

2018 CARBON NEUTRAL ACTION REPORT

COMOX VALLEY SCHOOLS

SCHOOL DISTRICT NO. 71



Comox Valley Schools

A Community of Learners

INNOVATIVE • INQUISITIVE • INCLUSIVE

VANCOUVER ISLAND



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DECLARATION STATEMENT

This Carbon Neutral Action Report (CNAR) for the period January 1st, 2018 to December 31st, 2018 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2018 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2019 and beyond.

By June 30, 2019 School District 71, Comox Valley's final Carbon Neutral Action Report will be posted to our website at www.comoxvalleyschools.ca/.



OVERVIEW - COMOX VALLEY SCHOOLS

Comox Valley Schools or School District 71 (SD71) is one of 60 school districts in British Columbia. In addition to serving the central Vancouver Island municipalities of the City of Courtenay, the Town of Comox and the Village of Cumberland, SD71 also serves students in the surrounding communities of Black Creek, Merville, Royston, Union Bay, Hornby Island and Denman Island.

QUICK FACTS – SD71 serves:

- 1 Regional District
- 2 Islands
- 8500 + students
- 3 Municipalities
- 1 First Nation



Vancouver Island, BC

Fifteen Elementary Schools: Airport, Arden, Aspen Park, Brooklyn, Courtenay, Cumberland Community School (K-9), Denman Island, École Puntledge Park, École Robb Road, Hornby Island, Huband Park, Miracle Beach, Queneesh, Royston, Valley View

One Middle School: Lake Trail Middle School (Gr. 6-9)

Three Secondary Schools: Georges P. Vanier, Highland, Mark R. Isfeld

Additional Schools/Programs: Glacier View Secondary Centre (Alternate Gr. 8-12), Nala'atsi Alternate Program, Navigate (NIDES), International Student Program

SD71's Vision and Mission Statement:

"A learning community that embraces diversity, honours relationship and prepares all learners for a changing world. To work with our educational partners to develop responsible, compassionate citizens and successful, lifelong learners."

Board of Trustees 2019 – 2022

OVERVIEW - GHG REPORTING

In 2007, the B.C. Government took a major step in the fight against climate change by setting aggressive greenhouse gas (GHG) reduction targets and making it legally binding. The Climate Change Accountability Act (CCAA), formerly titled “Greenhouse Gas Reduction Targets Act (GGRTA)” updates legislated targets for reducing greenhouse gases. Under the Act, B.C.’s GHG emissions are to be reduced by the following listed targets set for the PSOs and regulated by the Carbon Neutral Government:

- ❑ By 2030, B.C. will reduce GHG emissions by 40 per cent, compared to 2007 levels
- ❑ By 2040, B.C. will reduce GHG emissions by 60 per cent, compared to 2007 levels
- ❑ By 2050, GHG emissions will be reduced by at least 80 per cent below 2007 levels

To meet legislated targets, all public sector organizations including school districts, are required to be carbon neutral. The phrase “carbon neutral” is a way to explain and take responsibility for the GHGs emitted. As a PSO “adding” GHGs to heat buildings, the emissions can be “subtracted” by purchasing carbon offsets. These purchased offsets support innovative B.C.-based projects that create economic opportunities and fosters the use and development of clean technologies across the province. All public sector organizations follow a five-step process to become carbon neutral and have been doing so since 2010.

SD71 has implemented these five steps to become carbon neutral. Firstly, **measuring** operational GHG emissions from district buildings, district vehicles and district wide paper consumption. Secondly, **reducing** emissions where possible through an integrated approach. Thirdly, **offsetting** SD71 GHG emissions by purchasing an equivalent amount of high quality, made-in-B.C. carbon offsets. Fourthly, **reporting** annually on progress through the Carbon Neutral Action Report (CNAR) and finally, **verifying** data and emissions through SMARTTool. To convert GHG emissions into a unit of measure, the BC government uses the application SMARTTool. All PSOs enter their data into SMARTTool, which then converts this data into tonnes of carbon dioxide equivalents (tCO₂e).



To become carbon neutral for the 2018 calendar year, SD71 purchased carbon offsets for 2079 tonnes of carbon dioxide equivalent (tCO₂e) emitted.

Since SD71 began annual reporting in 2010, tCO₂e emissions have varied but have shown some declining trends. While the highest tCO₂e level was reported in 2012, the lowest level was in reported in 2015. Historical SD71 annual levels of tCO₂e emission are as follows:

- 2010 – 2463 tCO₂e
- 2011 – 2475 tCO₂e
- 2012 – 2504 tCO₂e
- 2013 – 2268 tCO₂e
- 2014 – 2208 tCO₂e
- 2015 – 1975 tCO₂e
- 2016 – 2027 tCO₂e
- 2017 – 2275 tCO₂e
- 2018 – 2079 tCO₂e

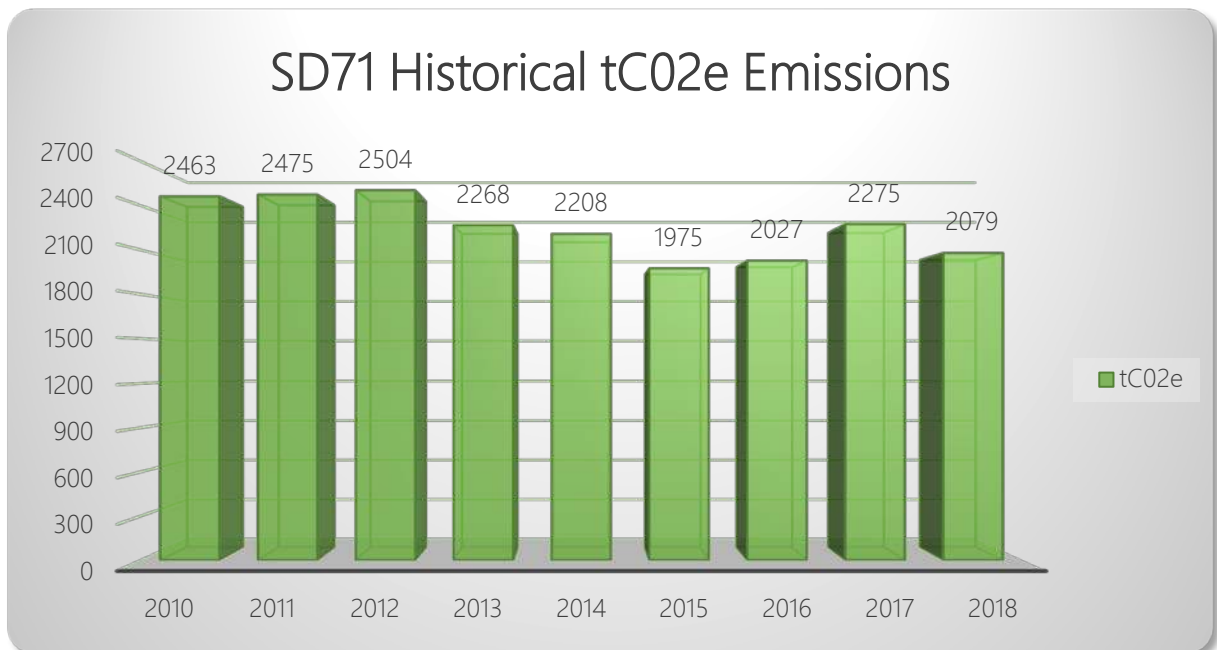


Figure 1 - SD 71 Historical tCO₂e Emissions 2010 - 2018

As noted in the data below, extracted from SMARTTool reports, district wide, buildings continue to produce the majority of GHG emissions at approximately 88% of the tCO₂e produced due to heating and lighting demands.

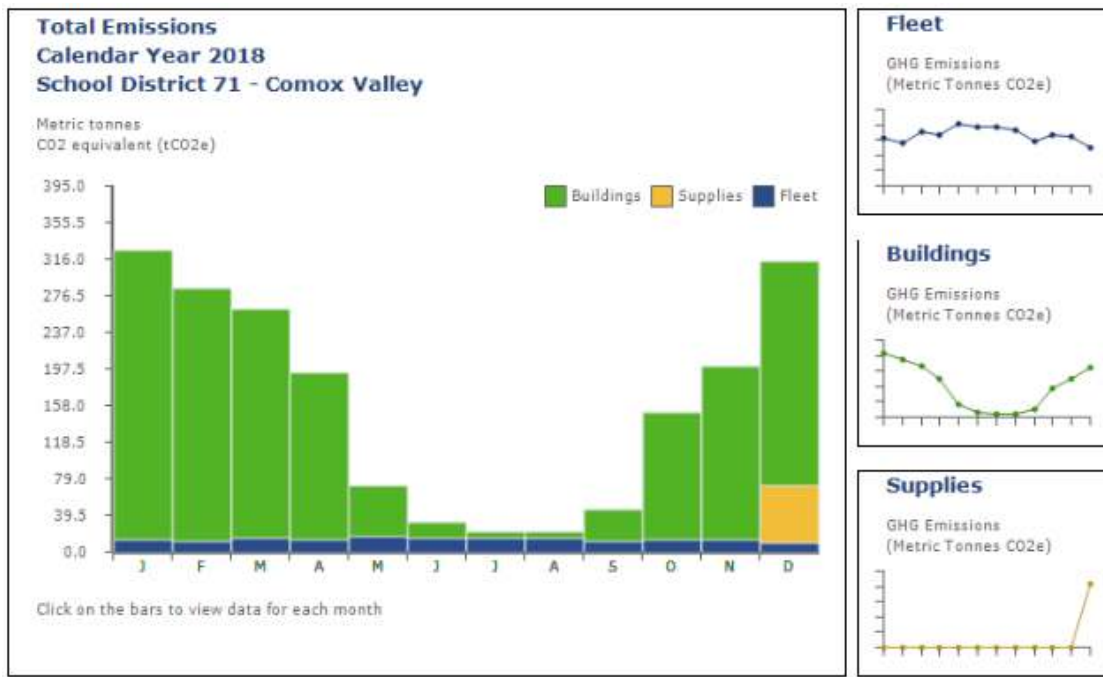


Figure 2 - SMARTTool Report of SD71 Monthly tCO₂e Levels

	Total Emissions	Total Offsets
2019 Calendar Year	706	706
2018 Calendar Year	1,962	1,956
Adjustment to 2017	132	132
Adjustment to 2016	-9	-9

Totals Calendar Year 2018, School District 71 - Comox Valley

Measure	Quantity	Greenhouse Gases in Tonnes					tCO ₂ e ¹
		CO ₂	BioCO ₂	CH ₄	N ₂ O		
Scope 1 (Direct) Emissions							
Mobile Combustion (Fleet)	Litres	74,163.00	163.16	5.60	0.02	0.04	182.02
Stationary Combustion, Reported ³	GigaJoules	33,155.51	1,648.43	0.00	0.03	0.03	1,658.60
Scope 2 (Indirect) Emissions							
Purchased Energy, Reported ³	GigaJoules	19,468.87	58.41	0.00	0.00	0.00	58.41
Scope 3 (Business Travel and Office Paper) Emissions							
Office Paper	Packages	9,720.00	62.63	0.00	0.00	0.00	62.63
Total Emissions, Calendar Year 2018			1,932.63	5.60	0.05	0.07	1,962
Carbon Neutral or Offset Exempt			0.00	5.60	0.00	0.00	6
Total for Offsets⁴			1,932.63	0.00	0.05	0.07	1,956

1. Each greenhouse gas has been converted to a standard measurement (tCO₂e) by multiplying its emissions by its global warming potential (GWP). The GWP of carbon dioxide (CO₂) from both anthropogenic and biogenic sources is 1; methane (CH₄) is 25, and nitrous oxide (N₂O) is 298. The Totals for tCO₂e are shown here rounded to the nearest whole metric tonne as only whole tonnes of tCO₂e can be purchased for offsets.
2. Estimated data has been calculated based on the methods described in the Methodology Document.
3. Reported data refers to consumption which has been directly billed to the organization.
4. The tCO₂e value from the "Total for Offsets" line represents the quantity of offset purchases required to become carbon neutral.

Figure 3 - SMARTTool Report of SD71 GHG in Tonnes, tCO₂e

OVERVIEW - KEY ACTIONS 2018

Throughout SD71, we are committed to preparing all learners for a changing world. We value healthy living and social responsibility as well as academics. Comox Valley Schools has met the challenges of rising heating costs and increased demand on aging facilities. Senior management has played an active role in seeking out and securing funding opportunities that will result in GHG emission reductions.

SD71 is committed to reducing greenhouse gas emissions, and energy efficiency highly contributes to this goal. The following four principles are of key importance when assessing the need for replacing equipment:

1. Creating healthy environments for students and teachers: air, noise, and temperature
2. Reducing energy waste
3. Reducing energy consumption
4. Increasing equipment and system efficiency

The most significant GHG reduction upgrade projects completed in 2018 include:

1. Valley View Elementary Boilers and Water Heater Replacement Project
2. Royston Elementary HVAC Mechanical & DDC Upgrade Project
3. Various Building and Equipment Upgrades

1. Valley View Elementary Boilers and Water Heater Replacement Project

A 2015 Mechanical Feasibility study of Valley View Elementary identified that the standard gas fired boilers were inefficient and were close to the end of their expected service life. The report detailed that the old standard efficiency boilers (approximately 50 to 60% efficient) should be replaced by high efficiency boilers to increase student comfort and to dramatically reduce natural gas consumption.



Figure 4 - Valley View School Boilers & Water Heater Replacements (pumps also replaced)

The photos above show Viessmann high efficiency boilers that replaced the Teledyne boilers in the summer of 2018. The estimated annual 60.57 tCO₂e or 33% reduction in emissions will occur due to replacement with a high efficiency condensing boiler system. This project was partially subsidised by Carbon Neutral Capital Program (CNCP) funding.

2. Royston Elementary HVAC (Mechanical) & DDC Replacement Project

A 2017 Mechanical Feasibility study of Royston Elementary identified that the existing mechanical system was controlled by a Delta DDC temperature control system and four classrooms were still served by original floor mounted Herman-Nelson unit ventilators. The floor mounted unit ventilators did not provide the required ventilation rates or good air distribution in the classrooms and were often turned off because of noise and drafts. The original exhaust fans had been in service for more than thirty-five years and all the exhaust fans and air conditioning units were showing the signs of structural failure due to corrosion (affected by weather). Cold air drafts were experienced in classrooms equipped with a motorized relief air system. Furthermore, the DDC system was outdated with micro panels there were no longer manufactured, and the District's maintenance department reported several failures of components.



Figure 5 - Royston Elementary School HVAC (Mechanical) & DDC Replacement

The photos above show that Royston Elementary school was replaced with heating and ventilating systems that provide ventilation rates acceptable for indoor air quality and occupants' thermal comfort. The existing floor mounted unit ventilators were replaced with vertical type unit ventilators and air distribution ductwork. Notably, the new demand-controlled ventilation and air side economizers maximize overall efficiency of the heating and ventilation system. Additionally, the gymnasium's air handling system was upgraded for variable air flow and CO₂ monitoring to increase system energy efficiency at lower occupant loads. With these upgrades, it is estimated that the annual GHG saving is 16.04 tons CO₂ (18%). This project was partially funded by the School Enhancement Program (SEP).

3. Various Building and Equipment Upgrades

A. **Direct Digital Control (DDC) building controls upgrades** were completed at Valley View and Royston Elementary schools. DDC systems are used to control a building's various systems from one central point. Depending on the building and its functions, these systems vary in complexity. A building may incorporate a DDC system just to control its HVAC (heating, ventilation and air conditioning) system, or to automate the entire building by also controlling other mechanical and electrical systems. An upgraded DDC system reduces energy waste, energy consumption, and increases equipment and system efficiency.

- B. LED Light upgrades were completed in the **gymnasiums** of the following three schools: Cumberland Community School's Beaufort building, Highland Secondary, and G.P. Vanier Secondary. The new gym lighting systems consume 40% less electricity than the former systems.

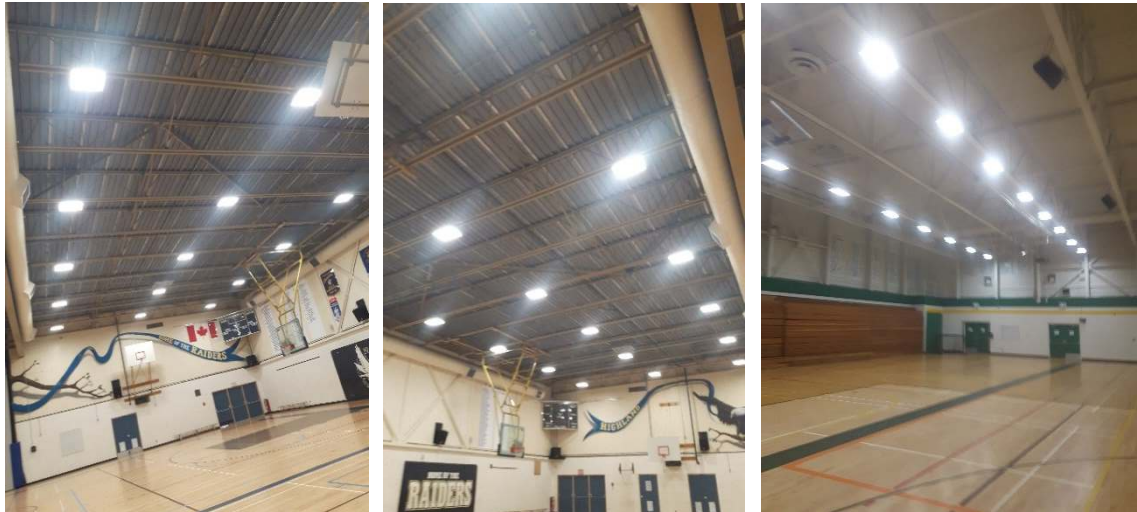


Figure 6 - Gymnasium LED Lighting upgrades at Highland Secondary and G.P. Vanier Secondary

- C. **IT Hardware Upgrades** - The IT Department continues to replace older computers that draw more power and create more heat with newer units as a part of the district's ongoing technology replacement plan. At the same time, replacing older liquid-crystal display (LCD) monitors with newer light-emitting diode (LED) monitors results in less heat generation and power loss. A cathode-ray tube (CRT) monitor needs 110 W to work but the new LED monitors need 17.18 W to work. **This translates to 68% power savings per Energy Star LED monitor.** Additionally, centrally located printers are replacing multiple, personal use printers.
- D. **SD71 Fleet Upgrades** - SD71 continues to remove older fleet vehicles and purchase newer vehicles that are fuel-efficient and produce less emissions.

OVERVIEW - SUCCESS STORIES

Roughly, 80% of SD71 buildings have fuel heating. Natural gas and propane have much higher tCO₂e emissions than electricity. Therefore, as funding and budgets allow, it is imperative to assess and plan which equipment, such as boiler plants, should be upgraded/replaced to gain better fuel efficiency and thus reduce emissions. The next few pages analyze three school boiler replacements from the years 2015, 2016, and 2017.

Lake Trail Middle School Boiler Replacement – Summer 2016

Completion of the boiler replacement at Lake Trail Middle School occurred in July 2016. Like the 2018 Valley View Elementary boiler replacement, a 2015 Mechanical Feasibility study of Lake Trail Middle School identified that the standard gas fired boilers were inefficient and close to the end of their expected service life. The report detailed that the old standard efficiency boilers (approximately 50 to 60% efficient) should be replaced by high efficiency boilers to increase student comfort and to reduce natural gas consumption.

The Lake Trail Middle School Boiler replacement was partially funded by the Carbon Neutral Capital Program (CNCP). This program provides grants to Public Service Organizations (PSOs) to invest in capital projects that reduce energy costs and lower carbon emissions. Funding is allocated by the Ministry of Health to six health authorities, including the Ministry of Education to school districts.

The three bar charts on the following pages show decreasing natural gas emissions (tCO₂e), increasing total cumulative sum of gas emissions saved (tCO₂e), and decreasing natural gas consumption (GJ's) after the 2016 boiler replacement at Lake Trail Middle School.



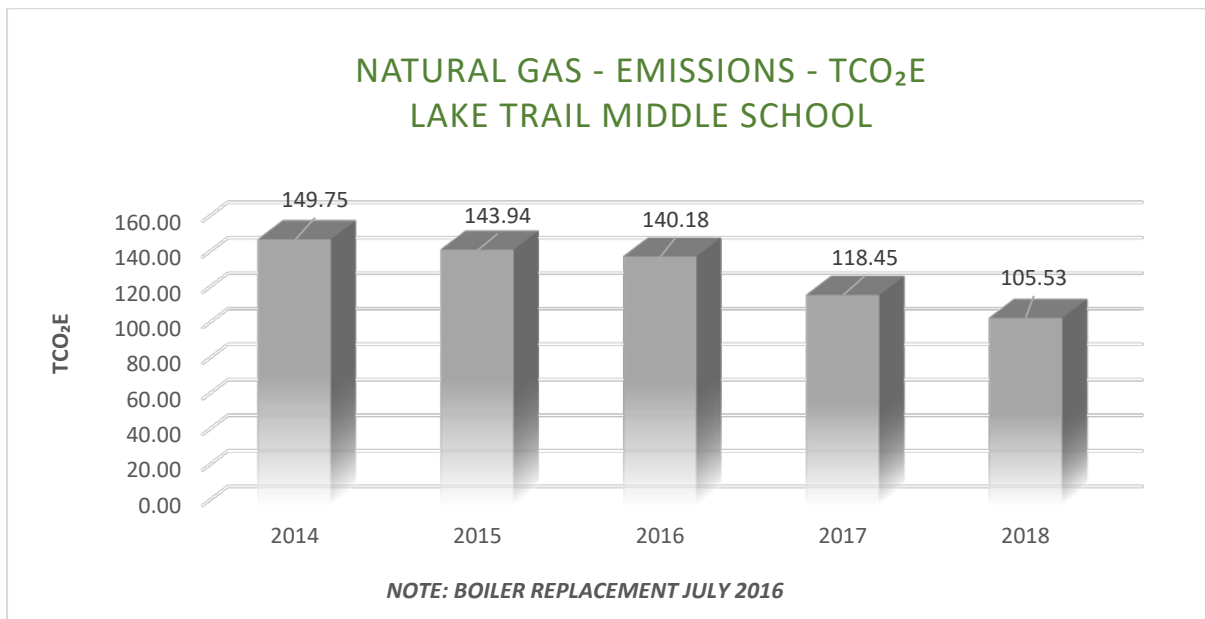


Figure 7 - Lake Trail Middle School - the amount of natural gas tCO₂e (tonnes of carbon dioxide equivalent) emitted annually from 2014-2018. The amount of emissions in 2018 is 27% less than in 2015 when an old and inefficient boiler was running.

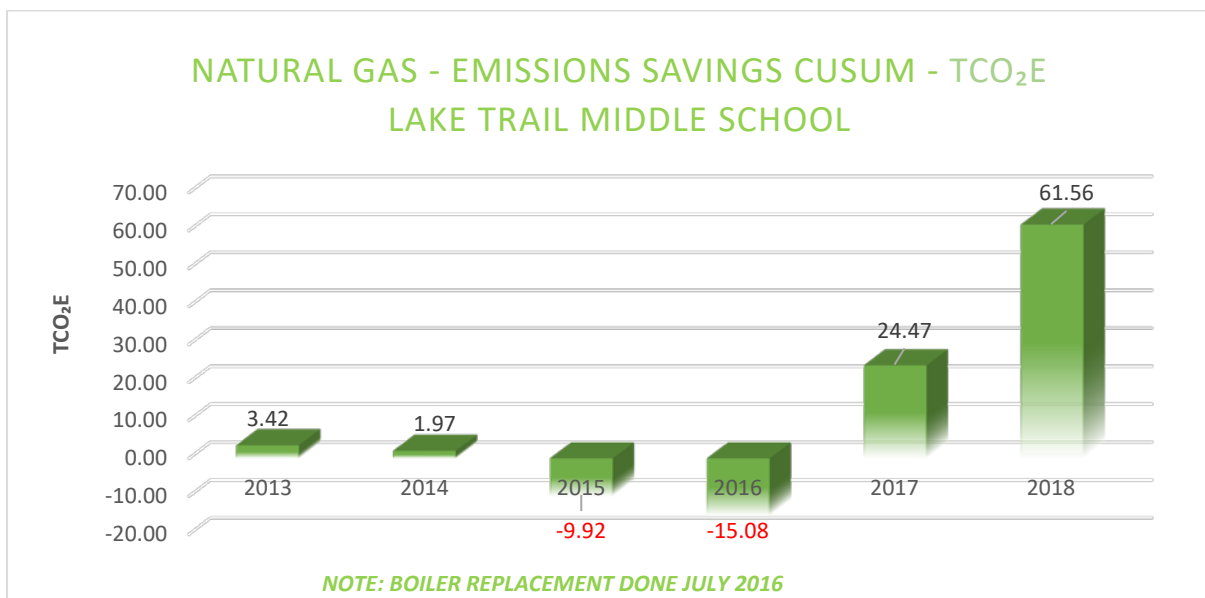


Figure 8 - Lake Trail Middle School - the CUSUM (cumulative sum) of savings of tCO₂e since the baseline year 2013/14. Note the substantial cumulative emissions savings in 2017 and 2018 since the boiler was replaced July 2016.

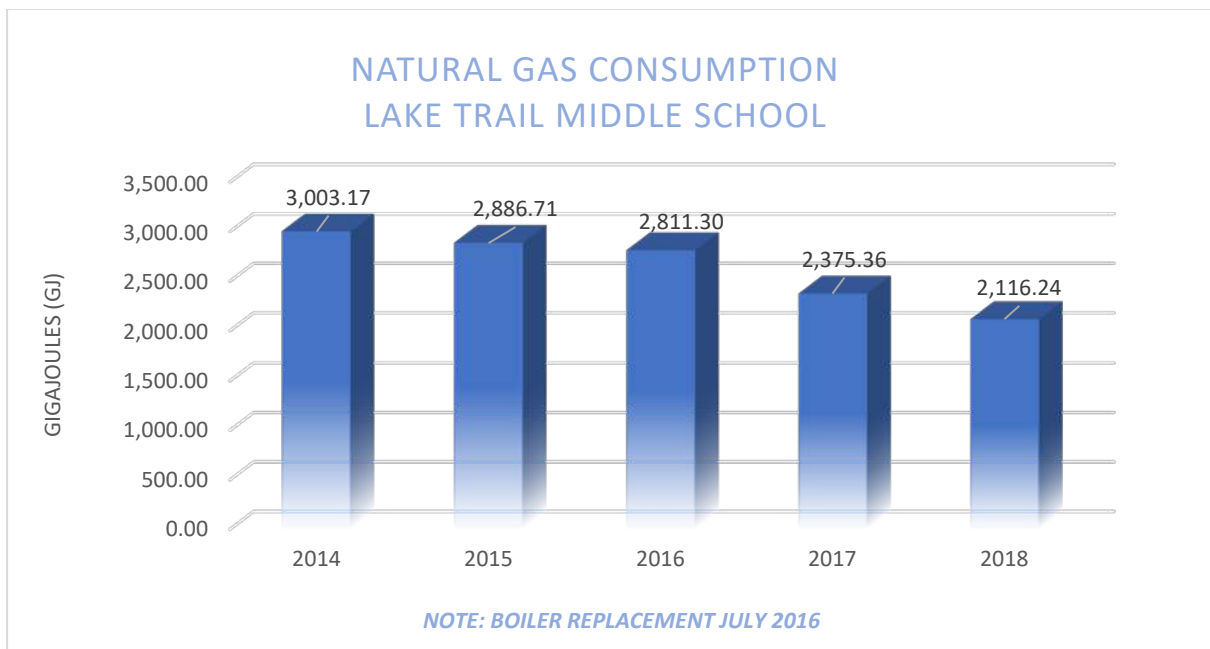


Figure 9 - Lake Trail Middle School - the amount of natural gas consumed since 2016 decreased by 15% in 2017 and 25% in 2018.

Courtenay Elementary School Boiler Replacement – Summer 2017

Completion of the Boiler replacement at Courtenay Elementary School took place in July 2017. This replacement was funded by School District No. 71.

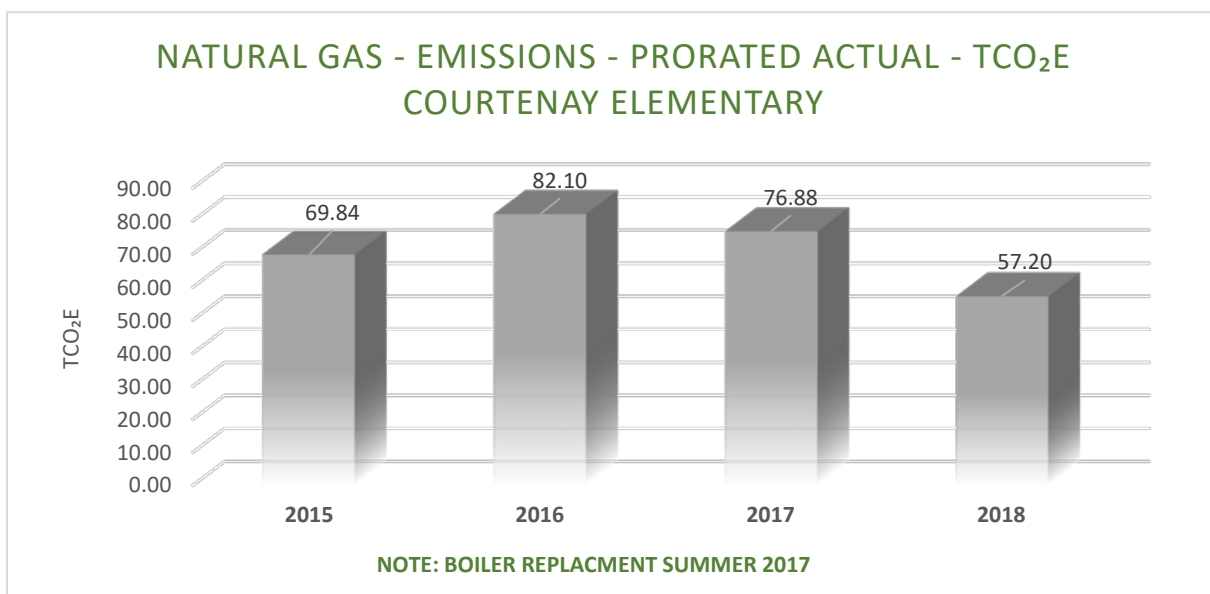


Figure 10 - Courtenay Elementary School - the amount of natural gas tCO₂e emitted annually from 2015-2018. Note the decline since the boiler replacement in 2017. The amount of emissions in 2018 is 30% less than in 2016 when an old and inefficient boiler was running.

Ecole Robb Road School Boiler Replacement – Summer 2017

Ecole Robb Road Elementary School also received a boiler replacement in July 2017. This replacement was funded by School District No. 71.

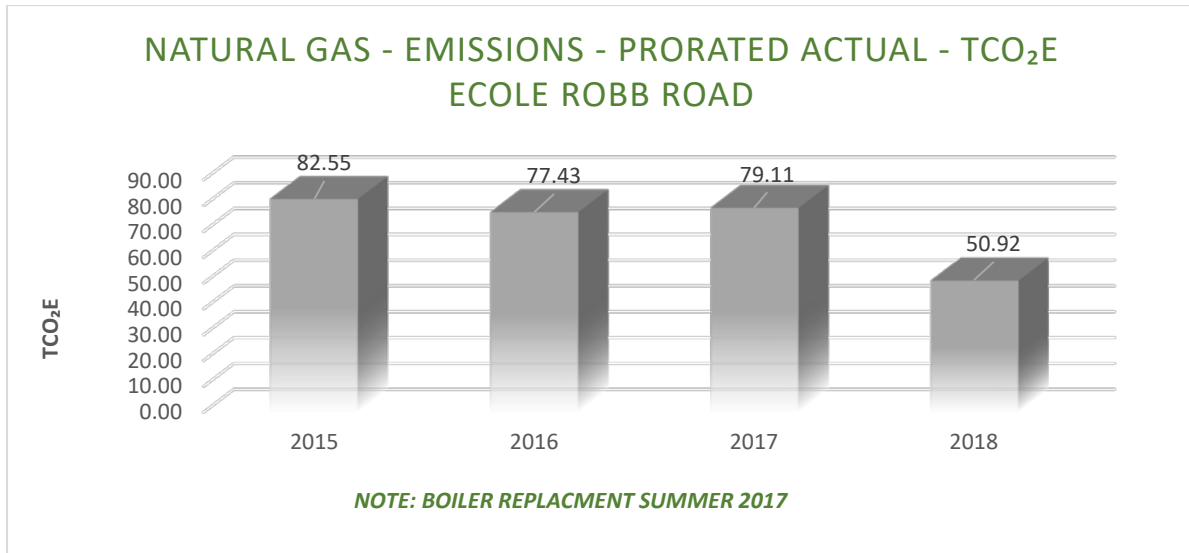


Figure 11 - Ecole Robb Road - the amount of natural gas tCO₂e emitted annually from 2015-2018. The amount of emissions in 2018 is **34% less** than in 2016 when an old and inefficient boiler was running.

Royston Elementary School Boiler Replacement – Summer 2015

Ecole Robb Road Elementary School received a boiler replacement in July 2015 funded by School District No. 71. The following two graphs show cumulative savings.

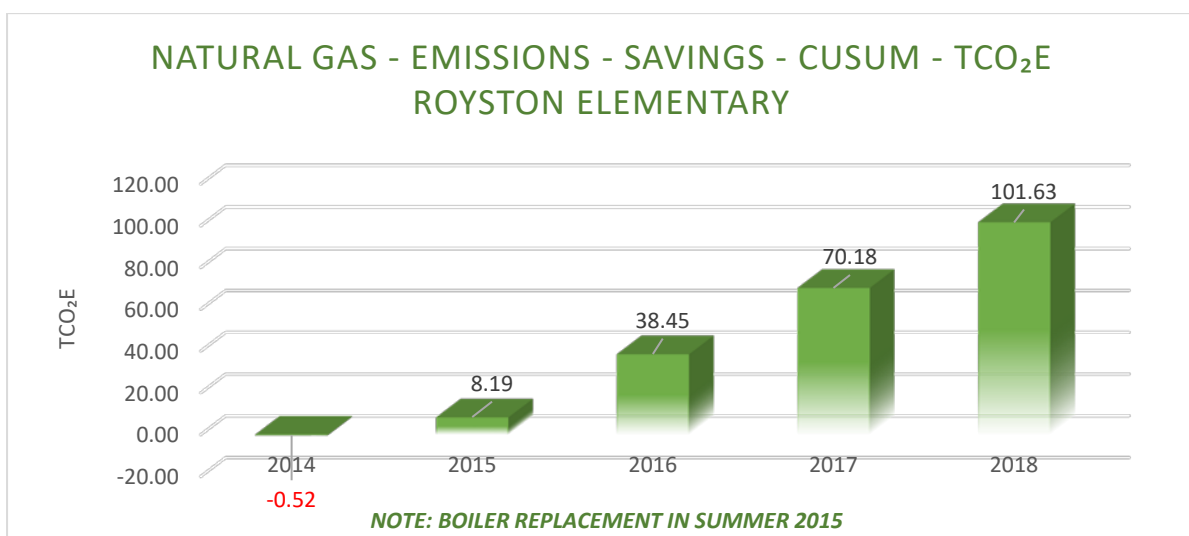


Figure 12 - Royston Elementary – the CUSUM (cumulative sum) of natural gas tCO₂e saved from 2014 to 2018 as compared to the baseline year 2013/14, adjusted for weather.

Cost CUSUM: Meter

Project: **SD#71 Comox PUMA (2015033)**
 Site: **RytnEL Royston EL**
 Meter: **GAS-RytnEL-01: 948801/#73 (1406149)**

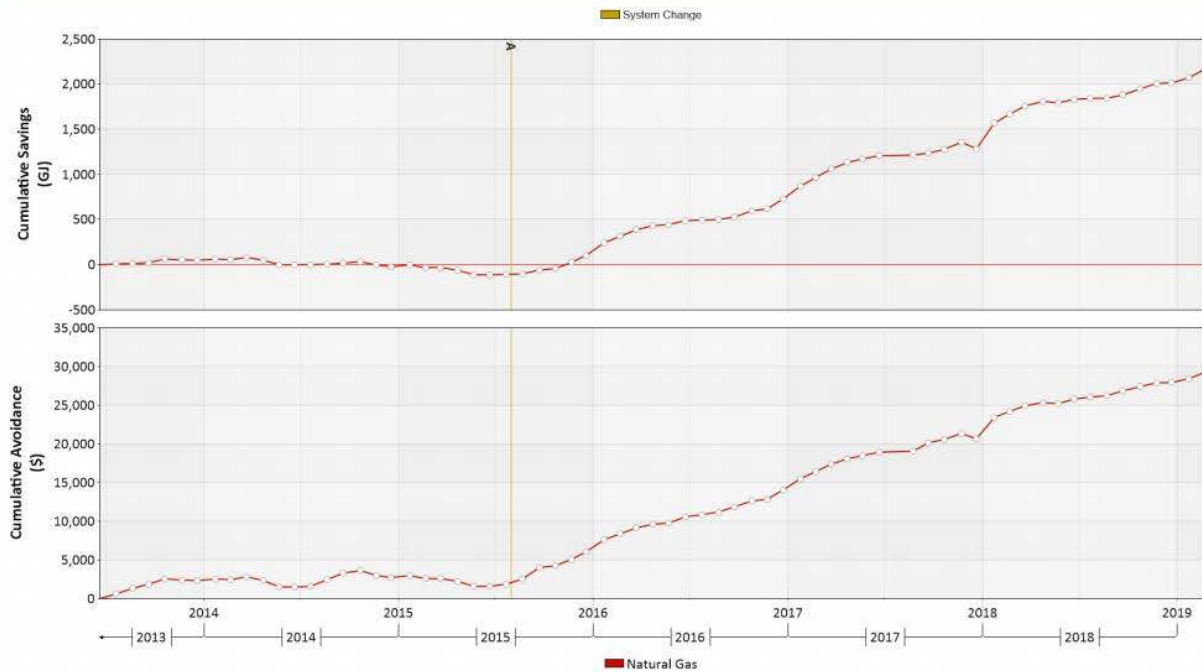


Figure 13 - Royston Elementary – the CUSUM (cumulative sum) of natural gas consumption savings (GJ) and \$ cost savings from 2014 to 2018. The yellow vertical line notes the boiler replacement done in the summer of 2015. Report from PUMA by Prism Engineering.



OVERVIEW - FUTURE EMISSIONS REDUCTION

Since 2010, about one-third of B.C.'s 128 PSOs have achieved a 15% reduction in emissions and approximately one-fifth have reduced emissions by approximately 25% or more. SD71 aims to contribute to the 2050 emission reductions targets as set out by the BC government by reducing the GHG emissions.

The largest portion of the School District's GHG emissions originate from the energy used to heat and power the schools, maintenance, and administration buildings. Consequently, the largest GHG reduction initiatives and applications for funding are directed towards reducing the energy consumption from buildings. Some key strategies include assessing the energy performance of each school site and identifying future energy efficiency projects that will reduce consumption in the district facilities. These assessments will factor in the *Annual Facility Grant (AFG)* project planning process, the *Annual Capital Plan*, *Long Range Facilities Plan (LRFP)*, and the *Carbon Neutral Capital Program (CNCP)* funding requests.

Planned Energy Efficiency Projects for 2019:

- ❑ Installation of **HVAC (mechanical) upgrades** at Royston Elementary with funding from the *School Enhancement Program (SEP)*.
- ❑ Installation of a **high efficiency boiler plant** at Highland Secondary School with some funding from the provincial *Carbon Neutral Capital Program (CNCP)*.
- ❑ Installation of a **high efficiency boiler plant** at Cumberland Community School with funding from the *School Enhancement Program (SEP)*.
- ❑ Installation of a **high efficiency boiler plant** at Mark R. Isfeld Secondary with funding from the *School Enhancement Program (SEP)*.
- ❑ Installation of a **high efficiency boiler plant** will also take place at Ecole Puntledge Park Elementary and be funded by SD71.
- ❑ Installation of **energy efficient LED lighting system** in the trade shops of Highland Secondary, Mark R. Isfeld Secondary, and G.P. Vanier Secondary using SD71 funds.
- ❑ A **Direct Digital Control (DDC) building controls upgrade** will be completed at Ecole Puntledge Park and be funded by SD71.

EMISSIONS & OFFSETS SUMMARY

Comox Valley Schools, School District 71, GHG Emissions and Offsets for 2018 (tCO₂e)

GHG Emissions created in Calendar Year 2018

Total Emissions (tCO ₂ e)	1962
Total BioCO ₂	6
Total Offsets (tCO ₂ e)	1956

Adjustments to GHG Emissions Reported in Prior Years

Total Emissions (tCO ₂ e)	123
Total Offsets (tCO ₂ e)	123

Grand Total Offsets for the 2018 Reporting Year

Grand Total Offsets (tCO ₂ e)	2079
Grand Total Offsets required (tCO ₂ e)	2079
Total Offset Investment	<u>\$51,975</u>

Retirement of Offsets:

In accordance with the requirements of the Greenhouse Gas Reduction Targets Act and Carbon Neutral Government Regulation, *School District 71, Comox Valley* is responsible for arranging for the retirement of the offsets obligation reported above for the 2018 calendar year, together with any adjustments reported for past calendar years. The Organization hereby agrees that, in exchange for the Ministry of Environment ensuring that these offsets are retired on the Organization's behalf, the Organization will pay within 30 days, the associated invoice to be issued by the Ministry in an amount equal to \$25 per tonne of offsets retired on its behalf plus GST.

Executive sign-off:

Signature:  Date: May 15th, 2019

Name: Mr. Dean Lindquist

Title: Superintendent of Schools

APPENDIX A:

Greenhouse Gas Emissions Source Report - Climate Action Secretariat will append to this Carbon Neutral Action Report (CNAR) on June 30th, 2019.

