



Report to Committee of the Whole

May 16, 2022

Subject: Energy and Greenhouse Gas Emissions Update

Recommendation

This report is for the information of the board

2020/21 Energy Use Intensity

Since 2008 the Waterloo Region District School Board (Board) has monitored energy consumption at our schools, outdoor centres and administration and supporting facilities, using weather-normalized Energy Use Intensity (EUI) as a means to identify facilities with optimum performance and those in greater need of attention, and monitor performance year to year. Figure 1 reports the change in total EUI for all Board-owned sites over the last 13 years. The Board has experienced a weather-normalized **19.8 percent reduction in our overall Energy Use Intensity** between 2008 and 2020/21. The reduction in electricity intensity during this period was 24.3 percent, with a reduction in natural gas intensity of 17.8 percent. Figure 2 reports the average EUI by panel. The EUI in all three panels increased this year due to the ventilation measures necessary to reduce COVID-19 transmission, as mandated by the Ministry. The EUI for each school is presented in Appendices A and B. The technical background for these terms and methodology is given in Appendix G.

Figure 1: Total Energy Use Intensity Combined, 2008 to Fiscal Year 2020/21

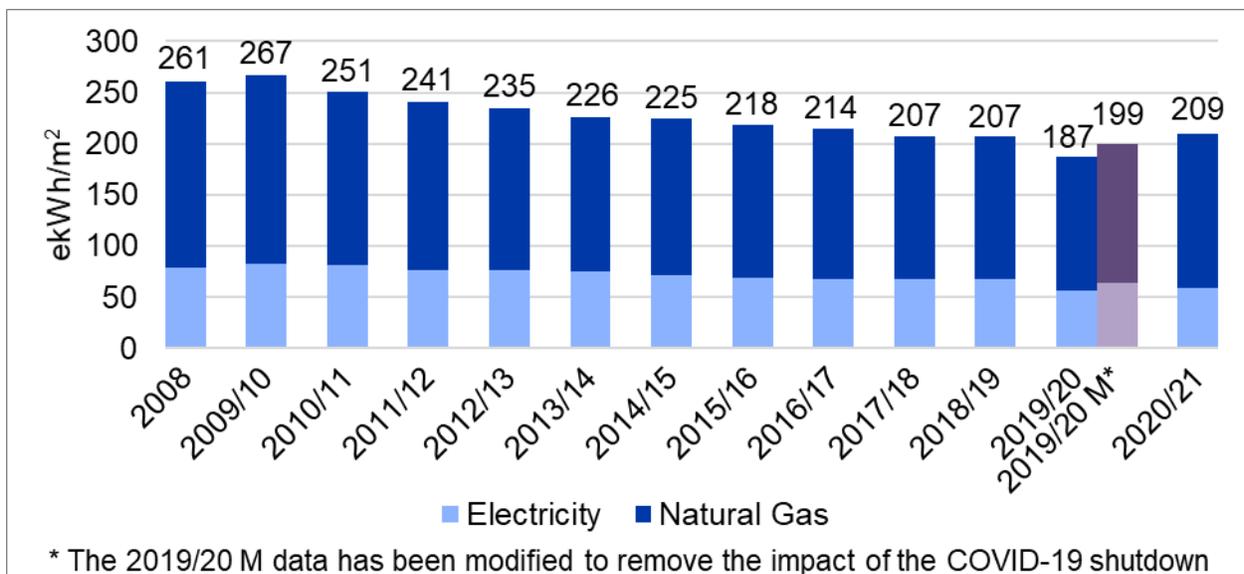
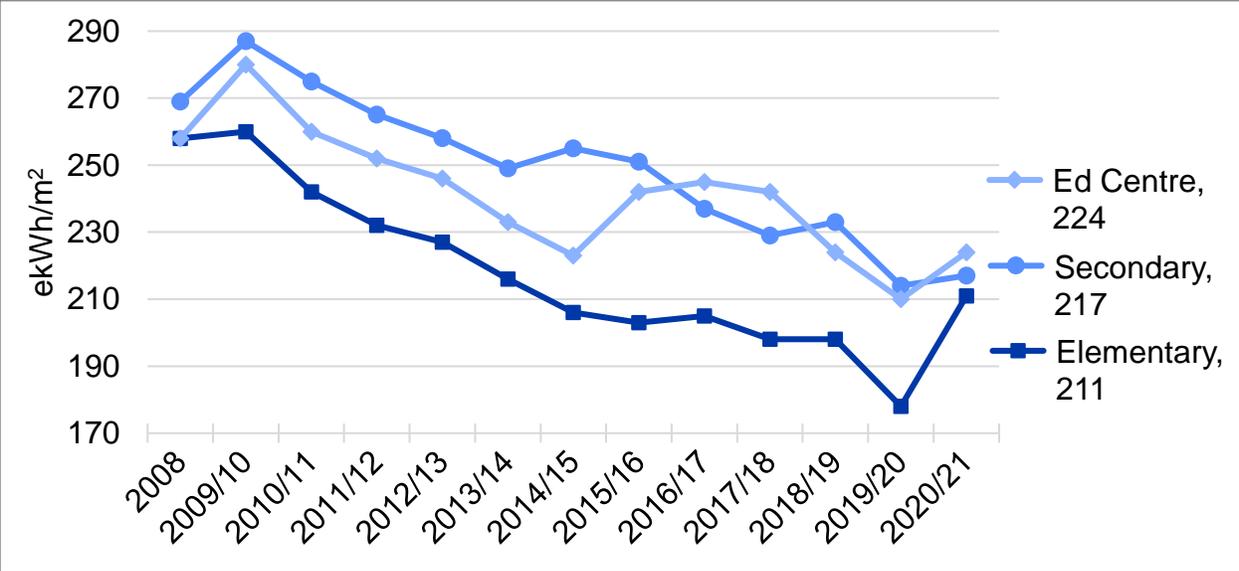


Figure 2: Average Energy Use Intensity by Panel, 2008 to Fiscal Year 2020/21



2020/21 Greenhouse Gas Emissions

Total green house gas (GHG) emissions per square meter (GHG emission intensity) for all Board-owned sites is show in Figure 3. Figure 4 reports the average GHG emission intensity by panel. Note that this data is not weather normalized. The GHG emission intensity increased this year due to the COVID-19 ventilation requirements. GHG emissions intensities for each school are presented in Appendix C and D.

Total GHG Emission Intensity has reduced 37 percent since 2008. The Board’s GHG emissions are significantly influenced by GHG emissions from electricity generation in Ontario. The **emissions from electricity generation have fallen by 80 percent in Ontario** in the last decade. They were lowest in 2017/18, but they have begun to increase slightly.

Figure 3: Total GHG Emission Intensity Combined, 2008 to Fiscal Year 2020/21

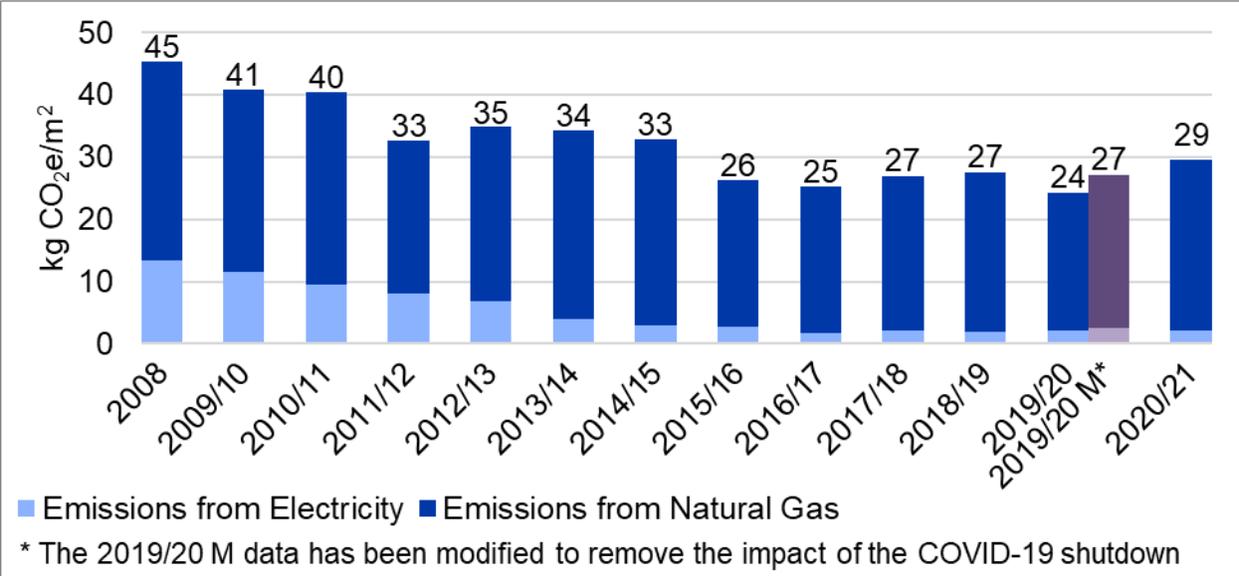
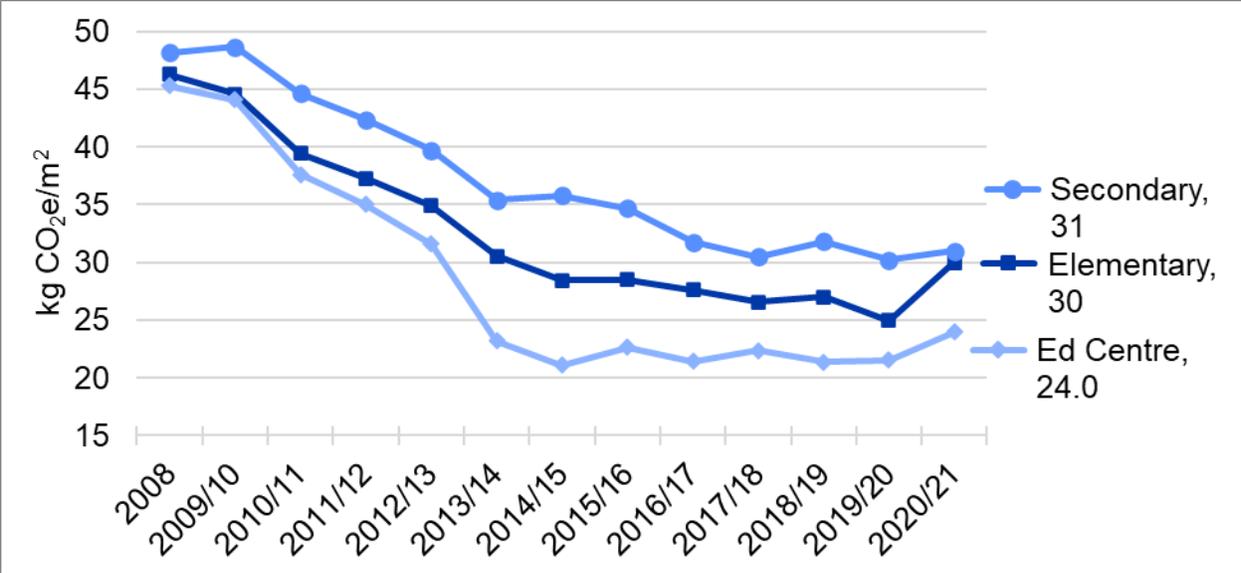


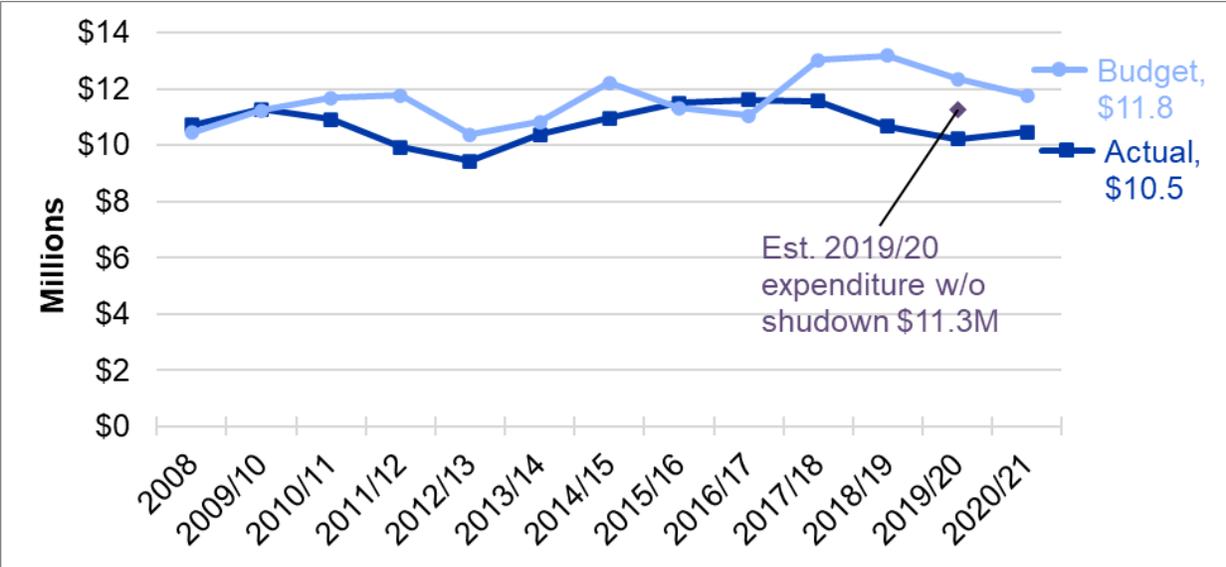
Figure 4: Average GHG Emission Intensity by Panel, 2008 to Fiscal Year 2020/21



Energy Budget and Expenditure

A thirteen-year history of the Board budgets and expenditures for electricity and natural gas is presented in Figure 5 and Appendix E. The Board’s natural gas and electricity budget for 2020/21 was \$11.8M and expenditures were \$10.5M.

Figure 5: Budget and Actual Expenditures, Fiscal Years 2008/09 to 2020/21



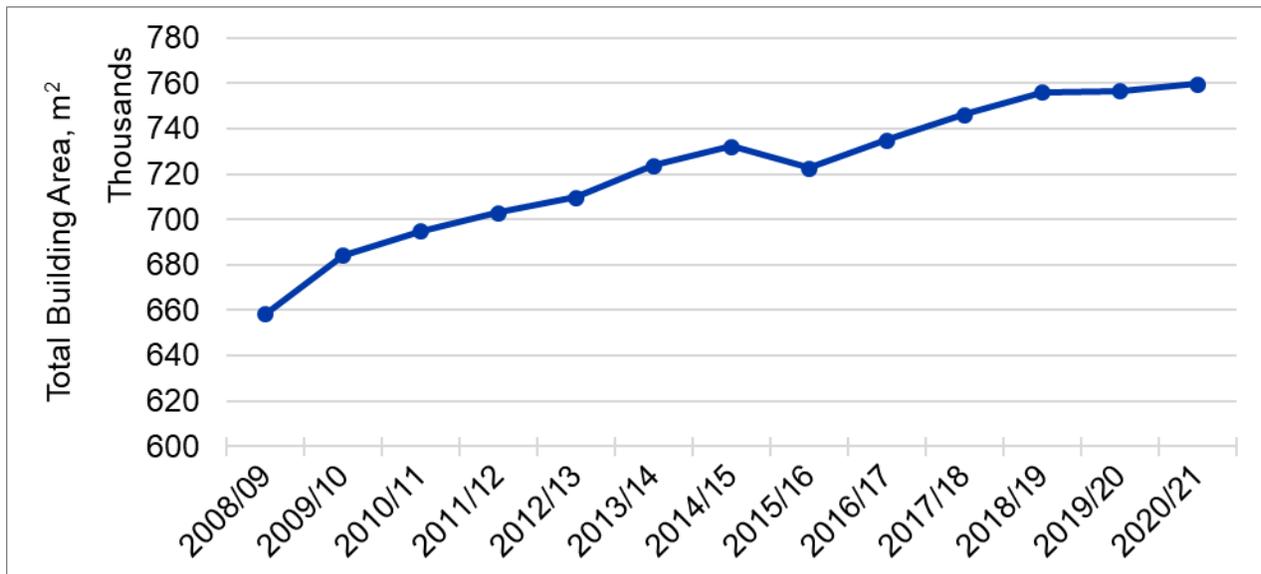
Budget and actual expenses cannot be compared directly year over year as a metric for operational efficiencies, as there are too many variables beyond the control of Facility Services, and the Board as a whole. Consumption and prices are the two drivers of energy expenditures. While consumption can be influenced on the long term with energy conservation strategies discussed below, there are several factors beyond the Board’s control:

- Weather (i.e. warmer summer and shoulder season drives cooling demand)
- Hours of operation (i.e. extended use initiatives such as Community Use)
- School closures (i.e. disposal of surplus sites, port-a-packs, and portables)
- Expansion of facilities and square footage (i.e. new schools or school additions)
- User behaviour (influenced through conservation strategy but not controlled)

Energy prices are also outside the Board’s control and fluctuate year to year. The best prediction of all relevant variables is made when the budget is created but forecasting weather a year and more away does not allow for a great degree of precision.

It is a significant achievement that the utility budget has only increased 13 percent since 2008/09, and expenditures have fallen by 2 percent. As shown in Figure 6, the total building area operated by the WRDSB has increased 15 percent since 2008/09. As shown in Figure 7, the combined energy price the Board pays has increased 8 percent since 2008/09. There has also been a significant expansion in operating hours due to increased community use of schools. **Efficiency gains continue to be the primary reason for the 2 percent expenditure reduction since 2008/09.**

Figure 6: Total Building Area, Fiscal Years 2008/09 to 2020/21



In 2020/21, **natural gas cost 2.86 cents per kWh** and **electricity cost 16.2 cents per kWh** with a combined cost for both commodities at 6.74 cents per kWh. The full history of energy costs per kWh is given in Figure 7. Natural gas costs have begun to increase as both commodity costs and the carbon tax increase. Electricity prices continue to fall as the Ontario Government shifts costs from the Global Adjustment to the tax base, although prices are expected to increase again as nuclear power plants are scheduled to be taken offline for refurbishment and retirement, and temporarily replaced by expensive natural gas generation.

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 each commodity in 2020/21 is presented in Figure 8.

Figure 7: Natural Gas, Electricity and Combined costs per kWh, 2008 to 2020/21

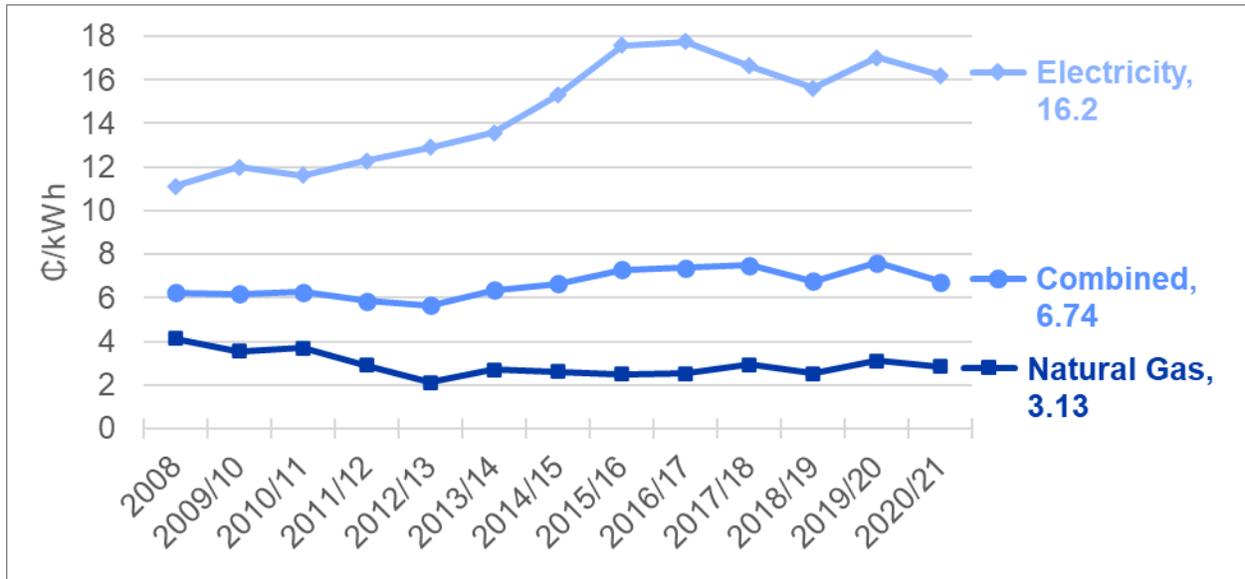
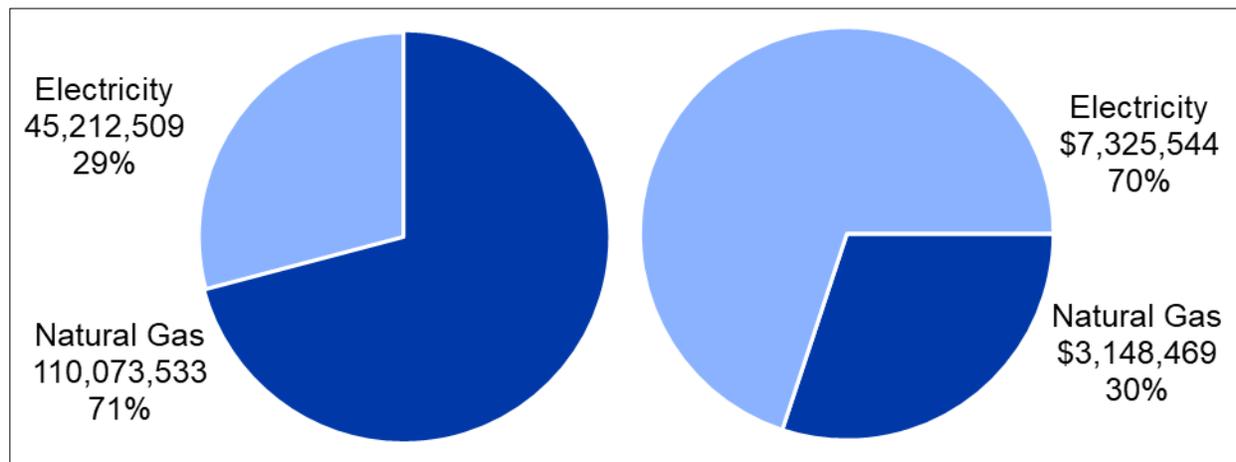
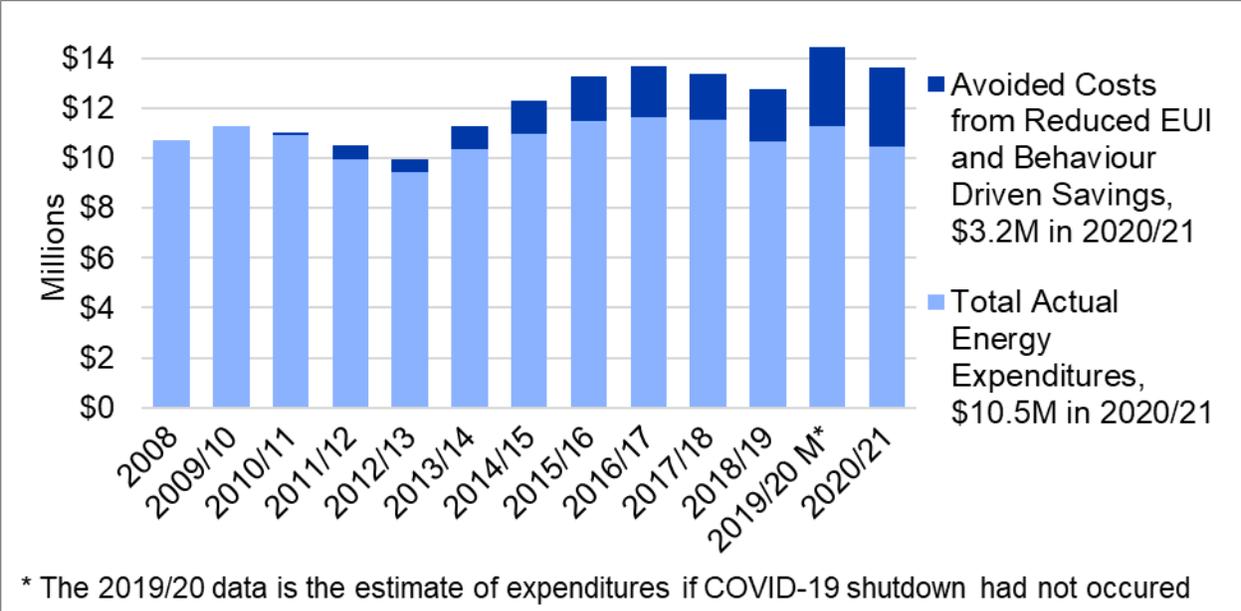


Figure 8: Energy Consumption (ekWh) and Expenditures by Commodity, 2020/21



The reduction in EUI since 2008 has resulted in significant financial savings. **Utility costs have been offset by \$3.2M in Fiscal Year 2020/21**, compared to the operational conditions in 2008. See Figure 9 for details. This figure compares the 2020/21 expenditures to the scenario where the Board operated the 2020/21 building portfolio with the EUI 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 EUI has offset utility costs by \$17.8M.**

Figure 9: Actual Energy Costs and Savings Relative to 2008 Baseline, 2008 to 2020/21



The Energy Conservation Program

This report has detailed the significant success the existing energy conservation program has had in the last twelve years. This program consists of the following efforts:

- Careful collection and monitoring of utility consumption data through an online dashboard and weather normalized annual database
- Upgrading to Light Emitting Diodes (LED) lights controlled by occupancy sensors
- Building Automation Systems with free cooling, schedules and night setbacks
- Demand controlled ventilation using CO₂ sensors
- Memos to staff on use of vestibules and water conservation
- Hiring of Canada Summer Jobs students
- The Sustainability Working Group, where staff collaborate and share knowledge
- Implementation of a preventative maintenance program
- Requiring new schools to be 25 percent more efficient than required by code
- Architectural design briefs for roofs, windows, and vestibules
- Recommissioning of boilers and HVAC equipment
- Use of efficient equipment like condensing boilers/water heaters, compressors
- Alternative methods of cooling classrooms such as destratification fans
- Pilot studies such as new multizone units, gas-fired heat pump systems, surfactants in boiler loops, load shedding cooling controls for secondary schools, point-of-use utility meters, envelope thermography to find breaches in envelope, and water meters for cooling towers

WRDSB staff also make good use of existing incentive programs. **Since 2009, the Board has received more than \$766k in incentives from the local utilities** and the Save ON Energy program. These incentives continue to be reinvested each year into the energy conservation program. Appendix F details how these incentives were used in 2020/21.

The Board also operates five photovoltaic solar panel arrays, funded by the Ministry in 2010/11. These projects have generated more than \$466,487 in revenue over 116 months of operation, as detailed in Appendix F.

Commitments

WRDSB is required to submit an Energy Conservation and Demand Management (ECDM) plan every 5 years by the Electricity Act. The WRDSB submitted the required ECDM plan for the five years following 2017/2018 in 2020. In this plan, the WRDSB accessed plans for the use of capital and operational funds and set a target of an 11.8 percent decrease in Energy Use Intensity from 2017/18 levels by 2022/23. Due to the COVID-19 pandemic, **the WRDSB is not on track to meet the target set in its latest ECDM plan.**

In 2020, the WRDSB became a pledging member of Sustainable Waterloo Region by committing to reduce its GHG emissions intensity by 20 percent from 2018/19 levels by 2028/29. The measures required to achieve this goal are roughly in line with the goal set in the latest ECDM plan. While this target is for many more years into the future than the ECDM plan target, **the WRDSB is also not on track to meet the target it has committed to through Sustainable Waterloo Region.**

WRDSB Ranking in the Province

The Ministry of Education has begun ranking all school boards based on their Energy Use Intensity and Emissions Intensity, among other variables. For 2019/20 (the most recent year where this data is available), the **WRDSB was ranked 53 and 56 out of 72 boards**, respectively. **Energy Use and Emissions Intensity** is clearly an area where the **WRDSB's performance relative to other school boards is weak.** Several factors contribute to this reality including a relatively old fleet of buildings, large numbers of single pane windows, heavy reliance on portables, and a region with a growing population that does not allow old buildings to be closed.

Although the WRDSB has made great strides in the last 13 years in reducing our energy use, other boards appear to have made greater strides. In some cases, they have benefited from closures of older schools, prioritized replacement of port-a-pack and a choice not to cool new classrooms spaces.

WRDSB staff have developed an **Accelerated Energy Savings plan to position the WRDSB in the top third of school boards by 2030** or sooner. Achieving this will require the WRDSB to reduce its energy use intensity by 40% from 2018/19 levels by 2029/30. Please see the accompanying report on the Accelerated Energy Savings plan for details.

Implications for Wellbeing and Equity, Diversity and Inclusion

Eco-anxiety is understood as worry, fear, anxiety or distress caused by the knowledge of climate change and the impact it is having on humanity¹. Numerous news articles in the

¹ Clayton, S. 2020. "Climate anxiety: Psychological responses to climate change." *Journal of Anxiety Disorders*, 74, 1022263, doi.org/10.1016/j.janxdis.2020.102263

last few years report on the impacts this is having on children². 60 percent of children say they feel very or extremely worried about climate change, and more than 45 percent say feelings about climate change impact their daily lives³. These patterns of anxiety are exacerbated by governments continually failing to take action on the level that scientists say is required to mitigate the worst of climate change. The impact of increased anxiety on learning is self-evident. In addition, climate change impacts less affluent and racialized communities disproportionately⁴. The WRDSB serves many students with family ties to these areas, and these students are often the same students who experience racism and marginalization. A strong energy conservation program that involves students is one component of what is necessary to address this eco-anxiety and inequality.

Financial Implications

While the utility budget represents 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. There is no way to reduce energy expenditure in the middle of a budget year. Long-term planning and action is the only way to reduce the financial risk of rising energy prices.

Energy prices are expected to increase in the coming decade. Electricity prices are expected to rise as nuclear power plants are taken offline for refurbishment or retirement and that capacity is replaced by expensive natural gas generation. Natural gas prices are expected to rise especially rapidly as the carbon tax continues to increase and commodity costs increase due to market changes. These include increased exports from the United States to Mexico, Asia and Europe due to the crisis in Ukraine. North America has enjoyed low natural gas prices relative to the rest of the world, but the larger the volume of exports, the more the North American market is exposed to these global prices.

The rate of increase is likely to exceed the ability of the current energy conservation program to maintain budgets flat solely through the current energy efficiency measures. Without accelerated action, staff estimate that the utility budget for the board could be \$16 million by 2029/30, an increase of \$4.6 million.

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 the Energy Consumption and Greenhouse Gas Emission annual reports, as issued through the UCD, are available in hard copy at the Education Centre or online for public access as required under the Electricity Act:

² Atter, Heidi. 2021. "Climate change anxiety affecting children, but parents acknowledging it can help: social worker." *CBC News*. August 19. <https://www.cbc.ca/news/canada/saskatchewan/ecoanxiety-children-youth-1.6146470>.

Rodriguez, Jeremiah. 2021. "Eco-anxiety: Young Canadians report climate change impact on their mental health." *CTV News*. October 7. <https://www.ctvnews.ca/climate-and-environment/eco-anxiety-young-canadians-report-climate-change-impact-on-their-mental-health-1.5615253>.

³ Harrabin, Roger. 2021. "Climate change: Young people very worried - survey." *BBC News*. September 14. <https://www.bbc.com/news/world-58549373>.

⁴ Levy, Barry S. Patz, Jonathan A. 2015 "Climate Change, Human Rights, and Social Justice." *Annals of Global Health*. Volume 81, Issue 3. <https://doi.org/10.1016/j.aogh.2015.08.008>.

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

The Accelerated Energy Savings Plan will also be made available in these ways once it has been approved.

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

**ENERGY UPDATE
ANNUAL ENERGY USE INTENSITY (ekWh/m²) - ELEMENTARY SCHOOLS**

School	08	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
A R Kaufman P.S.	212	267	244	234	239	229	186	204	176	185	199	158	163
Abraham Erb P.S.	189	166	173	167	171	162	157	148	148	146	150	134	187
Alpine P.S.	287	330	318	334	307	284	285	293	296	286	252	255	291
Avenue Road P.S.	242	400	331	197	170	180	173	172	180	173	180	173	215
Ayr P.S.	238	292	277	268	257	246	220	213	209	212	217	202	228
Baden P.S.	232	176	168	156	161	163	166	153	155	160	160	147	181
Blair O.E.C.	Un.	297	267	292	271	266	250	280	205	220	229	200	203
Blair Road P.S.	422	249	224	246	212	214	208	214	191	190	196	182	262
Breslau P.S.	336	393	268	267	248	330	236	226	231	219	213	178	249
Bridgeport P.S.	246	241	245	269	262	186	160	161	108	172	176	159	197
Brigadoon P.S.	199	296	213	181	185	188	162	154	169	168	168	151	179
Cedar Creek P.S.	211	206	182	174	175	184	168	174	187	185	187	172	192
Cedarbrae P.S.	289	245	308	264	255	245	250	241	238	225	258	228	297
Centennial (Camb) P.S.	269	286	254	251	266	244	224	228	237	226	230	215	268
Centennial (Wloo) P.S.	389	264	244	246	247	253	233	226	232	238	232	235	204
Central P.S.	269	294	268	284	277	272	261	274	265	214	223	207	265
Chalmers Street P.S.	265	274	288	316	267	253	232	229	204	206	211	191	218
Chicopee Hills P.S.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	151	125	115	154
Clemens Mill P.S.	223	219	206	209	213	203	221	248	225	219	212	174	184
Conestogo P.S.	261	271	252	273	244	235	221	249	236	212	220	189	300
Coronation P.S.	440	378	364	326	329	318	327	342	354	343	349	336	288
Country Hills P.S.	190	224	229	301	268	226	215	179	168	170	175	163	196
Courtland Senior P.S.	246	254	244	219	223	269	222	194	182	203	210	170	227
Crestview P.S.	242	322	299	279	311	291	313	288	292	288	266	210	245
Dickson P.S.	184	183	185	161	171	169	96	Dis.	Dis.	Dis.	Dis.	Dis.	Dis.
Doon P.S.	279	304	281	219	211	200	164	151	167	196	189	165	221
Driftwood Park P.S.	232	199	183	185	180	179	190	151	121	159	163	127	161
Edna Staebler P.S.	N.O.	171	159	149	158	155	155	140	143	142	145	131	179
Elgin Street P.S.	196	226	204	187	196	187	179	194	202	220	225	204	226
Elizabeth Ziegler P.S.	272	278	268	251	226	234	236	234	215	180	187	171	188
Empire P.S.	238	246	239	227	239	158	203	209	208	207	210	198	248
Floradale P.S.	209	191	218	233	232	202	176	217	200	177	189	174	225
Forest Glen P.S.	281	260	240	221	202	228	210	195	201	205	210	197	242
Forest Hill P.S.	316	269	246	248	208	196	192	224	213	227	217	219	197
Franklin P.S.	236	258	233	234	227	215	206	215	260	241	216	200	277
Glencairn P.S.	156	177	182	173	187	210	181	168	181	185	162	176	174
GrandView (Camb) P.S.	230	251	239	143	168	171	159	150	169	156	163	137	189
Grandview (NH) P.S.	197	326	228	233	217	215	187	199	187	189	204	192	244
Groh P.S.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	125	136	109	137
Hespeler P.S.	206	205	184	166	168	177	173	158	163	165	166	156	146
Highland P.S.	326	281	275	204	189	202	201	211	213	203	210	189	263
Hillcrest P.S.	232	221	209	191	205	181	179	157	152	158	169	161	230
Howard Robertson P.S.	407	343	335	280	287	257	264	281	185	285	282	267	313
J F Carmichael P.S.	217	198	192	183	161	169	164	174	169	163	176	168	236
J.W. Gerth P.S.	N.O.	125	137	120	141	146	147	133	159	144	139	118	173
Janet Metcalf P.S.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	151	115	132
Jean Steckle P.S.	N.O.	N.O.	N.O.	N.O.	N.O.	146	119	122	121	127	125	102	140
John Darling P.S.	179	215	170	171	177	180	192	181	180	178	180	156	211
John Mahood P.S.	323	258	228	221	213	189	181	178	173	178	192	164	199
Keatsway P.S.	250	197	172	154	132	149	144	143	147	147	147	130	161
King Edward P.S.	594	268	261	252	256	243	272	332	266	236	211	203	220
Lackner Woods P.S.	192	213	203	210	209	215	214	199	196	223	212	179	219
Laurelwood P.S.	223	235	216	220	205	204	199	186	178	177	181	169	196
Laurentian P.S.	293	321	303	264	258	299	356	255	285	242	224	192	248
Lester B. Pearson P.S.	217	173	171	173	175	161	163	150	155	142	146	129	210
Lexington P.S.	307	287	291	261	256	289	223	237	236	230	231	217	236
Lincoln Avenue P.S.	289	358	332	330	313	149	143	Dis.	Dis.	Dis.	Dis.	Dis.	Dis.
Lincoln Heights P.S.	298	258	232	233	234	209	197	286	289	213	211	206	233
Linwood P.S.	356	268	252	273	247	248	234	244	229	210	206	193	219

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

APPENDIX A

**ENERGY UPDATE
ANNUAL ENERGY USE INTENSITY (ekWh/m²) - ELEMENTARY SCHOOLS**

School	08	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
MacGregor Sr P.S.	201	212	204	201	202	194	188	202	198	204	222	225	219
Mackenzie King P.S.	294	319	299	313	281	295	211	214	220	214	208	198	225
Manchester P.S.	281	316	304	286	258	246	189	176	157	138	163	151	175
Margaret Avenue P.S.	229	285	198	236	237	191	243	259	369	238	235	232	265
Mary Johnston P.S.	174	176	176	175	165	180	166	163	160	155	158	145	181
McQuarrie Centre	539	531	561	411	522	421	294	262	272	261	250	278	227
Meadowlane P.S.	225	271	270	255	247	246	228	211	257	251	226	196	233
Millen Woods P.S.	N.O.	N.O.	196	153	162	165	149	152	155	156	156	139	206
Moffat Creek P.S.	N.O.	N.O.	N.O.	N.O.	138	123	114	134	132	128	99	105	101
N A MacEachern P.S.	326	338	317	250	256	248	276	214	203	197	151	212	293
New Dawn	412	424	403	430	368	260	204	166	170	146	347	348	271
New Dundee P.S.	188	215	205	209	208	189	192	193	195	198	195	184	208
Northlake Woods P.S.	311	234	241	234	217	195	189	201	211	194	209	180	182
Park Manor P.S.	341	313	284	272	276	273	271	206	335	353	355	234	210
Parkway P.S.	289	260	256	280	337	260	234	224	215	233	223	217	278
Pioneer Park P.S.	236	274	248	255	260	219	215	208	235	225	198	194	234
Preston P.S.	180	188	194	191	191	175	157	158	166	168	168	155	199
Prueter P.S.	169	286	277	219	259	239	190	201	212	212	204	217	249
Queen Elizabeth P.S.	220	252	251	277	268	232	200	229	271	241	232	221	206
Queensmount Sr P.S.	400	309	342	324	258	282	321	252	257	304	255	150	155
Riverside P.S.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	141	136	136	116	149
Riverside (old location)	171	217	175	175	186	151	128	126	87	91	94	91	86
Rockway P.S.	265	311	281	311	257	311	265	311	299	285	299	217	242
Rosemount P.S.	245	299	287	269	271	267	294	303	306	292	Dis.	Dis.	Dis.
Ryerson P.S.	260	264	246	199	207	200	192	176	189	200	173	140	205
Saginaw P.S.	250	281	248	232	251	237	229	232	223	218	207	185	272
Sandhills P.S.	238	251	226	224	246	231	202	193	205	194	189	172	253
Sandowne P.S.	285	206	221	293	274	246	255	238	226	181	175	170	185
Sheppard P.S.	224	277	268	249	241	245	237	217	212	252	230	200	236
Silverheights P.S.	229	209	203	186	183	157	143	143	155	143	148	132	177
Sir Adam Beck P.S.	N.O.	N.O.	124	164	130	132	130	131	131	132	132	121	152
Smithson P.S.	216	259	249	255	250	191	235	228	222	234	222	221	251
Southridge P.S.	284	318	294	183	287	269	300	255	290	292	288	242	315
St Andrew's P.S.	247	191	196	173	174	169	170	175	156	164	158	154	178
St Jacobs P.S.	236	253	250	235	239	233	218	220	223	223	223	239	281
Stanley Park P.S.	299	331	314	299	280	309	256	246	270	251	282	243	280
Stewart Avenue P.S.	270	306	191	170	179	163	166	171	190	169	170	152	194
Suddaby P.S.	149	197	192	192	146	154	153	151	148	150	151	135	169
Sunnyside P.S.	226	243	218	198	205	204	204	188	185	186	202	174	184
Tait Street P.S.	227	243	241	229	230	236	173	173	180	177	180	169	210
Three Bridges P.S.	193	200	187	193	169	175	92	Dis.	Dis.	Dis.	Dis.	Dis.	Dis.
Trillium P.S.	262	342	255	251	253	245	221	239	243	227	250	231	212
Vista Hills P.S.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	144	131	129	128	126
W.T. Townshend P.S.	158	161	156	139	147	151	141	138	129	133	134	119	165
Wellesley P.S.	243	261	252	242	243	235	219	202	215	205	196	177	193
Westheights P.S.	309	339	255	232	235	228	232	229	210	233	210	181	233
Westmount P.S.	244	256	248	223	241	235	371	166	133	137	128	99	162
Westvale P.S.	151	145	141	128	140	132	131	125	129	132	151	127	168
William G. Davis P.S.	308	410	331	328	303	288	270	277	282	261	217	237	215
Williamsburg P.S.	159	149	145	149	150	154	153	139	157	145	149	133	167
Wilson Avenue P.S.	225	185	234	223	226	226	214	181	192	181	195	183	205
Winston Churchill P.S.	217	234	216	163	179	178	194	201	207	194	196	177	196
Woodland Park P.S.	177	191	179	167	162	152	152	142	139	127	139	130	156
Wrigley's Corners O.E.C.	Un.	251	225	282	236	230	244	249	223	228	255	201	190
Average Energy Use Intensity (ekWh/m²)	258	260	242	231	227	216	206	203	205	198	197	179	211

N.O. - Not Open

Un. - Unavailable

Dis. - Disposed

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

APPENDIX B

**ENERGY UPDATE
ANNUAL ENERGY USE INTENSITY (ekWh/m²) - SECONDARY SCHOOLS**

School	08	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Bluevale C.I.	274	291	237	249	255	241	240	231	214	230	228	242	235
Cameron Heights C.I.	385	379	368	357	337	338	597	398	358	313	305	259	189
Eastwood C.I.	211	237	221	213	224	249	228	229	198	205	239	191	219
Elmira District S.S.	278	303	277	258	238	227	238	237	247	220	239	219	234
Forest Heights C.I.	325	328	321	341	287	273	263	247	257	296	295	239	247
Galt C.I.	254	248	258	296	287	273	262	265	262	241	254	241	220
Glenview Park S.S.	275	298	313	284	275	242	218	218	201	201	202	190	193
Grand River C.I.	244	283	264	246	260	250	254	260	228	220	227	225	201
Huron Heights S.S.	252	280	282	264	272	238	224	247	236	226	222	210	212
Jacob Hespeler S.S.	219	281	290	250	265	249	211	249	209	184	196	184	224
Kitchener-Waterloo C. & V.S.	291	269	266	251	253	261	232	229	226	223	229	196	198
Preston H.S.	260	306	267	259	257	260	245	259	257	254	239	235	228
Sir John A. Macdonald S.S.	246	257	242	240	218	205	199	210	210	206	192	182	222
Southwood S.S.	275	225	193	177	164	162	156	158	161	157	160	156	154
Waterloo C.I.	265	278	272	249	256	246	233	240	242	240	239	194	214
Waterloo-Oxford District S.S.	243	322	321	307	281	271	274	283	265	248	260	255	284
Average Energy Use Intensity (ekWh/m²)	269	287	275	265	258	249	255	251	237	229	233	214	217
Education Centre (ekWh/m²)	258	280	260	252	246	233	223	242	245	242	224	210	224

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

APPENDIX C

ENERGY UPDATE

ANNUAL GREENHOUSE GAS EMISSION INTENSITY (kg CO₂e/m²) - ELEMENTARY SCHOOLS

School	08	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
A R Kaufman P.S.	38	45	39	36	35	30	22	27	21	22	24	20	21
Abraham Erb P.S.	34	28	27	25	25	21	20	19	19	18	18	18	27
Alpine P.S.	51	56	52	54	47	41	41	43	43	40	34	38	42
Avenue Road P.S.	44	70	57	33	26	25	24	24	25	23	24	25	31
Ayr P.S.	43	52	48	46	42	39	32	31	30	29	29	29	34
Baden P.S.	41	28	25	23	22	19	19	17	17	17	18	19	23
Blair O.E.C.	Un.	53	47	50	45	42	39	45	30	31	33	30	31
Blair Road P.S.	75	41	35	38	30	28	26	26	22	20	20	20	31
Breslau P.S.	61	69	44	44	38	47	33	32	32	29	28	25	37
Bridgeport P.S.	44	42	41	45	42	26	21	22	11	22	23	22	27
Brigadoon P.S.	35	49	32	25	24	19	17	15	16	15	15	15	19
Cedar Creek P.S.	38	34	28	26	25	22	20	19	22	19	24	23	27
Cedarbrae P.S.	52	42	52	43	41	37	37	36	34	32	38	34	46
Centennial (Camb) P.S.	48	49	41	40	42	35	31	33	34	32	32	32	41
Centennial (Wloo) P.S.	70	46	41	41	40	39	36	35	35	31	31	34	29
Central P.S.	49	51	45	47	46	42	40	43	42	32	33	32	42
Chalmers Street P.S.	48	47	46	49	41	36	31	31	26	25	25	25	30
Chicopee Hills P.S.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	20	15	14	21
Clemens Mill P.S.	40	36	31	30	30	26	26	31	26	24	23	20	20
Conestogo P.S.	47	46	42	45	38	33	31	36	33	28	31	27	47
Coronation P.S.	80	66	61	54	53	48	50	53	56	53	53	54	46
Country Hills P.S.	33	35	32	47	38	30	28	23	20	18	20	21	25
Courtland Senior P.S.	44	44	42	37	36	43	34	29	27	30	32	26	36
Crestview P.S.	44	57	51	47	52	46	49	45	45	45	41	33	38
Dickson P.S.	33	32	31	27	28	27	16	Dis.	Dis.	Dis.	Dis.	Dis.	Dis.
Doon P.S.	50	53	47	35	33	28	24	22	24	27	26	23	32
Driftwood Park P.S.	41	32	27	27	24	19	21	15	9	15	16	13	17
Edna Staebler P.S.	N.O.	28	24	22	22	18	18	17	17	16	18	18	26
Elgin Street P.S.	35	37	31	28	28	23	22	23	23	28	28	27	30
Elizabeth Ziegler P.S.	49	49	47	43	37	36	36	36	31	26	27	26	28
Empire P.S.	43	42	39	36	37	21	28	29	28	26	27	27	36
Floradale P.S.	37	32	35	36	35	26	22	29	24	20	22	22	29
Forest Glen P.S.	50	45	40	36	32	33	30	28	26	25	26	27	34
Forest Hill P.S.	57	47	41	42	34	29	27	33	31	33	32	34	30
Franklin P.S.	42	44	38	38	36	31	29	31	38	34	29	30	42
Glencairn P.S.	28	29	28	26	28	30	25	23	24	25	21	25	25
GrandView (Camb) P.S.	41	44	41	24	23	19	18	17	20	16	18	16	24
Grandview (NH) P.S.	36	57	38	38	34	29	26	29	26	26	28	28	36
Groh P.S.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	16	16	13	17
Hespeler P.S.	36	34	28	25	23	22	21	18	18	17	17	18	16
Highland P.S.	59	49	46	33	28	29	29	31	32	29	29	26	41
Hillcrest P.S.	41	37	33	29	30	25	25	22	21	21	23	23	35
Howard Robertson P.S.	74	60	58	47	47	40	40	44	43	43	42	41	48
J F Carmichael P.S.	39	34	32	30	25	25	24	25	24	22	25	25	37
J.W. Gerth P.S.	N.O.	20	21	18	19	16	18	16	19	17	16	15	24
Janet Metcalf P.S.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	19	15	17
Jean Steckle P.S.	N.O.	N.O.	N.O.	N.O.	N.O.	18	11	12	10	10	11	11	18
John Darling P.S.	32	37	27	27	27	25	27	26	25	25	25	22	33
John Mahood P.S.	58	43	35	34	31	24	23	23	21	20	22	21	27
Keatsway P.S.	45	33	26	23	17	16	17	17	16	16	16	16	20
King Edward P.S.	108	47	45	43	43	39	44	55	43	37	32	32	34
Lackner Woods P.S.	34	34	30	31	29	25	24	23	21	26	23	21	27
Laurelwood P.S.	39	38	32	31	27	23	21	20	19	19	20	21	24
Laurentian P.S.	53	56	51	44	42	47	56	39	44	37	34	30	40
Lester B. Pearson P.S.	38	27	25	25	24	19	19	17	16	15	16	16	29
Lexington P.S.	55	49	48	43	42	46	34	37	35	33	33	33	35
Lincoln Avenue P.S.	52	62	55	54	50	23	21	Dis.	Dis.	Dis.	Dis.	Dis.	Dis.
Lincoln Heights P.S.	54	45	39	38	38	32	29	44	44	31	30	32	37
Linwood P.S.	64	46	42	45	39	37	33	36	32	29	29	29	33

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

ENERGY UPDATE

ANNUAL GREENHOUSE GAS EMISSION INTENSITY (kg CO₂e/m²) - ELEMENTARY SCHOOLS

School	08	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
MacGregor Sr P.S.	36	36	34	32	31	28	27	29	28	28	31	33	31
MacKenzie King P.S.	53	55	50	52	45	44	30	31	31	30	29	30	33
Manchester P.S.	51	56	52	49	43	38	25	25	21	17	21	21	25
Margaret Avenue P.S.	41	50	32	39	39	28	36	39	57	35	34	35	41
Mary Johnston P.S.	31	29	28	28	25	25	21	21	22	20	20	21	26
McQuarrie Centre	98	95	99	73	92	73	50	45	46	44	42	47	38
Meadowlane P.S.	40	45	43	40	37	32	27	25	32	28	24	20	27
Millen Woods P.S.	N.O.	N.O.	31	22	23	20	17	18	17	17	17	17	27
Moffat Creek P.S.	N.O.	N.O.	N.O.	N.O.	20	17	13	16	15	14	9	12	11
N A MacEachern P.S.	58	56	49	38	37	30	35	27	25	23	9	25	38
New Dawn	75	76	69	73	61	43	32	29	30	22	57	56	43
New Dundee P.S.	34	37	34	34	33	29	29	30	29	29	30	29	33
Northlake Woods P.S.	56	40	39	37	34	27	25	26	24	23	27	24	24
Park Manor P.S.	61	54	47	44	43	38	37	27	51	53	53	34	29
Parkway P.S.	52	44	41	45	50	35	30	30	27	29	25	28	37
Pioneer Park P.S.	42	47	41	41	40	31	30	29	33	30	26	27	34
Preston P.S.	32	31	30	29	28	24	21	21	21	21	21	21	28
Prueter P.S.	30	49	45	37	44	39	30	31	32	31	30	34	40
Queen Elizabeth P.S.	40	44	42	47	44	35	30	36	42	37	36	34	32
Queensmount Sr P.S.	72	54	58	55	42	43	50	38	39	44	37	21	22
Riverside P.S.	30	35	27	26	27	20	17	17	19	17	14	15	20
Riverside (old location)	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	12	14	17	13	12
Rockway P.S.	48	55	48	53	43	51	42	51	49	45	48	35	39
Rosemount P.S.	44	53	50	47	46	44	49	51	51	48	Dis.	Dis.	Dis.
Ryerson P.S.	47	44	39	30	29	24	22	20	21	22	21	19	28
Saginaw P.S.	44	47	38	35	36	31	28	29	28	26	25	24	38
Sandhills P.S.	42	41	34	33	35	30	26	25	27	24	22	22	37
Sandowne P.S.	51	34	35	47	43	34	34	32	30	22	21	23	25
Sheppard P.S.	40	48	45	41	39	38	37	32	31	37	34	30	37
Silverheights P.S.	41	34	32	28	26	20	17	17	18	14	14	15	22
Sir Adam Beck P.S.	N.O.	N.O.	20	26	18	17	16	15	15	14	15	15	19
Smithson P.S.	39	46	43	44	42	30	38	37	34	37	34	35	39
Southridge P.S.	51	56	50	48	48	42	47	39	45	43	45	39	51
St Andrew's P.S.	44	33	32	28	26	24	24	25	21	22	22	23	27
St Jacobs P.S.	43	44	42	39	39	34	30	32	31	32	32	36	44
Stanley Park P.S.	54	58	53	50	45	48	38	37	41	37	42	37	45
Stewart Avenue P.S.	48	52	30	26	25	20	20	22	25	21	21	21	27
Suddaby P.S.	27	35	33	33	24	25	25	24	23	23	23	22	27
Sunnyside P.S.	41	42	37	33	33	31	31	28	27	27	30	27	28
Tait Street P.S.	41	42	41	38	37	35	25	25	24	23	23	24	31
Three Bridges P.S.	35	34	29	30	23	21	15	Dis.	Dis.	Dis.	Dis.	Dis.	Dis.
Trillium P.S.	47	57	41	40	37	33	29	31	31	26	30	30	27
Vista Hills P.S.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	18	16	14	15	14
W.T. Townshend P.S.	28	25	22	19	19	18	17	15	14	15	16	16	23
Wellesley P.S.	44	45	42	40	39	35	32	30	31	29	28	27	29
Westheights P.S.	55	57	40	35	33	27	26	27	22	25	20	19	28
Westmount P.S.	43	42	38	34	34	28	49	22	16	15	14	11	21
Westvale P.S.	27	23	20	17	17	14	12	11	11	11	13	13	18
William G. Davis P.S.	56	72	57	56	50	46	42	44	45	40	33	38	34
Williamsburg P.S.	28	24	22	22	20	18	18	17	20	17	17	16	22
Wilson Avenue P.S.	40	31	38	35	34	30	28	23	23	22	25	25	28
Winston Churchill P.S.	39	40	36	25	26	24	26	28	28	23	24	23	26
Woodland Park P.S.	31	31	27	25	22	17	17	16	15	13	16	16	20
Wrigley's Corners O.E.C.	Un.	52	45	55	42	36	40	45	39	40	48	36	36
Average GHG Emission Intensity (kg CO₂e/m²)	46	45	39	37	35	31	28	28	28	26	26	25	30

N.O. - Not Open

Un. - Unavailable

Dis. - Disposed

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

ENERGY UPDATE

ANNUAL GREENHOUSE GAS EMISSION INTENSITY (kg CO₂e/m²) - SECONDARY SCHOOLS

School	08	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Bluevale C.I.	49	49	38	39	38	34	33	31	27	30	30	34	32
Cameron Heights C.I.	69	64	59	56	51	45	92	57	49	39	38	35	24
Eastwood C.I.	38	40	35	33	33	34	30	31	24	24	30	26	30
Elmira District S.S.	50	52	45	42	37	33	34	34	35	30	33	32	34
Forest Heights C.I.	59	56	53	56	46	40	38	36	37	44	43	35	37
Galt C.I.	46	42	42	48	46	40	37	38	37	32	35	36	33
Glenview Park S.S.	50	52	52	47	45	37	32	32	28	28	28	28	29
Grand River C.I.	44	48	43	39	40	36	35	37	30	29	30	33	29
Huron Heights S.S.	45	46	44	40	39	30	27	31	28	24	24	26	26
Jacob Hespeler S.S.	39	47	46	39	40	35	27	34	26	21	22	23	30
Kitchener-Waterloo C. & V.S.	52	47	44	41	40	40	34	33	32	31	32	28	29
Preston H.S.	47	53	45	43	41	39	37	39	38	37	35	36	35
Sir John A. Macdonald S.S.	44	42	37	36	30	25	23	25	24	21	20	22	29
Southwood S.S.	49	38	30	27	24	21	19	20	20	20	21	22	22
Waterloo C.I.	48	48	45	40	40	36	34	35	35	34	33	28	31
Waterloo-Oxford District S.S.	44	56	54	51	45	41	41	42	39	36	37	38	44
Average GHG Emission Intensity (kg CO₂e/m²)	48	49	45	42	40	35	36	35	32	30	31	30	31
Education Centre (kg CO₂e/m²)	45	44	38	35	32	23	21	23	21	21	20	22	24

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

**ENERGY UPDATE
ENERGY BUDGET AND EXPENDITURES**

Commodity	2008/09		2009/10		2010/11	
	Budget	Actual	Budget	Actual	Budget	Actual
Electricity	\$ 4,616,900	\$ 5,755,988	\$ 5,733,000	\$ 6,797,223	\$ 6,759,525	\$ 6,549,661
Natural Gas	\$ 5,832,400	\$ 4,966,345	\$ 5,505,900	\$ 4,480,301	\$ 4,915,515	\$ 4,352,896
Total	\$ 10,449,300	\$ 10,722,333	\$ 11,238,900	\$ 11,277,524	\$ 11,675,040	\$ 10,902,557

Commodity	2011/12		2012/13		2013/14	
	Budget	Actual	Budget	Actual	Budget	Actual
Electricity	\$ 6,809,909	\$ 6,572,072	\$ 7,204,740	\$ 7,062,058	\$ 7,315,200	\$ 7,432,158
Natural Gas	\$ 4,958,342	\$ 3,357,832	\$ 3,163,721	\$ 2,377,512	\$ 3,512,270	\$ 2,934,994
Total	\$ 11,768,251	\$ 9,929,904	\$ 10,368,461	\$ 9,439,570	\$ 10,827,470	\$ 10,367,152

Commodity	2014/15		2015/16		2016/17	
	Budget	Actual	Budget	Actual	Budget	Actual
Electricity	\$ 9,213,000	\$ 8,018,535	\$ 8,263,900	\$ 8,803,203	\$ 8,164,700	\$ 8,892,776
Natural Gas	\$ 3,007,590	\$ 2,934,994	\$ 3,055,500	\$ 2,686,392	\$ 2,891,800	\$ 2,726,342
Total	\$ 12,220,590	\$ 10,953,529	\$ 11,319,400	\$ 11,489,595	\$ 11,056,500	\$ 11,619,118

Commodity	2017/18		2018/19		2019/20	
	Budget	Actual	Budget	Actual	Budget	Actual
Electricity	\$ 10,303,000	\$ 8,510,009	\$ 10,182,000	\$ 7,956,894	\$ 9,380,000	\$ 7,364,388
Natural Gas	\$ 2,714,000	\$ 3,044,841	\$ 2,997,500	\$ 2,698,385	\$ 2,971,500	\$ 2,846,183
Total	\$ 13,017,000	\$ 11,554,850	\$ 13,179,500	\$ 10,655,278	\$ 12,351,500	\$ 10,210,571

Commodity	2020/21	
	Budget	Actual
Electricity	\$ 8,854,500	\$ 7,325,544
Natural Gas	\$ 2,911,500	\$ 3,148,469
Total	\$ 11,766,000	\$ 10,474,013

**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.	108,015	\$ 86,628
Forest Glen P.S	121,589	\$ 97,514
Forest Heights C.I.	104,247	\$ 83,606
Lincoln Heights P.S.	118,332	\$ 94,902
Waterloo C.I.	129,472	\$ 103,837
Total	581,654	\$ 466,487

* Reports energy produced between November 2011 and August 2021.

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://lincolnhgtsp.solarvu.net/green/solarVuLive.php?ac=lincolnhgtsp&dr=dakon>
- Waterloo C.I. <http://www.waterlooci.solarvu.net/green/solarVu.php?ac=waterlooci>

2020/21 Utility Rebates Reinvestments (\$55,000)

- Brigadoon, Jean Steckle, 23 others Water meter monitoring equipment for leak detection
- GRCI, Laurentian, and 2 others Upgrade controls on urinal tanks to reduce water consumption
- Janet Metcalfe Recommissioning of building controls and mechanical equipment
- Avenue Rd Water conservation inspection
- GRCI, CHCI, Ayr, and 12 others Upgrade to exterior lighting control
- Elgin, Mary Johnston, and 32 others Upgrade interior lighting in portables to LED - 100 portables

2020/21 Capital Funded Energy Efficiency Upgrades (\$80,000)

- SSS, Conestogo, Glencairn and 4 others Upgrades to exterior lighting controls
- Coronation Install of energy efficient hand dryers
- Doon, BCI LED lighting upgrades
- Centennial W AC and Controls Upgrade
- CHCI LED exterior lighting upgrade
- SJAM Natural gas meter monitoring equipment trial

Appendix G – Technical Background and Methodology

The unit equivalent kilowatt-hours (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. This results in the metric Energy Use Intensity, measured in ekWh per square meter. These figures include portables and port-a-packs. Leased facilities such as 151 Weber are excluded.

Unlike 2019-20, data for 2020-21 was not adjusted for the impact of COVID-19 due to the complexity of these impacts in 2020-21. In 2020-21, ventilation measures (increased outdoor air, improved filters, HEPA units, etc.) increased energy consumption from pre-COVID behaviour, while school shutdowns in the second half of the year decreased it. The ventilation measures are estimated to have increased natural gas usage by 13 percent. The school closures reduced energy use over these periods by approximately 10 percent. As COVID-19 and the ventilation adaptations are likely to continue to impact energy data, and there are long-term ways WRDSB can mitigate the energy impact of these adaptations, this report will no longer adjust the data for these impacts.

GHG emissions are calculated using the emission factors reported in Environment Canada's Nation Inventory Report to the UN Framework Convention on Climate Change. Emissions are reported in units of kilograms of carbon dioxide equivalent (kg CO_{2e}).