



Report to Committee of the Whole

June 15, 2020

Subject: Energy and Greenhouse Gas Emissions Update

Recommendation

This report is for the information of the Board.

Status

2018-19 Energy Use Intensity and Greenhouse Gas (GHG) Emissions

Energy Use Intensity (EUI) measured in Equivalent Kilowatt Hours per Square Metre (ekWh/m²) is used by the Board to compare energy consumption year to year, and is presented in Figures 1 and 2. The unit ekWh allows electricity, normally measured in kWh, and natural gas and propane, normally measured in cubic meters and liters, respectively, to be added together. Natural gas and propane use is highly weather dependant as it is mostly used for space heating, so heating degree days are used to weather normalize the figures, removing the impact of weather which allows for a fair comparison between years. Electricity is not weather normalized, as the majority of its use is not weather dependant. The total energy consumption is divided by the total floor area of the board’s asset portfolio so that the effect of additional building area from new schools and school additions is removed from the comparison. These figures include portables and port-a-packs. Leased facilities such as 151 Weber are excluded.

The Waterloo Region District School Board (Board) has experienced a 21.0 percent reduction in our overall Energy Use Intensity when comparing 2018/2019 to 2008. The reduction in electricity intensity during this period was 14.3 percent, with a greater reduction in natural gas intensity of 23.9 percent.

Figure 1: Total Energy Use Intensity Combined, 2008 to Fiscal Year 2018/2019

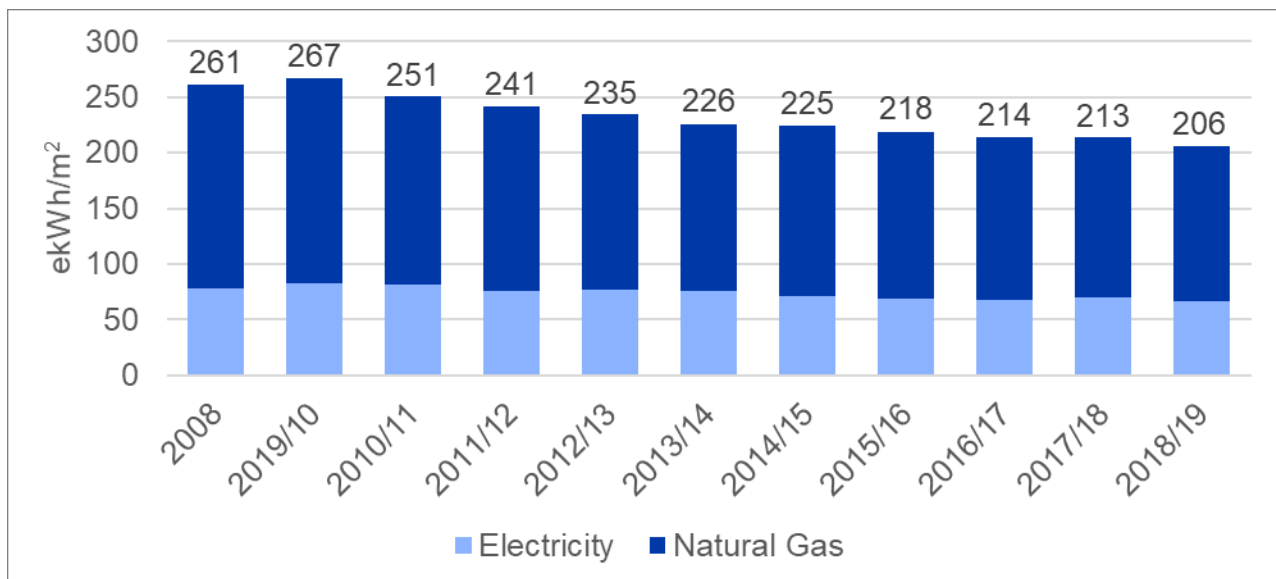
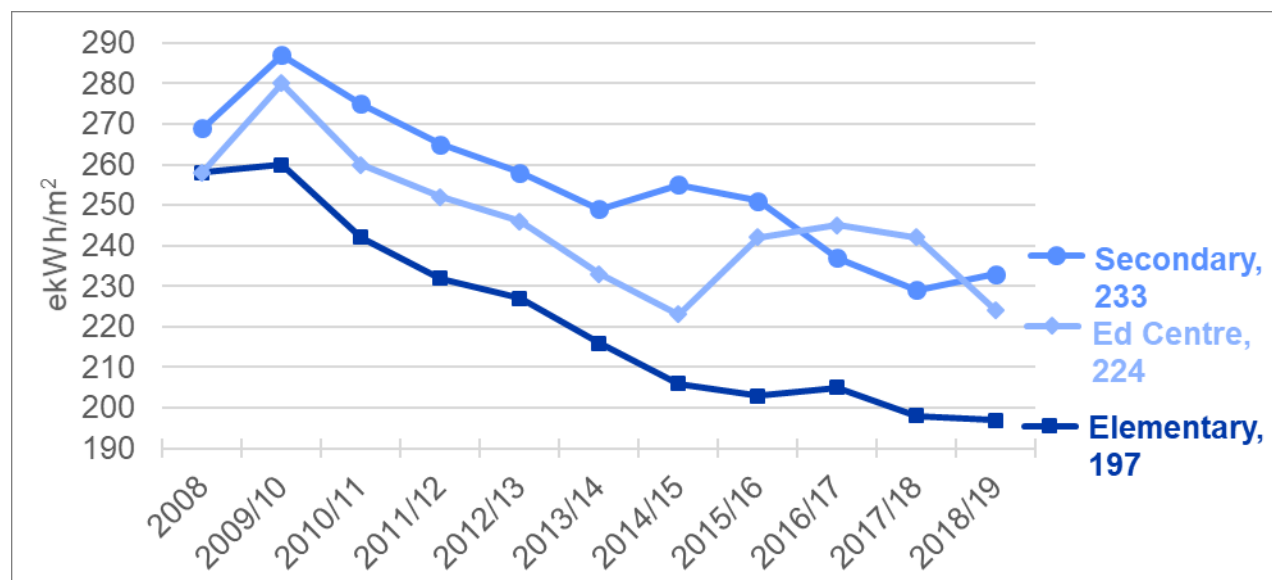


Figure 2: Average Energy Use Intensity by Panel, 2008 to Fiscal Year 2018/2019



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

Air conditioning within schools continues to be endorsed by school administrators, parent councils and student senate, as a major improvement to the classroom environment in support of student achievement and health. Mechanical cooling is often implemented when renovations take place and as part of new schools and additions, as a more energy efficient system can be installed cost effectively when combined with a construction project that includes updated building controls and building envelope. Cooling largely uses electricity and its GHG emissions impact is much less than that of natural gas heat.

GHG emissions are calculated using the emission factors reported in Environment Canada’s Nation Inventory Report to the UN Framework Convention on Climate Change, and include the impact of Carbon Dioxide (CO₂), Methane (CH₄) and Nitrous Oxide (N₂O), as the primary contributors to global warming. These different gas have different Global Warming Potentials (GWP). To report the impact of all three gases in one metric, the unit kilograms of carbon dioxide equivalent (kg CO₂e) is used that incorporates the impact of all three gases. Note that while the above energy intensity figures are weather normalized, the GHG emissions intensity figures are not.

Total GHG emissions per square meter of building for all sites is show in Figure 3. The Board is not able to control GHG emissions completely, because the GHG emission from the consumption of electricity depends on how the electricity is generated. The emissions required to produce a kWh of electricity have fallen by 88 percent in Ontario in the last decade, which has reduced the Board’s emissions. The Board has also made significant progress in reducing its GHG emissions by reducing natural gas intensity.

Total GHG Emission Intensity has reduced 38.8 percent since 2008.

Detailed GHG emissions for each school is presented in Appendix C for elementary and Appendix D for secondary schools and the Education Centre.

Figure 3: Total GHG Emission Intensity Combined, 2008 to Fiscal Year 2018/2019

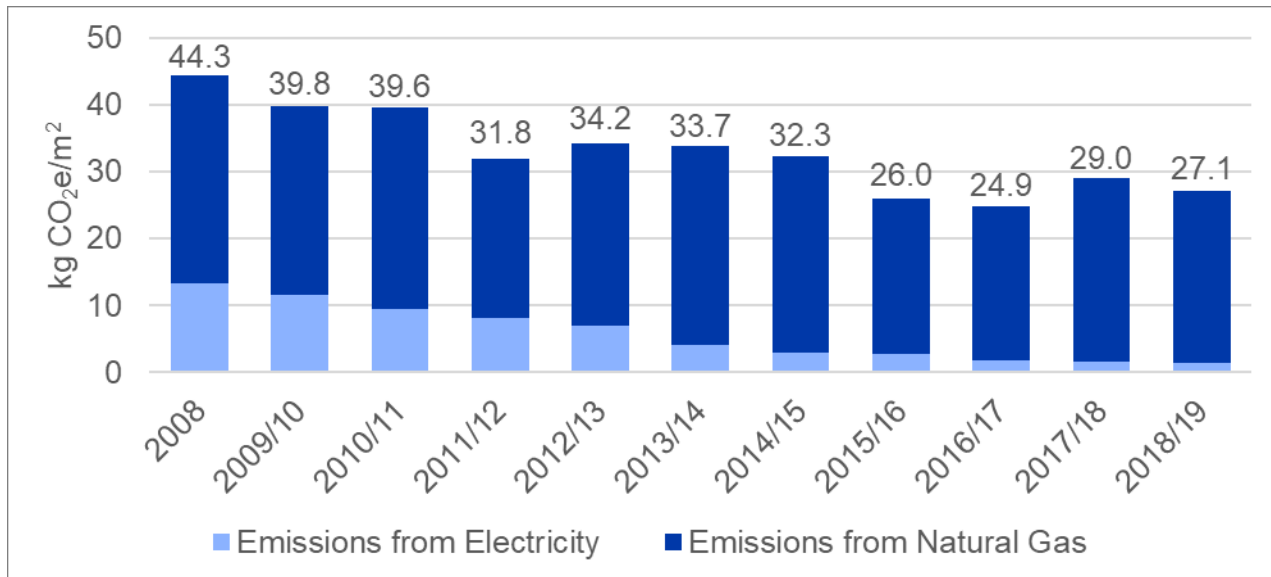
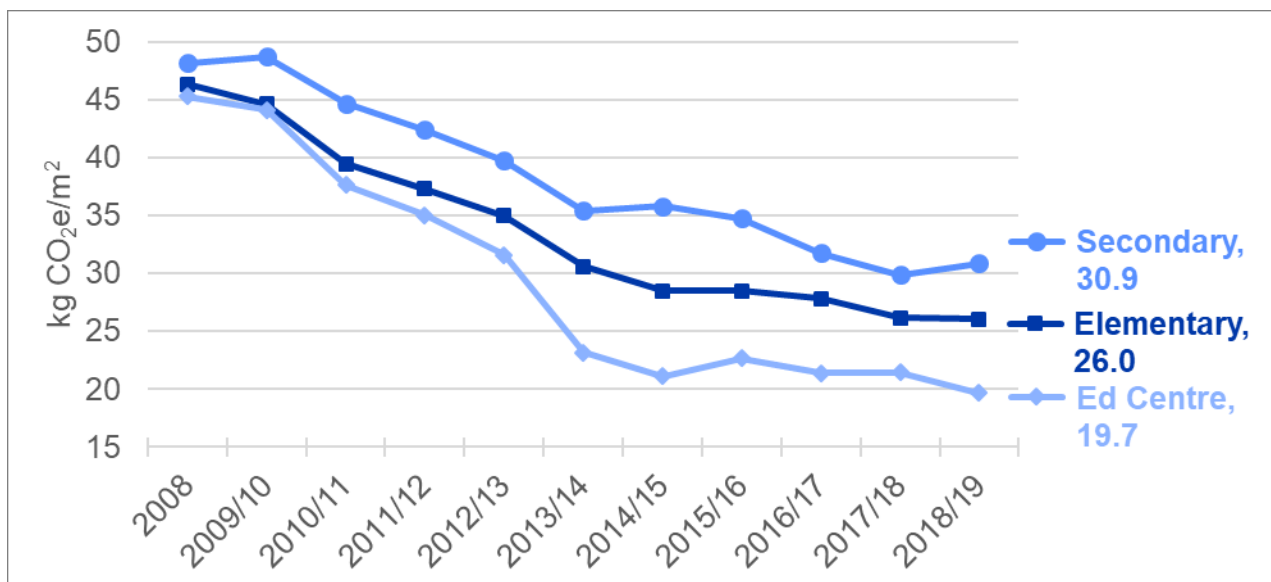


Figure 4: Average GHG Emission Intensity by Panel, 2008 to Fiscal Year 2018/2019



Energy intensity and resulting GHG emissions are 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 behavior (i.e. turning lights off when not in use)
- Waste minimization (i.e. proper temperature control and time of day use)
- Efficient technologies (i.e. high part load efficiency compressors, light emitting diode (LED) lighting)
- Occupancy sensors and building automation systems (i.e. motion controls for lighting, CO₂ based demand for ventilation air)
- Building envelope improvements (i.e. 40 percent max window to wall ratio, low E glass)

- Reduction of equipment power use and heat gain (i.e. LED lighting require less space cooling, Chromebooks and tablets charged at home)
- Designated periods of set-back and/or shut down for the heating, ventilation, and air conditioning (HVAC) system (i.e. synchronize cooling with instructional days and classroom hours)

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

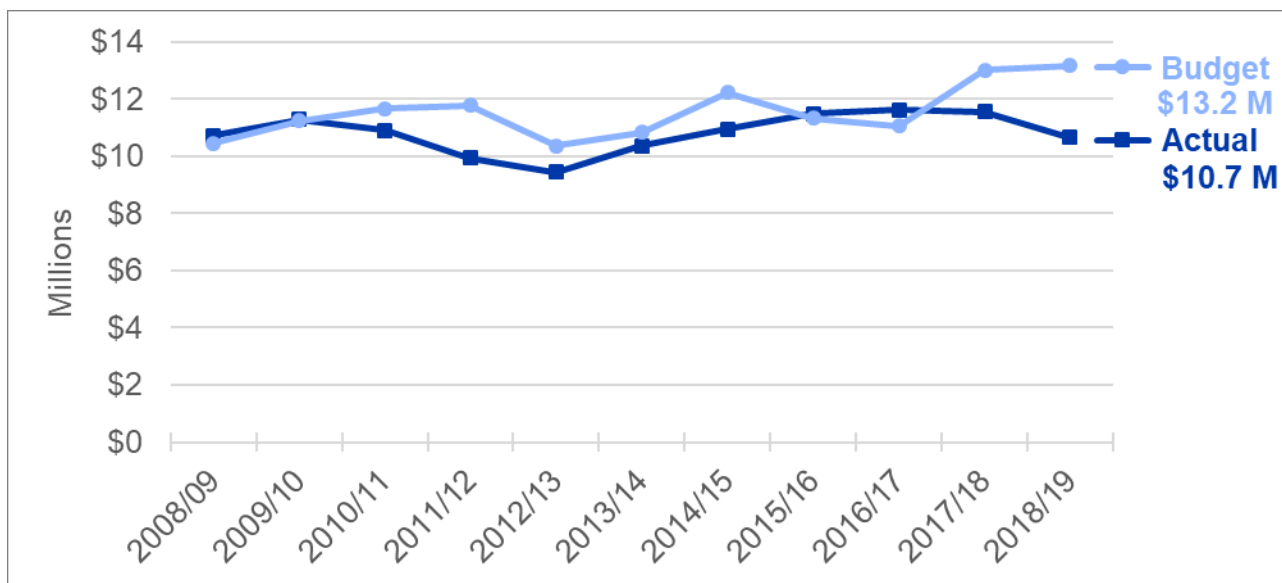
- Weather (i.e. warmer summer and shoulder season drives cooling demand)
- Hours of operation (i.e. extended use Ministry initiatives such as Community Use)
- School closures (i.e. disposal of surplus school sites, port-a-packs, and portables)
- Expansion of facilities and square footage (i.e. new schools or school additions)

Energy Budget and Expenditure

An eleven year history of the Board budgets and expenditures for electricity and natural gas are presented in Appendix E. The Board’s natural gas and electricity budget for 2018/2019 was \$13.2M and expenditures were \$10.7M. Figure 5 presents the Board’s budget versus expenditures since 2008.

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 user and weather dependent. Attempts are made to mitigate the impact of user behaviour. Weather fluctuates significantly year to year and cannot be controlled or accurately predicted. Costs are also outside the Board’s control and fluctuate year to year. The Board employs purchasing strategies to minimize the impacts of year-to-year cost fluctuations on the budget. The best prediction of all relevant variables is made when the budget is created, but this will not be particularly accurate, especially forecasting weather a year and more away.

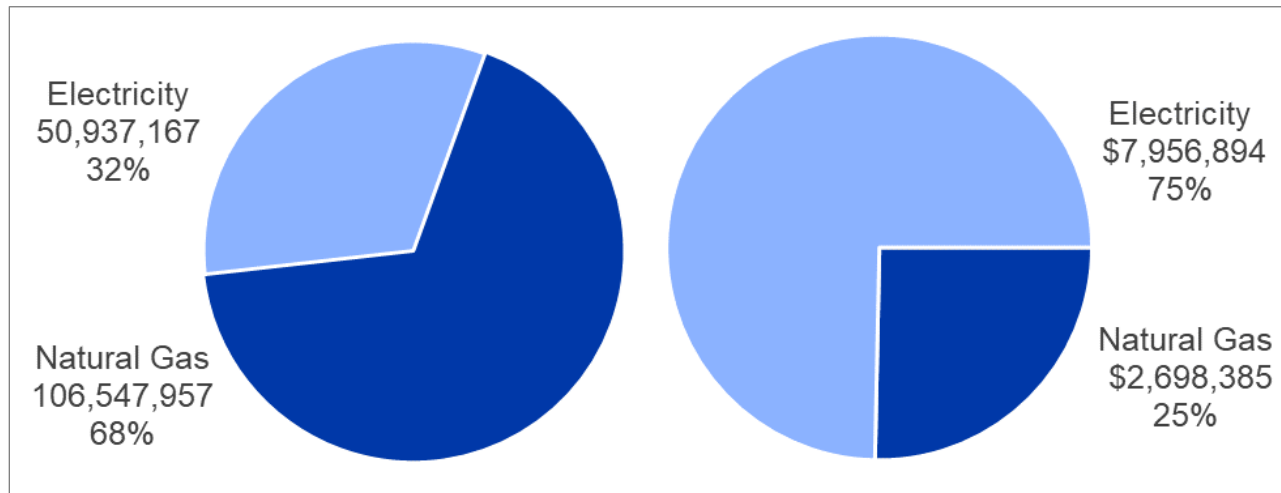
Figure 5: Budget and Actual Expenditures, Fiscal Years 2008/09 to 2018/2019



Consumption by commodity is an important factor that drives expenditures. Natural gas continues to be at a comparatively low cost to electricity, although the carbon tax is narrowing this gap. A greater reliance on natural gas as a resource for heating continues to be beneficial for our operational budget but generates greater GHG emissions than

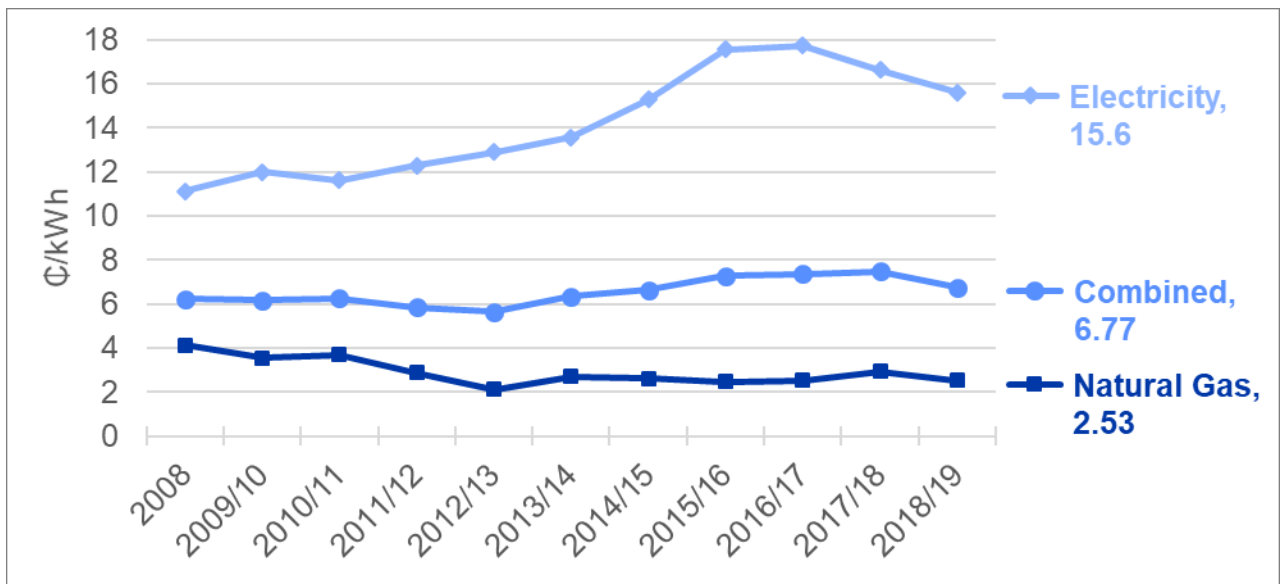
utilizing electricity as a source of heat. The composition of energy consumption and expenditures for 2018/2019 are presented in Figure 6.

Figure 6: Energy Consumption (ekWh) and Expenditures by Commodity, 2018/2019



On average for 2018/2019, natural gas cost approximately 2.53 cents per ekWh and electricity cost approximately 15.6 cents per kWh with a combined cost for both commodities at 6.77 cents per ekWh. The full history of energy costs per kWh is given in Figure 7. The five year period between 2013/2014 and 2017/2018 saw consistent year-over-year increases in combined energy costs driven by rapidly increasing electricity costs. 2018/2019 broke this trend with the combined commodity cost decreasing by 10.5 percent over the previous year.

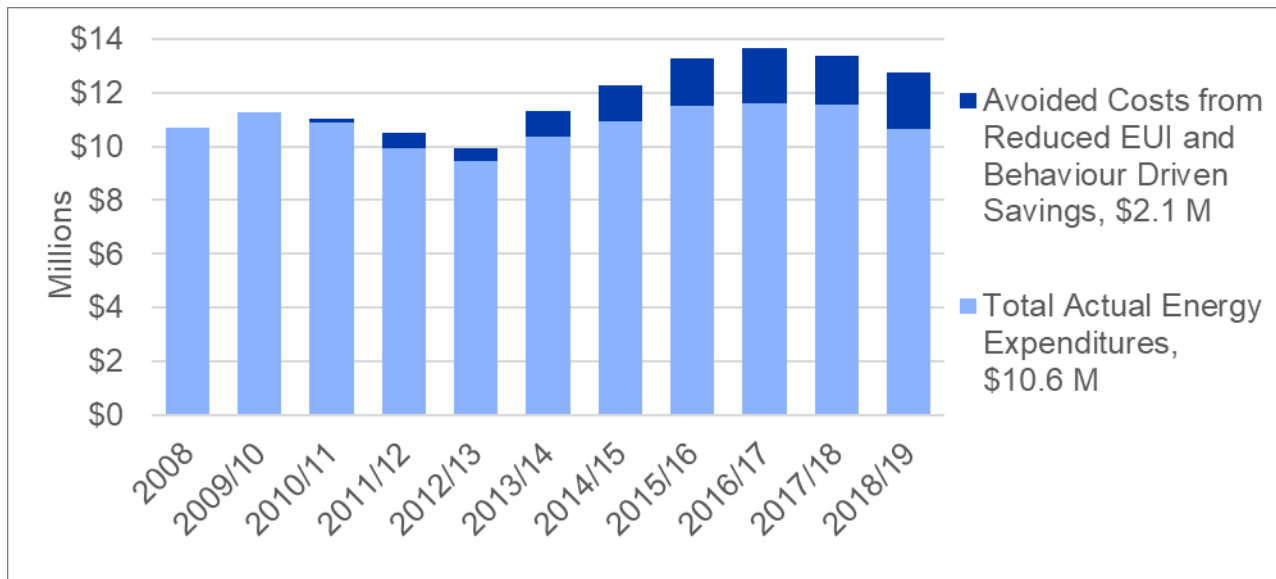
Figure 7: Natural Gas, Electricity and Combined costs per kWh, 2008 to 2018/2019



The reduction in energy use intensity between today and 2008 noted at the beginning of this report has resulted in significant financial savings. These savings have been realized through more energy efficient equipment, building techniques, controls, and behaviour change. These measures offset utility costs by \$2.1M in Fiscal Year 2018/2019, compared to the operational conditions in 2008. This estimate is formed by comparing the

actual 2018/2019 expenditures to the scenario where the Board operated the 2018/2019 building portfolio with the energy use intensities the Board operated at in 2008. This is an annual offset in utility costs that fluctuates based on actual consumption and market prices of energy. Cumulatively, over the last decade, the reduction in energy consumption has reduced expenditures by \$11M.

Figure 8: Actual Energy Costs and Savings Relative to 2008 Baseline, 2008 to 2018/2019



Regardless of our best efforts to reduce consumption by driving down EUI, energy costs are likely to continue to rise in the future. Offsetting these increases in costs by reducing our EUI is critical to minimizing the increases in future budgets and expenditures.

Operations

Changing human behaviour is our most promising as well as our most challenging area in resource conservation. Presentations by Facility Services staff to students and educators at schools, as well as custodial and maintenance personnel, administrators and others continue to raise awareness and training.

Efforts to create change in some everyday habits included memos and notices to schools encouraging turning lights off when not in need, eliminating the habit of propping vestibule doors open during winter months, and limiting the use of personal heaters in schools. These messages continue throughout the year raising awareness and the importance of saving energy.

The continuation of the Summer Experience Program (SEP) or Canada Summer Jobs (CSJ) program, assisting Facility Services with energy efficiency and resource conservation, was not funded for Waterloo Region District School Board in 2019 by the Province or the Government of Canada. The CSJ program has been funded for summer 2020, and Facility Services is in the process of hiring one student.

The Sustainability Working Group has met three times this past year and has gained participation with educators, Learning Services, Facility Services, Planning Department and Financial Services, and will continue to support competency development among central services and schools.

The continued implementation of Preventative Maintenance (PM) programs and the reallocation of staff to further support building maintenance and controls optimization both extend the working life of equipment and its efficient operation. However, this continues to be a challenge as the Board's trade staff compliment has remained stagnant since 2008, despite a 15 percent increases in square footage and equipment.

Technologies

As we maintain and renew older schools, and construct new schools, Facility Services continues to implement suitable energy efficiency technologies. Those of greatest impact include:

- Energy modeling of new schools, requiring architects and engineers to design buildings to be at least 25 percent more energy efficient than required by code
- Design Briefs for architects and designers to ensure roofs, windows, vestibules and other building envelope components are designed and constructed in a energy efficient manner
- LED lighting throughout all board facilities to replace fluorescent and high-intensity discharge (HID) lamps, implemented each time renovations occur or when repairs or replacement of lamps or fixtures is required
- Conversion from pneumatic to Direct Digital Control (DDC) building controls implemented each time renovations occur
- Commissioning of boiler and HVAC equipment fresh air dampers and pneumatic building controls, in particular for older / poor performing schools
- Provision of condensing boilers and water heaters whenever possible when replacing older heating plants

However, less significant technologies and pilots continue to assist in the efficient operation of schools.

In addition, Facility Services continues to operate a number of pilot programs designed to improve energy and resource conservation, including;

- Alternative ways of providing cooling in classroom spaces, including portable units and destratification fans
- Cooling through high efficiency Variable Refrigerant Flow (VRF) electric or Gas Heat Pump (GHP) systems
- Load shedding cooling controls for secondary schools offering a summer program
- Eyedro and AlertLabs point of use remote power or water monitoring meters
- Installation of water meters and monitoring at all cooling towers and play field irrigation systems
- Deciduous shade trees and glazing / overhang orientation in strategic areas to minimize solar heat gain
- Envelope thermography to assist in determining breaches in the building
- Replacement of free flowing urinal tanks with low flow flush valves or installation of timers
- Media Induced Crystallization (MIC) in place of water softeners to reduce salt / water use and maintenance needs
- Direct replacement LED lamps or light fixtures for non-renovated spaces as part of regular school maintenance

As implementations of these technologies help reduce consumption, Business Services staff intends to continue the expansion and use of such technologies in line with available funding, while targeting a reasonable three year to seven and a half year return on investment (ROI). However, while technology is a great resource to reduce consumption, our greatest opportunity is to change behaviours and reduce waste.

Renewables

The Board 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 \$370,392 in revenue over 81 months of operation. Appendix F 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 Micro Feed-In Tariff (MicroFIT) program at 80 cents per kWh provides a 20.8 year payback. This time frame would have been significantly longer if not subsidized at 80 cents per kWh.

Incentives and Reinvestment

In addition to the ongoing projects and reducing costs through reduced consumption, the Board has actively sought out incentive programs that additional fund which can be reinvested into schools and further help with resource conservation board wide.

Since 2009, the Board has received more than \$600k in incentives from partners that include Cambridge and North Dumfries, Kitchener Wilmot Hydro, Waterloo North Hydro, Reliance Commercial Solutions, Region of Waterloo, and Union Gas.

These incentives continue to be reinvested each year into upgrades directly related to energy conservation. Appendix F presents the recent energy and sustainability enhancements funded from these incentives.

Background

The Green Energy Act (O.Reg. 397/11) came into effect in 2009, and repealed the Energy Conservation Leadership Act and the Energy Efficiency Act. This Act included several initiatives that had a large impact on the electricity market in Ontario. Included in these initiatives were the Feed-In Tariff (FIT) and MicroFIT programs aimed at stimulating the installation of renewable energy (which the Board has benefited from, see Renewables above), and the phase out of coal-fired electricity generation. This was done to reduce GHG emissions from electricity generation and to realize significant health benefits through improved air quality. Throughout this shift in electricity policy, Ontario has retained a large dependence on nuclear power, despite the significant cost of these projects and the long-term impacts not being fully considered. These factors combined with the ongoing shifting regulatory environment has produced turbulent electricity prices.

Under this Act the Ministry Education implemented the Utility Consumption Database (UCD). The UCD reports on annual utility consumption and GHG emissions for more than 5,000 schools and administrative buildings across 72 boards. Also required by this Act is the implementation of a 5-year Energy Conservation and Demand Management Plan (ECDMP) every five years, beginning in 2013/2014 and due for reporting to the Ministry of Education in June 2019. It should be noted that the Green Energy Act was repealed in 2019, however these requirements were moved into the Electricity Act at that time.

In its 2013/2014 ECDMP, the WRDSB targeted a reduction in energy intensity of 6.1 percent between the base year of 2013/2014 and 2017/2018. This corresponded to a reduction in energy use intensity of 23 ekWh per m². This reduction was largely achieved, with a 22 ekWh/m² reduction, despite increasing building operating hours and air conditioning. The target was originally set by following the Ministry guidelines of reviewing all capital plans that would result in energy savings and estimating the size of these savings, without estimating potential causes of increasing consumption. The result has been reported to the Ministry through the Board's 2018/2019 ECDMP.

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 targeted capital investment into schools that were below the average in terms of energy performance and was discontinued by the Ministry at the end of 2011/2012.

From 2012/2013 to 2016/2017 capital funding through School Renewal (SR), School Condition Improvement (SCI) or new capital investment supported energy efficiency measures as Business Services continued to deliver capital projects across the region.

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 be monitored regularly and developed on an annual basis within Business Services in consultation with external agencies as required (consortium, Ministry, Operations, Maintenance and Construction (OMC) Energy Sub-Committee, School Energy Coalition), Coordinating Council, and brought forward through regular budget deliberations.

Target Setting

As discussed earlier, the Electricity Act requires the Board to prepare an Energy Conservation and Demand Management Plan every five years. The WRDSB submitted the required ECDMP for the five years following 2017/2018 in the past year. Plans for the use of capital and operational funding that would impact energy consumption were assessed, and it was determined that the Board can anticipate and target a further 11.8 percent reduction in energy intensity by 2022/2023. The same suite of measures discussed earlier in this report that allowed to Board to achieve the last target will be used to meet this target.

In addition, the Board has moved from being an observing member of Sustainable Waterloo Region to a pledging member in 2020 by making a commitment to reduce GHG emissions. The Board has set a goal of reducing our total GHG intensity per square meter by 20 percent by 2029. This goal, while on a longer time frame, requires roughly the same reductions in energy consumption year over year as the commitment made in the ECDMP. The setting of this goal will be publicized by Sustainable Waterloo Region.

Achieving these target represents a significant opportunity for the Board to keep operating cost in control in the face of increasing energy costs, and to demonstrate leadership in addressing climate change. The ability of the Board to meet these target is dependant on funding from the Ontario Government. The Board would benefit from increased capital

funding, especially if that included a greater emphasis on energy efficiency projects. Comfortable and safe learning and working environments remain the top priority, and investments in physical infrastructure often improves both comfort and energy efficiency.

Implications of COVID-19

This report is intended as an update on energy in 2018/19, but given the large impact COVID-19 has had on operations, the implications of COVID-19 will be discussed briefly. With schools being closed to students for 3.5 additional months in 2020, energy consumption will be lower in 2019/2020 than previous years, although exactly how much has yet to be determined. Building heating and cooling systems are being operated in unoccupied mode when possible, which reduces energy consumption to some extent. The provincial shutdown has also delayed some preventative maintenance and capital projects, although the impacts of these delays on energy consumption will be fairly small.

Going forward, there are some additional considerations. The Ontario Government has taken action to reduce electricity costs in the current year by deferring portions of the Global Adjustment into 2021. This will likely increase electricity costs slightly. The Facility Services team is also monitoring recommendations from Public Health and others on how to operate mechanical equipment once schools reopen to minimize the spread of COVID-19. These recommendations are evolving but will likely include increased ventilation and outside air requirements which will increase energy consumption. There are few certainties to report at this time, but the priority remains the integrity of a safe and comfortable learning environment, followed by responsible use of Board resources.

Communications

The Electricity Act requires that this Energy Update be presented to the Board and available publicly on an annual basis. In addition, the Energy Conservation and Demand Management Plan and Energy Consumption and Greenhouse Gas Emission annual reports, as available through the UCD, are available in hard copy at the Education Centre or online for public access as required under the Electricity Act:

- [Energy Conservation and Demand Management Plan](#)
- [Energy Conservation at the Waterloo Region District School Board](#)

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

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Lou Lima, Manager of Mechanical, Electrical and Environmental Services
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in consultation with Coordinating Council.

**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	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>
A R Kaufman P.S.	212	267	244	234	239	229	186	204	176	185	199
Abraham Erb P.S.	189	166	173	167	171	162	157	148	148	146	150
Alpine P.S.	287	330	318	334	307	284	285	293	296	286	252
Avenue Road P.S.	242	400	331	197	170	180	173	172	180	173	180
Ayr P.S.	238	292	277	268	257	246	220	213	209	212	217
Baden P.S.	232	176	168	156	161	163	166	153	155	160	160
Blair O.E.C.	Unavail	297	267	292	271	266	250	280	205	220	229
Blair Road P.S.	422	249	224	246	212	214	208	214	191	190	196
Breslau P.S.	336	393	268	267	248	330	236	226	231	219	213
Bridgeport P.S.	246	241	245	269	262	186	160	161	108	172	176
Brigadoon P.S.	199	296	213	181	185	188	162	154	169	168	168
Cedar Creek P.S.	211	206	182	174	175	184	168	174	187	185	187
Cedarbrae P.S.	289	245	308	264	255	245	250	241	238	225	258
Centennial (Camb) P.S.	269	286	254	251	266	244	224	228	237	226	230
Centennial (Wloo) P.S.	389	264	244	246	247	253	233	226	232	238	232
Central P.S.	269	294	268	284	277	272	261	274	265	214	223
Chalmers Street P.S.	265	274	288	316	267	253	232	229	204	206	211
Chicopee Hills P.S.	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	151	125
Clemens Mill P.S.	223	219	206	209	213	203	221	248	225	219	212
Conestogo P.S.	261	271	252	273	244	235	221	249	236	212	220
Coronation P.S.	440	378	364	326	329	318	327	342	354	343	349
Country Hills P.S.	190	224	229	301	268	226	215	179	168	170	175
Courtland Senior P.S.	246	254	244	219	223	269	222	194	182	203	210
Crestview P.S.	242	322	299	279	311	291	313	288	292	288	266
Dickson P.S.	184	183	185	161	171	169	96	Disposed	Disposed	Disposed	Disposed
Doon P.S.	279	304	281	219	211	200	164	151	167	196	189
Driftwood Park P.S.	232	199	183	185	180	179	190	151	121	159	163
Edna Staebler P.S.	Not Open	171	159	149	158	155	155	140	143	142	145
Elgin Street P.S.	196	226	204	187	196	187	179	194	202	220	225
Elizabeth Ziegler P.S.	272	278	268	251	226	234	236	234	215	180	187
Empire P.S.	238	246	239	227	239	158	203	209	208	207	210
Floradale P.S.	209	191	218	233	232	202	176	217	200	177	189
Forest Glen P.S.	281	260	240	221	202	228	210	195	201	205	210
Forest Hill P.S.	316	269	246	248	208	196	192	224	213	227	217
Franklin P.S.	236	258	233	234	227	215	206	215	260	241	216
Glencairn P.S.	156	177	182	173	187	210	181	168	181	185	162
GrandView (Camb) P.S.	230	251	239	143	168	171	159	150	169	156	163
Grandview (NH) P.S.	197	326	228	233	217	215	187	199	187	189	204
Groh P.S.	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	125	136
Hespeler P.S.	206	205	184	166	168	177	173	158	163	165	166
Highland P.S.	326	281	275	204	189	202	201	211	213	203	210
Hillcrest P.S.	232	221	209	191	205	181	179	157	152	158	169
Howard Robertson P.S.	407	343	335	280	287	257	264	281	185	285	282
J F Carmichael P.S.	217	198	192	183	161	169	164	174	169	163	176
J.W. Gerth P.S.	Not Open	125	137	120	141	146	147	133	159	144	139
Janet Metcalf P.S.	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	151
Jean Steckle P.S.	Not Open	Not Open	Not Open	Not Open	Not Open	146	119	122	121	127	125
John Darling P.S.	179	215	170	171	177	180	192	181	180	178	180
John Mahood P.S.	323	258	228	221	213	189	181	178	173	178	192
Keatsway P.S.	250	197	172	154	132	149	144	143	147	147	147
King Edward P.S.	594	268	261	252	256	243	272	332	266	236	211
Lackner Woods P.S.	192	213	203	210	209	215	214	199	196	223	212
Laurelwood P.S.	223	235	216	220	205	204	199	186	178	177	181
Laurentian P.S.	293	321	303	264	258	299	356	255	285	242	224
Lester B. Pearson P.S.	217	173	171	173	175	161	163	150	155	142	146
Lexington P.S.	307	287	291	261	256	289	223	237	236	230	231
Lincoln Avenue P.S.	289	358	332	330	313	149	143	Disposed	Disposed	Disposed	Disposed
Lincoln Heights P.S.	298	258	232	233	234	209	197	286	289	213	211
Linwood P.S.	356	268	252	273	247	248	234	244	229	210	206
MacGregor Sr P.S.	201	212	204	201	202	194	188	202	198	204	222
MacKenzie King P.S.	294	319	299	313	281	295	211	214	220	214	208

**WATERLOO REGION DISTRICT SCHOOL BOARD
BUSINESS SERVICES DIVISION
FACILITY SERVICES DEPARTMENT**

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Manchester P.S.	281	316	304	286	258	246	189	176	157	138	163
Margaret Avenue P.S.	229	285	198	236	237	191	243	259	369	238	235
Mary Johnston P.S.	174	176	176	175	165	180	166	163	160	155	158
McQuarrie Centre	539	531	561	411	522	421	294	262	272	261	250
Meadowlane P.S.	225	271	270	255	247	246	228	211	257	251	226
Millen Woods P.S.	Not Open	Not Open	196	153	162	165	149	152	155	156	156
Moffat Creek P.S.	Not Open	Not Open	Not Open	Not Open	138	123	114	134	132	128	99
N A MacEachern P.S.	326	338	317	250	256	248	276	214	203	197	151
New Dawn	412	424	403	430	368	260	204	166	170	146	347
New Dundee P.S.	188	215	205	209	208	189	192	193	195	198	195
Northlake Woods P.S.	311	234	241	234	217	195	189	201	211	194	209
Park Manor P.S.	341	313	284	272	276	273	271	206	335	353	355
Parkway P.S.	289	260	256	280	337	260	234	224	215	233	223
Pioneer Park P.S.	236	274	248	255	260	219	215	208	235	225	198
Preston P.S.	180	188	194	191	191	175	157	158	166	168	168
Prueter P.S.	169	286	277	219	259	239	190	201	212	212	204
Queen Elizabeth P.S.	220	252	251	277	268	232	200	229	271	241	232
Queensmount Sr P.S.	400	309	342	324	258	282	321	252	257	304	255
Riverside P.S.	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	141	136	136
Riverside (old location)	171	217	175	175	186	151	128	126	87	91	94
Rockway P.S.	265	311	281	311	257	311	265	311	299	285	299
Rosemount P.S.	245	299	287	269	271	267	294	303	306	292	Disposed
Ryerson P.S.	260	264	246	199	207	200	192	176	189	200	173
Saginaw P.S.	250	281	248	232	251	237	229	232	223	218	207
Sandhills P.S.	238	251	226	224	246	231	202	193	205	194	189
Sandowne P.S.	285	206	221	293	274	246	255	238	226	181	175
Sheppard P.S.	224	277	268	249	241	245	237	217	212	252	230
Silverheights P.S.	229	209	203	186	183	157	143	143	155	143	148
Sir Adam Beck P.S.	Not Open	Not Open	124	164	130	132	130	131	131	132	132
Smithson P.S.	216	259	249	255	250	191	235	228	222	234	222
Southridge P.S.	284	318	294	183	287	269	300	255	290	292	288
St Andrew's P.S.	247	191	196	173	174	169	170	175	156	164	158
St Jacobs P.S.	236	253	250	235	239	233	218	220	223	223	223
Stanley Park P.S.	299	331	314	299	280	309	256	246	270	251	282
Stewart Avenue P.S.	270	306	191	170	179	163	166	171	190	169	170
Suddaby P.S.	149	197	192	192	146	154	153	151	148	150	151
Sunnyside P.S.	226	243	218	198	205	204	204	188	185	186	202
Tait Street P.S.	227	243	241	229	230	236	173	173	180	177	180
Three Bridges P.S.	193	200	187	193	169	175	92	Disposed	Disposed	Disposed	Disposed
Trillium P.S.	262	342	255	251	253	245	221	239	243	227	250
Vista Hills P.S.	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	144	131	129
W.T. Townshend P.S.	158	161	156	139	147	151	141	138	129	133	134
Wellesley P.S.	243	261	252	242	243	235	219	202	215	205	196
Westheights P.S.	309	339	255	232	235	228	232	229	210	233	210
Westmount P.S.	244	256	248	223	241	235	371	166	133	137	128
Westvale P.S.	151	145	141	128	140	132	131	125	129	132	151
William G. Davis P.S.	308	410	331	328	303	288	270	277	282	261	217
Williamsburg P.S.	159	149	145	149	150	154	153	139	157	145	149
Wilson Avenue P.S.	225	185	234	223	226	226	214	181	192	181	195
Winston Churchill P.S.	217	234	216	163	179	178	194	201	207	194	196
Woodland Park P.S.	177	191	179	167	162	152	152	142	139	127	139
Wrigley's Corners O.E.C.	Unavail	251	225	282	236	230	244	249	223	228	255
Average Energy Use Intensity (ekWh/m²)	258	260	242	231	227	216	206	203	205	198	197

**WATERLOO REGION DISTRICT SCHOOL BOARD
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School	2008	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>	<i>ekWh/m²</i>
Bluevale C.I.	274	291	237	249	255	241	240	231	214	230	228
Cameron Heights C.I.	385	379	368	357	337	338	597	398	358	313	305
Eastwood C.I.	211	237	221	213	224	249	228	229	198	205	239
Elmira District S.S.	278	303	277	258	238	227	238	237	247	220	239
Forest Heights C.I.	325	328	321	341	287	273	263	247	257	296	295
Galt C.I.	254	248	258	296	287	273	262	265	262	241	254
Glenview Park S.S.	275	298	313	284	275	242	218	218	201	201	202
Grand River C.I.	244	283	264	246	260	250	254	260	228	220	227
Huron Heights S.S.	252	280	282	264	272	238	224	247	236	226	222
Jacob Hespeler S.S.	219	281	290	250	265	249	211	249	209	184	196
Kitchener-Waterloo C. & V.S.	291	269	266	251	253	261	232	229	226	223	229
Preston H.S.	260	306	267	259	257	260	245	259	257	254	239
Sir John A. Macdonald S.S.	246	257	242	240	218	205	199	210	210	206	192
Southwood S.S.	275	225	193	177	164	162	156	158	161	157	160
Waterloo C.I.	265	278	272	249	256	246	233	240	242	240	239
Waterloo-Oxford District S.S.	243	322	321	307	281	271	274	283	265	248	260
Average Energy Use Intensity (ekWh/m²)	269	287	275	265	258	249	255	251	237	229	233
Education Centre (ekWh/m²)	258	280	260	252	246	233	223	242	245	242	224

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	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²
A R Kaufman P.S.	38	45	39	36	35	30	22	27	21	22	24
Abraham Erb P.S.	34	28	27	25	25	21	20	19	19	18	18
Alpine P.S.	51	56	52	54	47	41	41	43	43	40	34
Avenue Road P.S.	44	70	57	33	26	25	24	24	25	23	24
Ayr P.S.	43	52	48	46	42	39	32	31	30	29	29
Baden P.S.	41	28	25	23	22	19	19	17	17	17	18
Blair O.E.C.	Unavail	53	47	50	45	42	39	45	30	31	33
Blair Road P.S.	75	41	35	38	30	28	26	26	22	20	20
Breslau P.S.	61	69	44	44	38	47	33	32	32	29	28
Bridgeport P.S.	44	42	41	45	42	26	21	22	11	22	23
Brigadoon P.S.	35	49	32	25	24	19	17	15	16	15	15
Cedar Creek P.S.	38	34	28	26	25	22	20	19	22	19	24
Cedarbrae P.S.	52	42	52	43	41	37	37	36	34	32	38
Centennial (Camb) P.S.	48	49	41	40	42	35	31	33	34	32	32
Centennial (Wloo) P.S.	70	46	41	41	40	39	36	35	35	31	31
Central P.S.	49	51	45	47	46	42	40	43	42	32	33
Chalmers Street P.S.	48	47	46	49	41	36	31	31	26	25	25
Chicopee Hills P.S.	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	20	15
Clemens Mill P.S.	40	36	31	30	30	26	26	31	26	24	23
Conestogo P.S.	47	46	42	45	38	33	31	36	33	28	31
Coronation P.S.	80	66	61	54	53	48	50	53	56	53	53
Country Hills P.S.	33	35	32	47	38	30	28	23	20	18	20
Courtland Senior P.S.	44	44	42	37	36	43	34	29	27	30	32
Crestview P.S.	44	57	51	47	52	46	49	45	45	45	41
Dickson P.S.	33	32	31	27	28	27	16	Disposed	Disposed	Disposed	Disposed
Doon P.S.	50	53	47	35	33	28	24	22	24	27	26
Driftwood Park P.S.	41	32	27	27	24	19	21	15	9	15	16
Edna Staebler P.S.	Not Open	28	24	22	22	18	18	17	17	16	18
Elgin Street P.S.	35	37	31	28	28	23	22	23	23	28	28
Elizabeth Ziegler P.S.	49	49	47	43	37	36	36	36	31	26	27
Empire P.S.	43	42	39	36	37	21	28	29	28	26	27
Floradale P.S.	37	32	35	36	35	26	22	29	24	20	22
Forest Glen P.S.	50	45	40	36	32	33	30	28	26	25	26
Forest Hill P.S.	57	47	41	42	34	29	27	33	31	33	32
Franklin P.S.	42	44	38	38	36	31	29	31	38	34	29
Glencairn P.S.	28	29	28	26	28	30	25	23	24	25	21
GrandView (Camb) P.S.	41	44	41	24	23	19	18	17	20	16	18
Grandview (NH) P.S.	36	57	38	38	34	29	26	29	26	26	28
Groh P.S.	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	16	16
Hespeler P.S.	36	34	28	25	23	22	21	18	18	17	17
Highland P.S.	59	49	46	33	28	29	29	31	32	29	29
Hillcrest P.S.	41	37	33	29	30	25	25	22	21	21	23
Howard Robertson P.S.	74	60	58	47	47	40	40	44	43	43	42
J F Carmichael P.S.	39	34	32	30	25	25	24	25	24	22	25
J.W. Gerth P.S.	Not Open	20	21	18	19	16	18	16	19	17	16
Janet Metcalf P.S.	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	19
Jean Steckle P.S.	Not Open	Not Open	Not Open	Not Open	Not Open	18	11	12	10	10	11
John Darling P.S.	32	37	27	27	27	25	27	26	25	25	25
John Mahood P.S.	58	43	35	34	31	24	23	23	21	20	22
Keatsway P.S.	45	33	26	23	17	16	17	17	16	16	16
King Edward P.S.	108	47	45	43	43	39	44	55	43	37	32
Lackner Woods P.S.	34	34	30	31	29	25	24	23	21	26	23
Laurelwood P.S.	39	38	32	31	27	23	21	20	19	19	20
Laurentian P.S.	53	56	51	44	42	47	56	39	44	37	34
Lester B. Pearson P.S.	38	27	25	25	24	19	19	17	16	15	16
Lexington P.S.	55	49	48	43	42	46	34	37	35	33	33
Lincoln Avenue P.S.	52	62	55	54	50	23	21	Disposed	Disposed	Disposed	Disposed
Lincoln Heights P.S.	54	45	39	38	38	32	29	44	44	31	30
Linwood P.S.	64	46	42	45	39	37	33	36	32	29	29
MacGregor Sr P.S.	36	36	34	32	31	28	27	29	28	28	31

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	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²
MacKenzie King P.S.	53	55	50	52	45	44	30	31	31	30	29
Manchester P.S.	51	56	52	49	43	38	25	25	21	17	21
Margaret Avenue P.S.	41	50	32	39	39	28	36	39	57	35	34
Mary Johnston P.S.	31	29	28	28	25	25	21	21	22	20	20
McQuarrie Centre	98	95	99	73	92	73	50	45	46	44	42
Meadowlane P.S.	40	45	43	40	37	32	27	25	32	28	24
Millen Woods P.S.	Not Open	Not Open	31	22	23	20	17	18	17	17	17
Moffat Creek P.S.	Not Open	Not Open	Not Open	Not Open	20	17	13	16	15	14	9
N A MacEachern P.S.	58	56	49	38	37	30	35	27	25	23	9
New Dawn	75	76	69	73	61	43	32	29	30	22	57
New Dundee P.S.	34	37	34	34	33	29	29	30	29	29	30
Northlake Woods P.S.	56	40	39	37	34	27	25	26	24	23	27
Park Manor P.S.	61	54	47	44	43	38	37	27	51	53	53
Parkway P.S.	52	44	41	45	50	35	30	30	27	29	25
Pioneer Park P.S.	42	47	41	41	40	31	30	29	33	30	26
Preston P.S.	32	31	30	29	28	24	21	21	21	21	21
Prueter P.S.	30	49	45	37	44	39	30	31	32	31	30
Queen Elizabeth P.S.	40	44	42	47	44	35	30	36	42	37	36
Queensmount Sr P.S.	72	54	58	55	42	43	50	38	39	44	37
Riverside P.S.	30	35	27	26	27	20	17	17	19	17	14
Riverside (old location)	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	12	14	17
Rockway P.S.	48	55	48	53	43	51	42	51	49	45	48
Rosemount P.S.	44	53	50	47	46	44	49	51	51	48	Disposed
Ryerson P.S.	47	44	39	30	29	24	22	20	21	22	21
Saginaw P.S.	44	47	38	35	36	31	28	29	28	26	25
Sandhills P.S.	42	41	34	33	35	30	26	25	27	24	22
Sandowne P.S.	51	34	35	47	43	34	34	32	30	22	21
Sheppard P.S.	40	48	45	41	39	38	37	32	31	37	34
Silverheights P.S.	41	34	32	28	26	20	17	17	18	14	14
Sir Adam Beck P.S.	Not Open	Not Open	20	26	18	17	16	15	15	14	15
Smithson P.S.	39	46	43	44	42	30	38	37	34	37	34
Southridge P.S.	51	56	50	48	48	42	47	39	45	43	45
St Andrew's P.S.	44	33	32	28	26	24	24	25	21	22	22
St Jacobs P.S.	43	44	42	39	39	34	30	32	31	32	32
Stanley Park P.S.	54	58	53	50	45	48	38	37	41	37	42
Stewart Avenue P.S.	48	52	30	26	25	20	20	22	25	21	21
Suddaby P.S.	27	35	33	33	24	25	25	24	23	23	23
Sunnyside P.S.	41	42	37	33	33	31	31	28	27	27	30
Tait Street P.S.	41	42	41	38	37	35	25	25	24	23	23
Three Bridges P.S.	35	34	29	30	23	21	15	Disposed	Disposed	Disposed	Disposed
Trillium P.S.	47	57	41	40	37	33	29	31	31	26	30
Vista Hills P.S.	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	Not Open	18	16	14
W.T. Townshend P.S.	28	25	22	19	19	18	17	15	14	15	16
Wellesley P.S.	44	45	42	40	39	35	32	30	31	29	28
Westheights P.S.	55	57	40	35	33	27	26	27	22	25	20
Westmount P.S.	43	42	38	34	34	28	49	22	16	15	14
Westvale P.S.	27	23	20	17	17	14	12	11	11	11	13
William G. Davis P.S.	56	72	57	56	50	46	42	44	45	40	33
Williamsburg P.S.	28	24	22	22	20	18	18	17	20	17	17
Wilson Avenue P.S.	40	31	38	35	34	30	28	23	23	22	25
Winston Churchill P.S.	39	40	36	25	26	24	26	28	28	23	24
Woodland Park P.S.	31	31	27	25	22	17	17	16	15	13	16
Wrigley's Corners O.E.C.	Unavail	52	45	55	42	36	40	45	39	40	48
Average GHG Emission Intensity (kg CO₂e/m²)	46	45	39	37	35	31	28	28	28	26	26

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	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²	kg CO ₂ e/m ²
Bluevale C.I.	49	49	38	39	38	34	33	31	27	30	30
Cameron Heights C.I.	69	64	59	56	51	45	92	57	49	39	38
Eastwood C.I.	38	40	35	33	33	34	30	31	24	24	30
Elmira District S.S.	50	52	45	42	37	33	34	34	35	30	33
Forest Heights C.I.	59	56	53	56	46	40	38	36	37	44	43
Galt C.I.	46	42	42	48	46	40	37	38	37	32	35
Glenview Park S.S.	50	52	52	47	45	37	32	32	28	28	28
Grand River C.I.	44	48	43	39	40	36	35	37	30	29	30
Huron Heights S.S.	45	46	44	40	39	30	27	31	28	24	24
Jacob Hespeler S.S.	39	47	46	39	40	35	27	34	26	21	22
Kitchener-Waterloo C. & V.S.	52	47	44	41	40	40	34	33	32	31	32
Preston H.S.	47	53	45	43	41	39	37	39	38	37	35
Sir John A. Macdonald S.S.	44	42	37	36	30	25	23	25	24	21	20
Southwood S.S.	49	38	30	27	24	21	19	20	20	20	21
Waterloo C.I.	48	48	45	40	40	36	34	35	35	34	33
Waterloo-Oxford District S.S.	44	56	54	51	45	41	41	42	39	36	37
Average GHG Emission Intensity (kg CO₂e/m²)	48	49	45	42	40	35	36	35	32	30	31
Education Centre (kg CO₂e/m²)	45	44	38	35	32	23	21	23	21	21	20

**WATERLOO REGION DISTRICT SCHOOL BOARD
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**ENERGY UPDATE
ENERGY BUDGET AND EXPENDITURES**

Commodity	2008/09		2009/10	
	Budget	Actual	Budget	Actual
Electricity	\$ 4,616,900	\$ 5,755,988	\$ 5,733,000	\$ 6,797,223
Natural Gas	\$ 5,832,400	\$ 4,966,345	\$ 5,505,900	\$ 4,480,301
Total	\$ 10,449,300	\$ 10,722,333	\$ 11,238,900	\$ 11,277,524

Commodity	2010/11		2011/12	
	Budget	Actual	Budget	Actual
Electricity	\$ 6,759,525	\$ 6,549,661	\$ 6,809,909	\$ 6,572,072
Natural Gas	\$ 4,915,515	\$ 4,352,896	\$ 4,958,342	\$ 3,357,832
Total	\$ 11,675,040	\$ 10,902,557	\$ 11,768,251	\$ 9,929,904

Commodity	2012/13		2013/14	
	Budget	Actual	Budget	Actual
Electricity	\$ 7,204,740	\$ 7,062,058	\$ 7,315,200	\$ 7,432,158
Natural Gas	\$ 3,163,721	\$ 2,377,512	\$ 3,512,270	\$ 2,934,994
Total	\$ 10,368,461	\$ 9,439,570	\$ 10,827,470	\$ 10,367,152

Commodity	2014/15		2015/16	
	Budget	Actual	Budget	Actual
Electricity	\$ 9,213,000	\$ 8,018,535	\$ 8,263,900	\$ 8,803,203
Natural Gas	\$ 3,007,590	\$ 2,934,994	\$ 3,055,500	\$ 2,686,392
Total	\$ 12,220,590	\$ 10,953,529	\$ 11,319,400	\$ 11,489,595

Commodity	2016/17		2017/18	
	Budget	Actual	Budget	Actual
Electricity	\$ 8,164,700	\$ 8,892,776	\$ 10,303,000	\$ 8,510,009
Natural Gas	\$ 2,891,800	\$ 2,726,342	\$ 2,714,000	\$ 3,044,841
Total	\$ 11,056,500	\$ 11,619,118	\$ 13,017,000	\$ 11,554,850

Commodity	2018/19	
	Budget	Actual
Electricity	\$ 10,182,000	\$ 7,956,894
Natural Gas	\$ 2,997,500	\$ 2,698,385
Total	\$ 13,179,500	\$ 10,655,278

**WATERLOO REGION DISTRICT SCHOOL BOARD
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FACILITY SERVICES DEPARTMENT**

**ENERGY UPDATE
PHOTOVOLTAIC GENERATION AND REVENUES (LIFETIME)***

	kWh Production	Revenue
Blair Road P.S.	84,476	\$ 67,750
Forest Glen P.S.	96,266	\$ 77,206
Forest Heights C.I.	83,308	\$ 66,813
Lincoln Heights P.S.	91,032	\$ 73,008
Waterloo C.I.	<u>107,002</u>	<u>\$ 85,815</u>
Total	462,084	\$ 370,592

Notes:

* Based on energy produced between November and December 2011 through August 2019.

Links to websites are as follows:

Blair Road P.S.	http://www.cachelan.com/green/solarVuLive.php?ac=blairrdsps&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

2018/19 Utility Rebates Reinvestments

King Edward, Winston Churchill	Energy Efficient Destratification Fans in lieu of mechanical cooling - 8 rooms
Smithson	Engineering for pilot project using portable units for classroom AC - 12 rooms
NA MacEachern, Westhights, 8 others	LED upgrade to all or remaining exterior lights
Southridge, ECI	LED corridor or gym lighting upgrades - 7 areas
Courtland, Winston Churchill, 2 others	Upgrade to exterior lighting control

2018/19 Capital Funded Energy Efficiency Upgrades

Wellesley, St. Andrews and 5 others	LED lighting or occupancy sensors upgrades – approximately 48 areas
GCI, WODSS, 2 others	Energy Efficient Destratification Fans in lieu of mechanical cooling - 12 rooms
Floradale, Chicopee Hills, King Edward	Commissioning / Recommissioning of controls and building systems
Smithson	Integration of installed AC in FDK classrooms with building controls
Central, Winston Churchill and others	Upgrade of urinal timers to minimize water use
William G Davis	Damper controls and insulation upgrade of ductwork systems
CHCI	LED lighting upgrade for the pool area (shared cost with City of Kitchener)