

Strategic Energy Management Plan

School District No. 72 (Campbell River)

March 2019

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1. OUR ORGANIZATION

School District 72 is one of 60 school districts in British Columbia. Based in Campbell River, our school district is 3939 square kilometers in size. Although most schools are located within the City of Campbell River, School District 72 has several outlying schools including the Village of Sayward, Read Island and Cortes Island.

1.1 Facility Profile

Facility Profile						
Site	Size m ²	2018 Annual Energy Consumption GJ (e)	2018 Annual Energy Cost (\$)	2018 Energy Intensity GJ (e) per m ²	2017 Energy Intensity GJ (e) per m ²	2016 Energy Intensity GJ (e) per m ²
Carihi	10,533	8,170	114,176	0.78	0.90	0.92
Cortes	1,382	927	37,798	0.67	0.75	0.80
Cedar	2,389	1,906	28,560	0.80	0.77	0.71
Discovery Passage	1,602	979	13,253	0.61	0.62	0.52
EDM	2,409	1,506	23,388	0.63	0.72	0.67
Georgia Park	3,375	2,305	45,009	0.68	0.73	0.75
Maintenance/Bus Garage (incl 3 portables)	2,068	820	15,697	0.40	0.55	0.48
Ocean Grove (incl 2 portables)	2,692	2,127	38,860	0.79	0.86	0.96
Oyster River	2,106	1,501	25,518	0.71	0.82	1.04
Penfield	2,918	1,406	47,260	0.48	0.53	0.51
Phoenix (incl 1 portable)	8,370	5,329	88,133	0.64	0.68	0.67
Pinecrest	3,221	1,639	28,811	0.51	0.55	0.66
Quadra	2,647	1,126	38,779	0.43	0.46	0.45
Ripple Rock (incl 1 portable)	2,809	2,016	33,398	0.72	0.71	0.77
Robron	5,846	4,120	72,565	0.70	0.62	0.69
Sandowne	3,581	2,219	42,990	0.62	0.77	0.83
Sayward	2,977	1,675	68,086	0.56	0.54	0.53
School Board Office (incl 1 portable)	1,824	1,561	46,505	0.86	0.92	0.97
Southgate	7,373	3,775	69,343	0.51	0.49	0.57
Surge Narrows (incl Community Use)	530	388	13,125	0.73	0.68	0.78
Heritage lands (incl portable and NIC)	18,299	19,254	314,843	1.05	1.16	1.20
Willow Point	2,772	2,044	34,643	0.74	0.75	0.76
TOTAL	91,722	66,793	1,240,740	0.73	0.75	0.79

Energy Intensity expresses a building's energy use as a function of its size or other characteristics. It facilitates comparison of different buildings over time. In 2018, our Energy Intensity of 0.73 GJ(e) per square meter was the second lowest level in the past 10 years (2015 was 0.70 GJ(e) per square meter). Space heating is the most significant energy requirement for School District 72. Heating Degree Days in 2018 were 12.6% below the 10-year average.

2. OUR COMMITMENT

2.1 Why is energy conservation important to us?

Energy conservation awareness is considered an integral component of sustainable environmental practices and education curriculum. The Campbell River School District strategic planning reflects this belief by including specific objectives in support of various strategic focus areas.

Financial benefits of energy conservation are both direct (through reduced utility costs) and indirect (reduced carbon offset payments). These savings are made available for educational programs and reinvestment into future energy conservation initiatives.

Strengthening and expanding community relations is one focus of the Campbell River School District Strategic Plan. Environmental stewardship awards presented by the City of Campbell River, Union of BC Municipalities, and Campbell River Chamber of Commerce reflect the positive relationships with our community partners. Additionally, strategic partnerships have been established with BC Hydro (Energy Manager program), Fortis BC (incentive programs), Natural Resources Canada (provision of benchmarking data through surveys and the Energy Star program), and the BC Climate Action Secretariat (Carbon Neutral Action Reports).

2.2 Operational Procedure 515 – Environmental Responsibility

Background

The District is committed to fostering policies, practices and educational programs which will protect and preserve the environment.

Procedures

1. The District will endeavour to purchase “environmentally friendly” products which will provide the highest possible level of performance.
2. The efficient use of energy and water will be guiding principles in all renovations, new construction and operations.
3. The District encourages and supports initiatives to reduce, recycle and recover waste materials in all schools and departments.
4. The District supports staff development initiatives designed to advance environmental awareness, environmental education and care for the environment within annual budget allocations for training and development.
5. Environmental education will continue to be incorporated into the content and methodology of the instructional program.

3. UNDERSTANDING OUR SITUATION

3.1 Utility Consumption and Costs

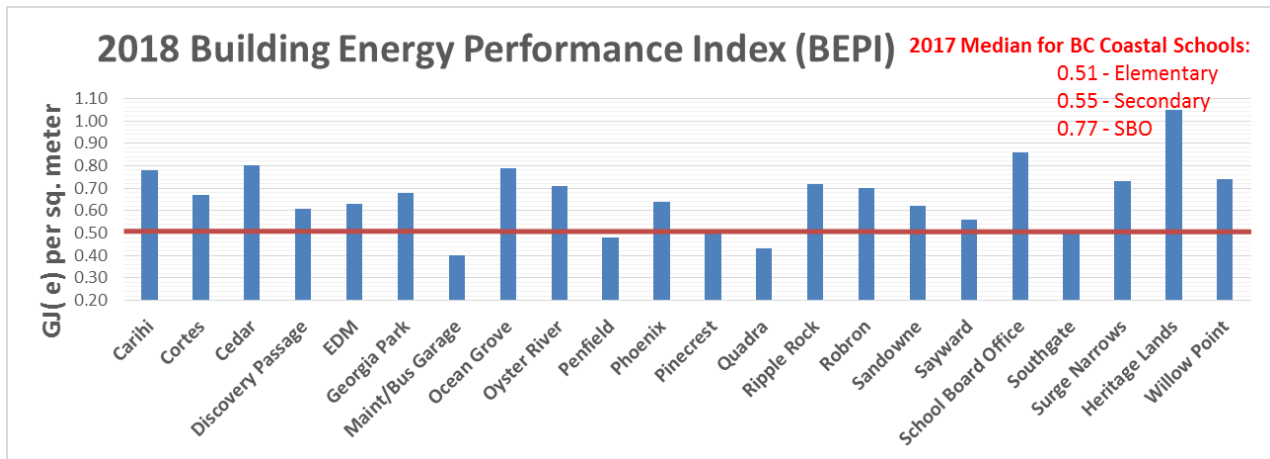
Referring to the following charts, electricity historically accounts for more than one-half of School District 72 utility costs. This fact contributed to the school district decision to become a member of the BC Hydro Energy Manager program from 2009 to 2015. In recent years, however, resources have focused more on reducing natural gas use because more than one-half of School District 72 carbon footprint is the result of fossil fuel consumption.

In addition to energy consumption, School District 72 proactively manages other types of utilities. The 2015 pilot project to connect irrigation controls to the University of Victoria's School-Based Weather Station Network has continued, with one site per year being converted so playing fields are only watered when weather dictates. In concert with the solid waste shared services contract with the City of Campbell River, recycling collection has continued to expand. Efforts have continued to reduce the number of propane-fueled vehicles, resulting in a lower carbon footprint.

2018 Calendar Year	Normalized Consumption	Normalized Costs	
	GJ	\$	%
Electricity	26,362	832,826	57%
Natural Gas	38,372	322,447	22%
Propane (buildings)	1,772	76,861	5%
Diesel (marked)	388	13,125	1%
Water, excl irrigation	50,828 m ³	52,187	4%
Irrigation	53,282 m ³	36,011	3%
Sewage	43,891 m ³	56,997	4%
Refuse (extra pickups)	716 yd ³	63,119 <i>(basic svc and extra pickups)</i>	4%
Recycling	1,305 yd ³	6,838	0.5%

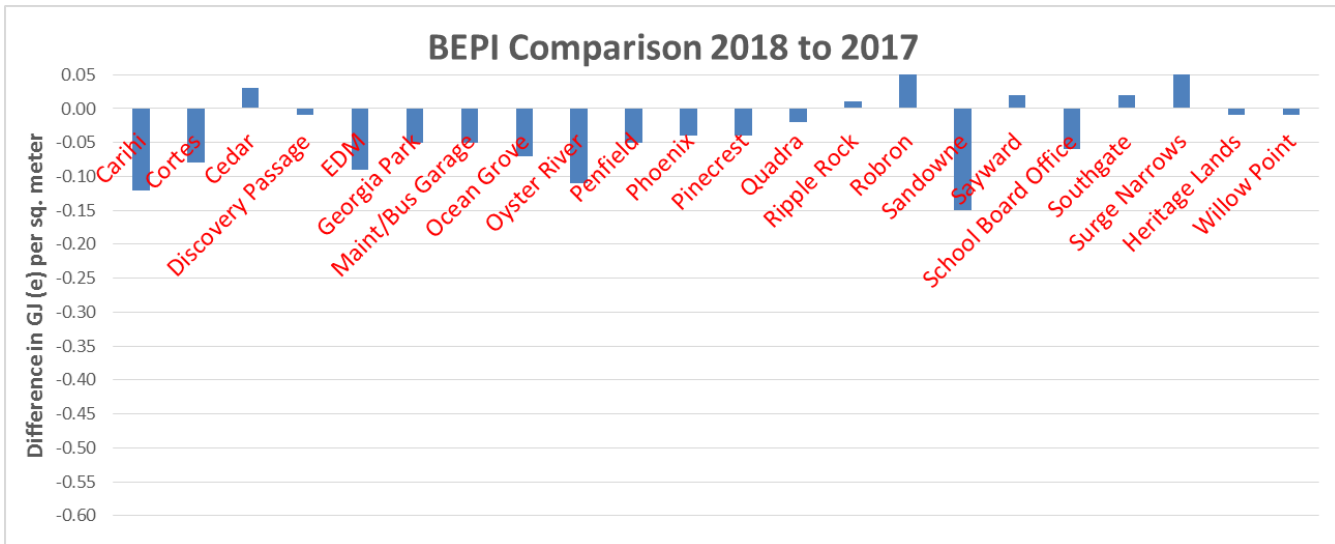
3.2 Savings Opportunity Assessment - Energy Consumption Intensity

While most facilities had an improved Building Energy Performance Index (BEPI) in 2018 compared to 2017, School District 72 continues to have above average energy intensity compared to most BC coastal schools. This indicates further opportunities for energy savings, cost avoidance and a lower carbon footprint.



For 2018, the three buildings in School District No. 72 with the highest BEPI were:

- a. Heritage Lands. This school is jointly occupied by Timberline Secondary and North Island College, with many educational programs not found elsewhere in the school district. For much of 2018, North Island College was undertaking a site redevelopment and expansion initiative. Although the BEPI remained relatively unchanged, School District 72 undertook the separation of utility accounts and costs so only Timberline Secondary will be tracked. This should result in a lower BEPI in 2019.
- b. School Board Office. Relative to 2017, overall energy consumption decreased slightly in 2018. Analysis shows the decrease is attributable to lower electricity use during the heating season, which more than offset increased natural gas consumption. This suggests a positive outcome from the preventive maintenance program for heat pumps, which was introduced in 2018. Additionally, fewer people may be using electric space heaters at their work stations because of more effective area heating.
- c. Cedar Elementary. Overall energy consumption increased slightly in 2018 compared to 2017. Natural gas consumption increased approximately 2% and electricity increased over 7%. These differences indicate the increased BEPI was primarily the result of a change in building occupancy.



School District 72 buildings with the greatest BEPI increase in 2018 were:

- a. Robron Centre. Ongoing issues with the heat distribution system resulting in a significant increase in natural gas use. Although emergency repairs are scheduled for 2019 to address leaks, replacement of heating system valves and improvements to the building controls are on hold until funding becomes available.
- b. Surge Narrows. This small school is the only site that uses a diesel generator to meet all energy requirements. The full impact of extending school hours was realized in 2018, resulting in increased energy consumption compared to 2017.
- c. Cedar Elementary. The BEPI increase is primarily due to greater electricity use. Given no identifiable changes in the building operation, the electricity use is believed to be the result of changing occupant needs. Cedar Elementary is on the Capital Plan for a proposed replacement. Therefore, major upgrades to the building envelop are not anticipated in the foreseeable future.

4. OUR ACTIONS

4.1 Program Results 2007-2018

School District 72's successes in energy conservation are described in previous Strategic Energy Management Plans and the feature article in the Ministry of Environment report *Carbon Neutral Government: Year in Review 2015*.

Energy Intensity by Heating Degree Days (HDD)

Heating Degree Days (HDD) are a significant factor when analyzing energy consumption. A cooler winter generally results in more HDD and higher energy consumption. In School District 72, only two elementary schools rely on electric heat. Therefore, the influence of the heating season is most noticeable on fossil fuel consumption.

Conversely, a warm summer (i.e. higher Cooling Degree Days) will generally result in high energy consumption because of air conditioning equipment and use of electrical fans for occupant comfort. In the case of School District 72, only the School Board Office and the Heritage Lands facility are air conditioned and occupied for most of the cooling season. Therefore, Cooling Degree Days are not as significant a contributor to energy consumption as HDD.

Historically, Heritage Lands has had the largest energy requirements of all facilities under management. Although there was a reduced energy intensity compared to 2017, the past year was transitional for the facility. By the end of 2018, School District 72 had effectively split the North Island College accounts from Timberline Secondary. With North Island College assuming responsibility for their energy consumption and costs, Heating (and Cooling) Degree Days should be less significant factor on School District 72 energy consumption.

The following table normalizes energy intensity using Heating Degree Days (HDD). Since 2007, the benchmark year under the Greenhouse Gas Reduction Targets Act, School District 72 has experienced a 6.8% increase in overall energy intensity per HDD. Since 2009, however, when School District 72 enrolled in the BC Hydro Energy Manager Program, School District 72 has achieved a 0.9% reduction in overall energy intensity per HDD. These comparisons reinforce the importance of a proactive energy management program to identify and implement energy conservation measures and efficiencies.

School District 72's greatest successes have been achieved in electrical conservation, reflecting completion of many re-lamping projects while having relative few buildings that use electric heating or cooling. Conversely, fossil fuel consumption continues to be a challenge and provides the greatest opportunities for energy conservation projects. As mechanical equipment reaches end-of-life, School District 72 has a continuing program of mechanical upgrades and boiler replacements using current energy conservation technologies.

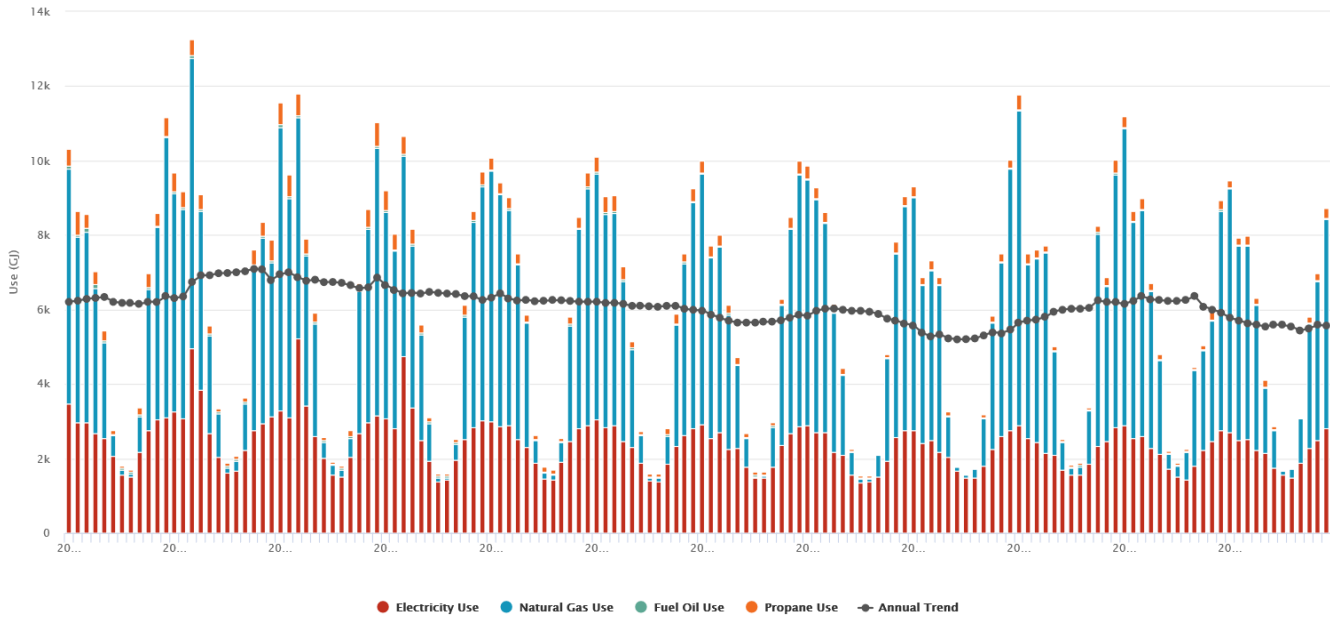
Year	Overall Energy Intensity (GJ(e)/HDD/)	Percent Change in Overall Energy Intensity (%)	Natural Gas GJ/sq M % Chg	Electricity KWH/Sq M % Chg
2007	30.85			
2008	31.62	2.5%	5.0%	10.8%
2009	33.24	5.1%	0.4%	-1.8%
2010	31.98	-3.8%	-9.3%	-6.0%
2011	29.23	-8.6%	7.7%	-9.9%
2012	29.04	-0.6%	-4.8%	-2.1%
2013	30.19	4.0%	-2.5%	-2.7%
2014	30.11	-0.3%	0.0%	-5.4%
2015	31.29	3.9%	-5.1%	-1.2%
2016	34.36	9.8%	18.9%	1.9%
2017	29.56	-14.0%	-6.8%	-0.3%
2018	32.95	11.5%	-9.8%	-1.0%

The following charts summarize energy use and cost trends since 2007, the benchmark year of the Greenhouse Gas Reduction Targets Act. Ongoing energy use decreases were achieved until 2016. The winter of 2015/2016 was cold compared to recent years, resulting in greater heat demand. A decreasing energy use trend appears to be reemerging in since 2016.

Comparing 2018 and 2007, overall energy use has decreased by 22%. This more than offset increases in energy rates, resulting in a net cost savings of 3.6%. This reinforces the long term financial benefits of energy conservation and enables more educational dollars to be invested into the classroom.

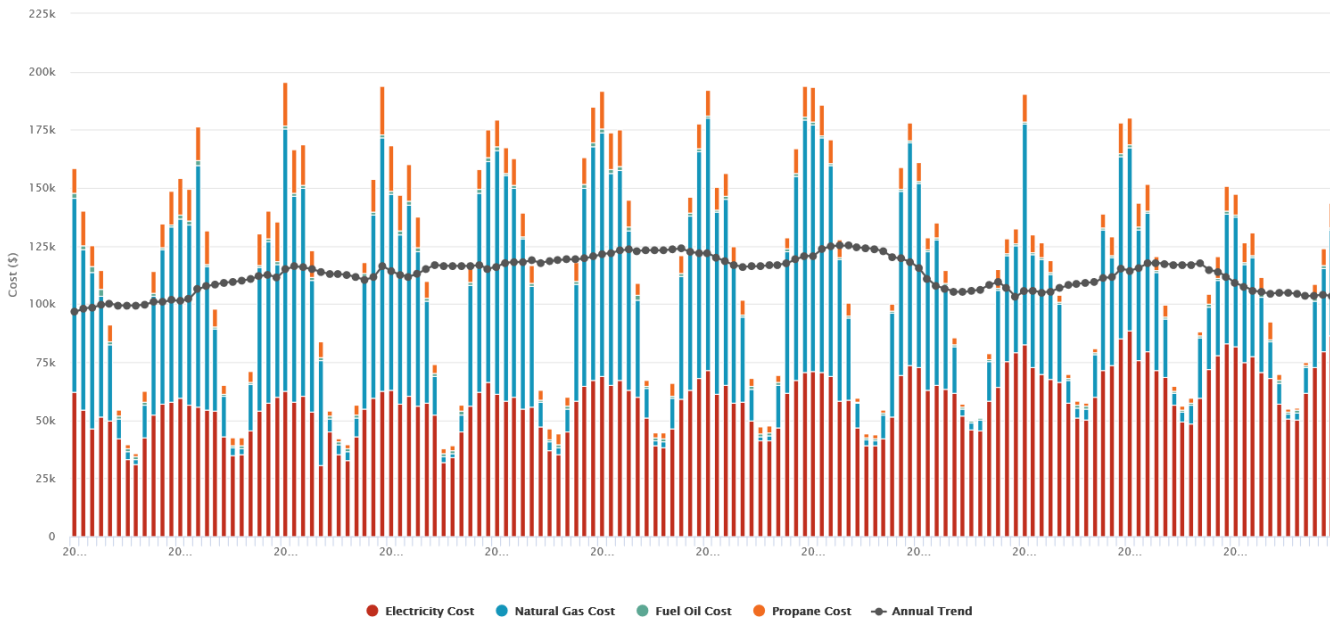
Energy Use Trend

All Facilities -- 01/2007 to 12/2018



Energy Cost Trend

All Facilities -- 01/2007 to 12/2018



4.2 Completed Energy Conservation Projects in 2018

Completed 2018 life-cycle replacement projects with the highest energy conservation impacts are summarized in the following table.

Location	Description	Cost	Funding Source(s)	Comments
Ocean Grove Elementary	Boiler Replacement	\$182,720	FortisBC, Annual Facilities Grant	Conversion to High Efficiency Boilers, in conjunction with life cycle replacement. Right-sizing for proposed school expansion
Ecole Des Deux Mondes	Boiler Replacement	\$63,438 (not incl contributed labour)	FortisBC, Annual Facilities Grant	Conversion to High Efficiency Boilers as part of life cycle replacement
Maintenance & Transportation Building	Life cycle replacement of two roof sections. Seismic upgrades	\$214,800	Annual Facilities Grant	Building envelop improvements in conjunction with seismic upgrades
Quadra Elementary	Replace four roof sections.	\$380,000	Annual Facilities Grant	Improved R-value in conjunction with roof replacements
Heritage Lands	Separate NIC and Timberline utilities	\$24,000	Annual Facilities Grant	Electrical sub-metering; transferring accounts to NIC wherever practicable

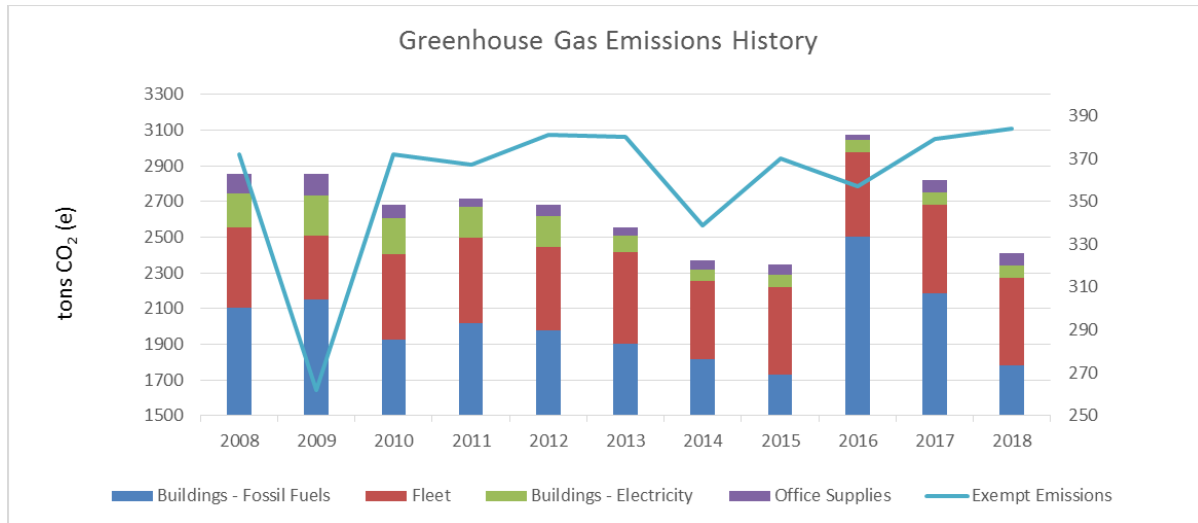
4.3 Impact on Greenhouse Gas Emissions

Energy consumption accounts for most School District 72 Greenhouse Gas Emissions. Therefore, energy conservation is a key factor for meeting the provincial requirement for carbon neutral operations.

Although our fossil fuel use has decreased significantly since 2007, the greatest opportunity for reducing our carbon footprint remains natural gas required for heating. School District 72's carbon footprint from electricity use has decreased of 70% since 2009 (the first year of enrollment in the BC Hydro Energy Manager program). Given the increases in recent years in the use of paper products, consumption of office stationary remains a significant engagement opportunity for staff.

Exempt carbon emissions have increased in recent years as a result of increased school bus mileage. These emissions are exempt from the purchase of carbon offsets because of the positive impact of reducing the use of privately owned vehicles.

To achieve carbon neutrality, School District 72 is required to purchase carbon offsets. For 2018, this will be approximately \$50,200.



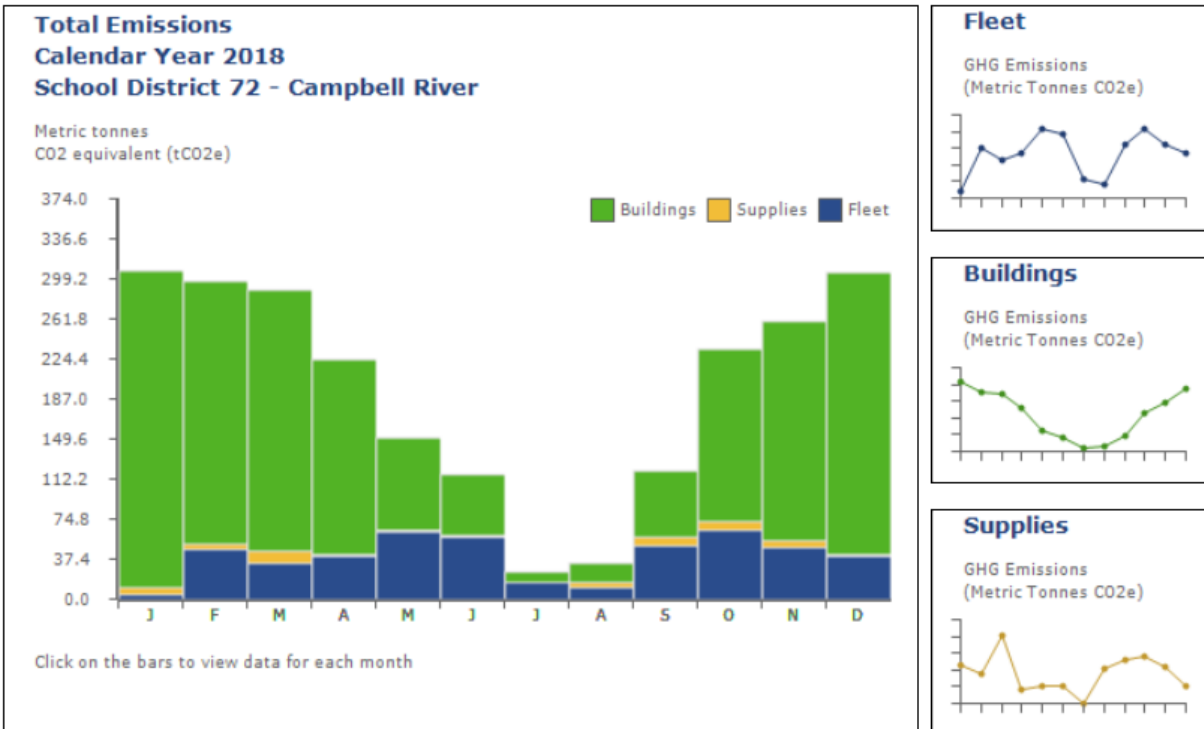
	Measure	Quantity	Greenhouse Gases in Tonnes				
			CO ₂	BioCO ₂	CH ₄	N ₂ O	tCO ₂ e ¹
Scope 1 (Direct) Emissions							
Mobile Combustion (Fleet)	Litres	183,784.57	462.72	17.58	0.02	0.04	492.83
Stationary Combustion, Reported ³	GigaJoules	35,181.33	1,766.59	0.94	0.04	0.04	1,780.42
Scope 2 (Indirect) Emissions							
Purchased Energy, Reported ³	GigaJoules	22,491.94	67.48	0.00	0.00	0.00	67.48
Scope 3 (Business Travel and Office Paper) Emissions							
Office Paper	Packages	10,841.00	67.89	0.00	0.00	0.00	67.89
Total Emissions, Calendar Year 2018			2,364.67	18.52	0.06	0.08	2,409
Carbon Neutral or Offset Exempt			358.79	18.52	0.02	0.02	384
Total for Offsets⁴			2,005.88	0.00	0.04	0.06	2,025

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.



4.4 Energy Conservation Targets 2019 and Beyond

School District 72 has consistently achieved energy conservation and greenhouse gas reductions targets by taking full advantage of opportunity funding and external grants. Going forward, energy conservation initiatives will strive for an ongoing 2% reduction in energy consumption per year. To achieve this goal, the Annual Facilities Grant, Major Capital Program, Carbon Neutral Capital Program and School Enhancement Program will consider and incorporate energy conservation opportunities when developing school renewal projects.

Planned 2019 life-cycle replacement projects with the highest energy conservation opportunities are summarized in the following table.

Location	Description	Preliminary Budget	Funding Source(s)	Comments
Carihi Shop Building	Life cycle replacement of heating system	\$730,900	Ministry of Education; Local Capital (Restricted)	Disconnecting obsolete boilers in main building by installing high efficiency boilers and providing classroom unit ventilators
Pinecrest Elementary	Life cycle replacement of three roof sections	\$410,000	Annual Facilities Grant	Improved roof R-value in conjunction with roof replacements
Timberline Secondary	Life cycle replacement of three roof sections	\$416,000	Annual Facilities Grant	Potential improvement to roof R-value
Carihi Main Building	Life cycle replacement of heating system	\$1,535,000	Ministry of Education	Providing classroom unit ventilators
Phoenix Middle	Life cycle replacement of boilers	\$310,000	Ministry of Education; Annual Facilities Grant	Conversion to high efficiency boilers in conjunction with life cycle replacement