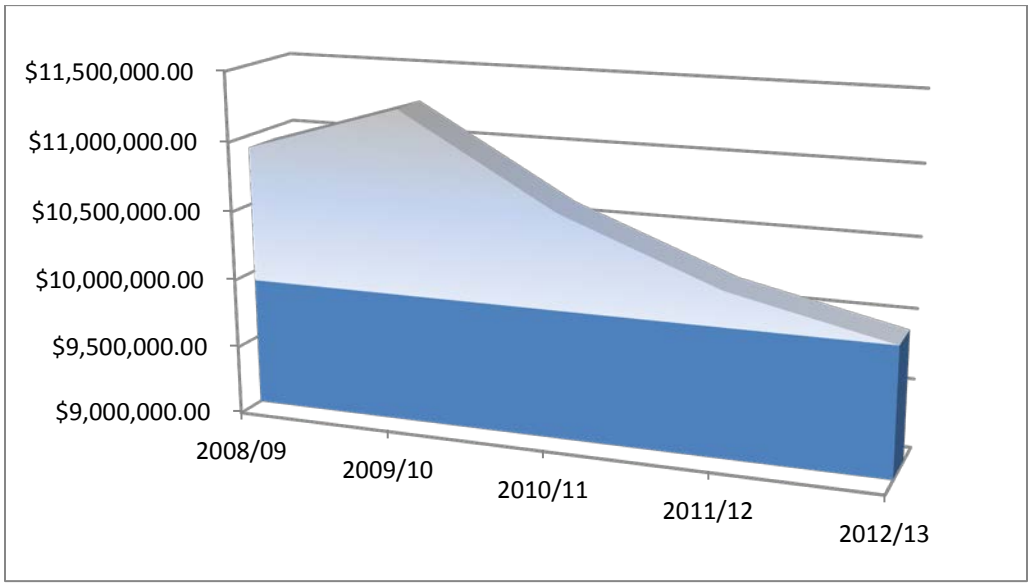
It is important to note when reviewing this information that budget and actual expenses cannot be compared directly year over year as a metric for operational efficiencies. Consumption is weather dependent. Costs are market dependent. Market pricing is something the board has very limited control over and market pricing can fluctuate greatly depending on demand and time of use. Business Services staff employs a purchasing strategy working through a consortium. This minimizes the board's exposure to spot market pricing and was instrumental in generating the savings experienced in 2012/13. Figure 4 presents the board's budget versus expenditures since 2008.

Figure 4 – Budget and Expenditures (Dollars) versus Year



One can estimate cost avoidance by holding energy rates constant at 2012/13 average cost of 5.90 cents per ekWh/m2 and maintaining a fixed inventory of area of schools while applying EUI factors that have reduced over time. Based on this, the area beneath the curve and above the fixed line on Figure 5 represents more than $3.2M in cost avoidance due to EUI reductions since 2008.

Figure 5 – Cost Avoidance (Dollars) Versus Year



Regardless of our best efforts to reduce consumption by driving down EUI, energy costs are likely to continue to rise in the future.

Operations
Operationally, the greatest opportunity that exists for our board to reduce energy consumption is to reduce waste. This means not only shutting it off, but perhaps a different mindset of not turning it on. This involves changing behaviour patterns of all stakeholders including staff and students and the public. We have employed strategies of generating awareness that are focused on turning it off. We need to further focus on not turning it on.

As we construct new or renew older facilities, Business Services staff search for new technologies to implement. More detailed presentations on some topics listed have been provided over the last number of years to Committee of the Whole, and are listed as a reference. Some of these technologies and sample paybacks are provided for information:

- Energy/heat recovery ventilators – 2 to 3 years
- Variable speed drives for fans and pumps – 2 to 4 years
- Occupancy sensors for lighting – 2 to 4 years
- T-8 or HID/HPS to LED lighting retrofits – 2 to 4 years
- Demand control ventilation – 2 to 4 years
- Building automation systems – 3 to 5 years (presented to Committee of the Whole May 2011)
- Daylight harvesting – 3 to 5 years
- Re-commissioning of building systems – 3 to 5 years
- Condensing make-up air rooftops – 4 to 6 years
- Boiler plant conversions from steam to hot water – 5 to 8 years
- Energy efficient boilers – 6 to 8 years
- Window replacement and upgrades (single/double pane to sealed low-e/argon) – 8 to 12 years
- Roof replacement and upgrades (R10 to R25/R30) – 15 to 20 years
- Photovoltaic – 18 years at $0.8/kWh (presented to Committee of the Whole May 2012)

Implementations of these technologies help to reduce consumption. Business Services staff will continue to expand the use such technologies where possible. It should be noted that while technology is a great resource to reduce consumption, our greatest opportunity to leverage reductions is to change behaviours and reduce waste.

Further to the use of technology, implementation of preventative maintenance programs extends the working life of equipment and also helps to reduce energy consumption and therefore use less energy. As such, the implementation of the Computerized Maintenance Management System (CMMS) and development of preventative maintenance programs is a key aspect to reduced consumption within our schools.

It is intended that this report will be shared with the, Elementary Accommodation Committee (EAC), Secondary Accommodation Committee (SAC), and Accommodation Steering Committee (ASC) in an effort to enhance awareness and build a knowledge base and momentum for energy conservation in the schools.

Renewables
The WRDSB received approximately $1M for five renewable energy projects from the Ministry in 2010/2011. These projects were completed in late 2011 and have generated more than $108,000 in revenue over 29 months of operation. Appendix D presents a summary of photovoltaic production and revenues.

It is important to recognize that despite generating significant revenue, the payback on the $1M capital investment under the MicroFIT program at 80 cents per kWh provides an estimated 18 year payback. This time frame would be significantly longer if not subsidized at 80 cents per kWh rate.

Incentives and Reinvestment
In addition to the projects implemented and the saving generated through reduced consumption, the WRDSB has actively sought out incentives programs that generate savings that can be reinvested into schools and help reduce our carbon footprint further.

Since 2009, the Board has received more than $212,000 in incentives from partners that include:

- Union Gas
- Cambridge ND, Kitchener Wilmot and Waterloo North Hydro
- Reliance Commercial Solutions

These incentives continue to be reinvested each year to support capital upgrades directly related to energy conservation or to support schools for their use in promotion of their EcoSchool status. Appendix E presents the EcoSchool recognition awards and recent energy upgrades funded from these incentives.

COMMUNICATIONS:
The Green Energy Act requires that this information be presented to Board and be available publicly on an annual basis. The UCD when available will help to achieve the board's reporting requirements under the Green Energy Act.

FINANCIAL IMPLICATIONS:
While the utility budget may represent less than two percent of the overall Board budget, the active management of the utility portfolio is required to mitigate risk exposure as cost over runs or savings can have a significant impact on the operating budget.

The utility budget will continue to monitored and developed on an annual basis within the Business Services Department in consultation with external agencies as required (consortium, Ministry, OMC Energy Sub-Committee, School Energy Coalition), Executive Council, and brought forward through regular budget deliberations and via the Energy Conservation Working Group.

RECOMMENDATION:
No recommendation. For information only.

Director of Education

APPENDIX A

WATERLOO REGION DISTRICT SCHOOL BOARD
BUSINESS SERVICES DIVISION
FACILITY SERVICES DEPARTMENT

ENERGY UPDATE
ANNUAL ENERGY USE INTENSITY - ELEMENTARY SCHOOLS

Fiscal Year (Sep to Aug) or Calendar Year (Jan to Dec) as available

School	2008 *EkWh/m2*	2009/10 *EkWh/m2*	2010/11 *EkWh/m2*	2011/12 *EkWh/m2*	2012/13 *EkWh/m2*
A R Kaufman P.S.	212	267	244	234	239
Abraham Erb P.S.	189	166	173	167	171
Alpine P.S.	287	330	318	334	307
Avenue Road P.S.	242	400	331	197	170
Ayr P.S.	238	292	277	268	257
Baden P.S.	232	176	168	156	161
Blair O.E.C.	Unavailable	297	267	292	271
Blair Road P.S.	422	249	224	246	212
Breslau P.S.	336	393	268	267	248
Bridgeport P.S.	246	241	245	269	262
Brigadoon P.S.	199	296	213	181	185
Cedar Creek P.S.	211	206	182	174	175
Cedarbrae P.S.	289	245	308	264	255
Centennial (Camb) P.S.	269	286	254	363	266
Centennial (Wloo) P.S.	389	264	244	171	247
Central P.S.	269	294	268	284	277
Chalmers Street P.S.	265	274	288	316	267
Clemens Mill P.S.	223	219	206	209	213
Conestogo P.S.	261	271	252	273	244
Coronation P.S.	440	378	364	326	329
Country Hills P.S.	190	224	229	301	268
Courtland Senior P.S.	246	254	244	219	223
Crestview P.S.	242	322	299	279	246
Dickson P.S.	184	183	185	161	171
Doon P.S.	279	304	281	219	211
Driftwood Park P.S.	232	199	183	185	180
Edna Staebler P.S.	Not Open	171	159	150	159
Elgin Street P.S.	196	226	204	187	196
Elizabeth Ziegler P.S.	272	278	268	251	226
Empire P.S.	238	246	239	227	239
Floradale P.S.	209	191	214	236	232
Forest Glen P.S.	281	260	240	221	202
Forest Hill P.S.	316	269	246	248	208
Franklin P.S.	236	258	233	234	227
Glencairn P.S.	156	177	182	173	187
GrandView (Camb) P.S.	230	251	239	143	168
Grandview (NH) P.S.	197	326	228	233	217
Hespeler P.S.	206	205	184	166	168
Highland P.S.	326	281	275	126	189
Hillcrest P.S.	232	221	209	191	205
Howard Robertson P.S.	407	343	335	280	287
J F Carmichael P.S.	217	198	192	183	161
J.W. Gerth P.S.	Not Open	125	137	120	141
John Darling P.S.	179	215	170	171	177
John Mahood P.S.	323	258	228	221	213

WATERLOO REGION DISTRICT SCHOOL BOARD
BUSINESS SERVICES DIVISION
FACILITY SERVICES DEPARTMENT

ENERGY UPDATE
ANNUAL ENERGY USE INTENSITY - ELEMENTARY SCHOOLS

Fiscal Year (Sep to Aug) or Calendar Year (Jan to Dec) as available

School	2008 *EkWh/m2*	2009/10 *EkWh/m2*	2010/11 *EkWh/m2*	2011/12 *EkWh/m2*	2012/13 *EkWh/m2*
Keatsway P.S.	250	197	172	154	132
King Edward P.S.	594	268	261	252	256
Lackner Woods P.S.	192	213	203	210	209
Laurelwood P.S.	223	235	216	220	205
Laurentian P.S.	293	321	303	264	258
Lester B. Pearson P.S.	217	173	171	173	175
Lexington P.S.	307	287	291	261	256
Lincoln Avenue P.S.	289	358	332	330	313
Lincoln Heights P.S.	298	258	232	233	234
Linwood P.S.	356	268	252	273	247
MacGregor Sr P.S.	201	212	204	201	202
MacKenzie King P.S.	294	319	299	313	281
Manchester P.S.	281	316	304	286	258
Margaret Avenue P.S.	229	285	198	236	237
Mary Johnston P.S.	174	176	176	175	165
McQuarrie Centre	539	531	561	411	522
Meadowlane P.S.	225	271	270	255	247
Millen Woods P.S.	Not Open	Not Open	196	153	162
Moffat Creek P.S.	Not Open	Not Open	Not Open	Not Open	138
N A MacEachern P.S.	326	338	317	250	256
New Dawn	412	424	403	430	368
New Dundee P.S.	188	215	205	209	208
Northlake Woods P.S.	311	234	241	234	217
Park Manor P.S.	341	313	284	272	276
Parkway P.S.	289	260	256	280	337
Pioneer Park P.S.	236	274	248	255	260
Preston P.S.	180	188	194	191	191
Prueter P.S.	169	286	277	219	259
Queen Elizabeth P.S.	220	252	251	277	268
Queensmount Sr P.S.	400	309	342	324	258
Riverside P.S.	171	217	175	175	186
Rockway P.S.	265	311	281	311	257
Rosemount P.S.	245	299	287	269	271
Ryerson P.S.	260	264	246	199	207
Saginaw P.S.	250	281	248	232	251
Sandhills P.S.	238	251	226	224	246
Sandowne P.S.	285	206	221	293	274
Sheppard P.S.	224	277	268	249	241
Silverheights P.S.	229	209	203	186	183
Sir Adam Beck P.S.	Not Open	Not Open	124	164	130
Smithson P.S.	216	259	249	255	250
Southridge P.S.	284	318	294	288	287
St Andrew's P.S.	247	191	196	173	174
St Jacobs P.S.	236	253	250	235	239
Stanley Park P.S.	299	331	314	299	280
Stewart Avenue P.S.	270	306	191	170	179
Suddaby P.S.	149	197	192	192	146

WATERLOO REGION DISTRICT SCHOOL BOARD
BUSINESS SERVICES DIVISION
FACILITY SERVICES DEPARTMENT

ENERGY UPDATE
ANNUAL ENERGY USE INTENSITY - ELEMENTARY SCHOOLS

Fiscal Year (Sep to Aug) or Calendar Year (Jan to Dec) as available

School	**2008** ***EkWh/m2***	**2009/10** ***EkWh/m2***	**2010/11** ***EkWh/m2***	**2011/12** ***EkWh/m2***	**2012/13** ***EkWh/m2***
Sunnyside P.S.	226	243	218	198	205
Tait Street P.S.	227	243	241	229	230
Three Bridges P.S.	193	200	187	193	169
Trillium P.S.	262	342	255	251	253
W.T. Townshend P.S.	158	161	156	139	147
Wellesley P.S.	243	261	252	242	243
Westheights P.S.	309	339	255	232	235
Westmount P.S.	244	256	248	223	241
Westvale P.S.	151	145	141	128	140
William G. Davis P.S.	308	410	331	328	303
Williamsburg P.S.	159	149	145	149	150
Wilson Avenue P.S.	225	185	234	223	226
Winston Churchill P.S.	217	234	216	163	179
Woodland Park P.S.	177	191	179	167	162
Wrigley's Corners O.E.C.	Unavailable	251	225	282	236
Energy Intensity Average (EkWh/m2)	**258**	**260**	**242**	**231**	**226**

APPENDIX B

WATERLOO REGION DISTRICT SCHOOL BOARD
BUSINESS SERVICES DIVISION
FACILITY SERVICES DEPARTMENT

ENERGY UPDATE
ANNUAL ENERGY USE INTENSITY - SECONDARY SCHOOLS

Fiscal Year (Sep to Aug) or Calendar Year (Jan to Dec) as available

School	**2008** ***EkWh/m2***	**2009/10** ***EkWh/m2***	**2010/11** ***EkWh/m2***	**2011/12** ***EkWh/m2***	**2012/13** ***EkWh/m2***
Bluevale C.I.	274	291	237	249	255
Cameron Heights C.I.	385	379	368	357	337
Eastwood C.I.	211	237	221	213	224
Elmira District S.S.	278	303	277	258	238
Forest Heights C.I.	325	328	321	341	287
Galt C.I.	254	248	258	296	287
Glenview Park S.S.	275	298	313	284	275
Grand River C.I.	244	283	264	246	260
Huron Heights S.S.	252	280	282	264	272
Jacob Hespeler S.S.	219	281	290	250	265
Kitchener-Waterloo C. & V.S.	291	269	266	251	253
Preston H.S.	260	306	267	259	257
Sir John A. Macdonald S.S.	246	257	242	240	218
Southwood S.S.	275	225	193	177	164
Waterloo C.I.	265	278	272	249	256
Waterloo-Oxford District S.S.	243	322	321	307	281
Energy Intensity Average (EkWh/m2)	**269**	**287**	**275**	**265**	**258**
Education Centre (EkWh/m2)	**258**	**280**	**279**	**267**	**258**

APPENDIX C

WATERLOO REGION DISTRICT SCHOOL BOARD
BUSINESS SERVICES DIVISION
FACILITY SERVICES DEPARTMENT

ENERGY UPDATE
ENERGY BUDGET AND EXPENDITURES

Commodity	**2008/09**	
	Budget	**Actual**
Electricity	$ 4,616,900	$ 5,755,988
Gas	$ 5,832,400	$ 4,966,345
Total	**$ 10,449,300**	**$ 10,722,333**

Commodity	**2009/10**	
	Budget	**Actual**
Electricity	$ 5,733,000	$ 6,797,223
Gas	$ 5,505,900	$ 4,480,301
Total	**$ 11,238,900**	**$ 11,277,524**

Commodity	**2010/11**	
	Budget	**Actual**
Electricity	$ 6,759,525	$ 6,549,661
Gas	$ 4,915,515	$ 4,352,896
Total	**$ 11,675,040**	**$ 10,902,557**

Commodity	**2011/12**	
	Budget	**Actual**
Electricity	$ 6,809,909	$ 6,572,072
Gas	$ 4,958,342	$ 3,357,832
Total	**$ 11,768,251**	**$ 9,929,904**

Commodity	**2012/13**	
	Budget	**Actual**
Electricity	$ 7,204,740	$ 7,062,058
Gas	$ 3,163,721	$ 2,377,512
Total	**$ 10,368,461**	**$ 9,439,570**

APPENDIX D

WATERLOO REGION DISTRICT SCHOOL BOARD
BUSINESS SERVICES DIVISION
FACILITY SERVICES DEPARTMENT

ENERGY UPDATE
PHOTOVOLTAIC GENERATION AND REVENUES (LIFETIME)*

	kWh Production	**Revenue**
Blair Road P.S.	26034	$ 20,879
Forest Glen P.S	27472	$ 22,033
Forest Heights C.I.	23645	$ 18,963
Lincoln Heights P.S.	28758	$ 23,064
Waterloo C.I.	29515	$ 23,671
Total	**135424**	**$ 108,610**

Notes:
* Based on energy produced between November and December 2011 through April 2014.
Estimates 18 year payback under microFIT program, significantly longer if not subsidized by the Ministry.

Links to websites are as follows:

Blair Road P.S. http://www.cachelan.com/green/solarVuLive.php?ac=blairrdps&dr=dakon
Forest Glen P.S. http://www.cachelan.com/green/solarVu.php?ac=forestglenps
Forest Heights C.I. http://www.foresthtsc.solarvu.net/green/solarVu.php?ac=foresthtsc
Lincoln Heights P.S. http://lincolnhgtsps.solarvu.net/green/solarVuLive.php?ac=lincolnhgtsps&dr=dakon
Waterloo C.I. http://www.waterlooci.solarvu.net/green/solarVu.php?ac=waterlooci

APPENDIX E

WATERLOO REGION DISTRICT SCHOOL BOARD
BUSINESS SERVICES DIVISION
FACILITY SERVICES DEPARTMENT

ENERGY UPDATE
ENERGY REBATES REINVESTMENTS

ECOSchools Recognition Awards

2012/13 Top 5 ECOSchools	Selected Recognition Award
Bluevale C.I.	Schools Grounds Greening (Trees and Plantings)
Eastwood C.I.	Bottle Water Hydration Station
Jacob Hespeler S.S.	Bottle Water Hydration Station
MacGregor P.S.	Energy Star LCD Monitor
Suddaby P.S.	Energy Efficient Hand Dryers

2011/12 Top 5 ECOSchools	
Highland P.S.	Energy Star LCD Monitor
New Dundee P.S.	School Grounds Greening (Trees and Plantings)
Forest Hill P.S.	Bottle Water Hydration Station
Waterloo C.I.	Bottle Water Hydration Station
Centennial P.S. (C)	Lighting Occupancy Sensors

2010/11 Top 5 ECOSchools	Selected Recognition Award
Glencairn P.S.	Schools Grounds Greening (Trees and Plantings)
Keatsway P.S.	Bottle Water Hydration Station
Lester B. Pearson P.S.	Schools Grounds Greening (Trees and Plantings)
Southwood S.S.	Bicycle Stand
Westvale P.S.	Energy Star LCD Monitor

Capital Projects Reinvestments

School	Project
Alpine P.S.	XENTA 511 Webserver (Building Controls)
Blair Road P.S.	PV Monitor Alarm
Jacob Hespeler S.S.	Astronomical Clock for Exterior Lights (Building Controls)
Lincoln Heights P.S.	PV Monitor Alarm
Sir John A MacDonald S.S.	eyedro Electricity Monitors
Sir John A MacDonald S.S.	Strategic Demand Power Reduction (Building Controls)
Waterloo C.I.	PV Monitor Alarm