

# **Strategic Energy Management Plan**

School District No. 72 (Campbell River)

March 2018

## Table of Contents

<b>1.</b>	<b>OUR ORGANIZATION.....</b>	<b>3</b>
1.1	FACILITY PROFILE .....	3
<b>2.</b>	<b>OUR COMMITMENT .....</b>	<b>4</b>
2.1	WHY IS ENERGY CONSERVATION IMPORTANT TO US? .....	4
2.2	OPERATIONAL PROCEDURE 515 – ENVIRONMENTAL RESPONSIBILITY POLICY.....	4
<b>3.</b>	<b>UNDERSTANDING OUR SITUATION.....</b>	<b>5</b>
3.1	UTILITY CONSUMPTION AND COSTS .....	5
3.2	SAVINGS OPPORTUNITY ASSESSMENT - ENERGY CONSUMPTION INTENSITY .....	5
<b>4.</b>	<b>OUR ACTIONS .....</b>	<b>8</b>
4.1	PROGRAM RESULTS 2007-2017.....	8
4.2	IMPACT ON GREENHOUSE GAS EMISSIONS.....	11
4.3	ENERGY CONSERVATION TARGETS 2017 AND BEYOND .....	12

## 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 <sup>2</sup>	2017 Annual Energy Consumption GJ (e)	2017 Annual Energy Cost (\$)	2017 Energy Intensity GJ (e) per m <sup>2</sup>	2016 Energy Intensity GJ (e) per m <sup>2</sup>	2015 Energy Intensity GJ (e) per m <sup>2</sup>
Carihi	10,533	9,515	133,418	0.90	0.92	0.79
Cortes	1,382	1,039	40,357	0.75	0.80	0.69
Cedar	2,389	1,850	31,368	0.77	0.71	0.79
Discovery Passage	1,602	997	15,265	0.62	0.52	0.81
EDM	2,409	1,725	28,659	0.72	0.67	0.69
Evergreen	1,330	337	7,454	0.25	0.21	0.18
Georgia Park	3,375	2,463	47,530	0.73	0.75	0.65
Maintenance/Bus Garage (incl 3 portables)	2,068	1,144	26,530	0.55	0.48	0.43
Ocean Grove (incl 1 portable)	2,609	2,231	42,783	0.86	0.96	0.73
Oyster River	2,106	1,720	31,785	0.82	1.04	1.11
Penfield	2,933	1,550	49,459	0.53	0.51	0.45
Phoenix (incl 1 portable)	8,367	5,720	96,251	0.68	0.67	0.56
Pinecrest	3,221	1,786	31,883	0.55	0.66	0.55
Quadra	2,628	1,198	41,378	0.46	0.45	0.45
Ripple Rock (incl 1 portable)	2,809	1,993	35,842	0.71	0.77	0.62
Robron	7,154	4,427	83,805	0.62	0.69	0.57
Sandowne	3,581	2,766	51,096	0.77	0.83	0.69
Sayward	2,977	1,606	62,477	0.54	0.53	0.46
School Board Office (incl 1 portable)	1,824	1,685	49,727	0.92	0.97	0.80
Southgate	7,373	3,598	67,740	0.49	0.57	0.54
Surge Narrows (incl Community Use)	530	361	11,810	0.68	0.78	0.63
Heritage lands (incl portables and NIC)	16,429	18,994	314,866	1.16	1.20	1.05
Willow Point	2,772	2,079	36,875	0.75	0.76	0.66

Space heating is the most significant energy requirement for School District 72. Heating Degree Days in 2017 were significantly higher than 2016, and the highest since 2012.

## **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 Plan 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 Policy**

#### 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

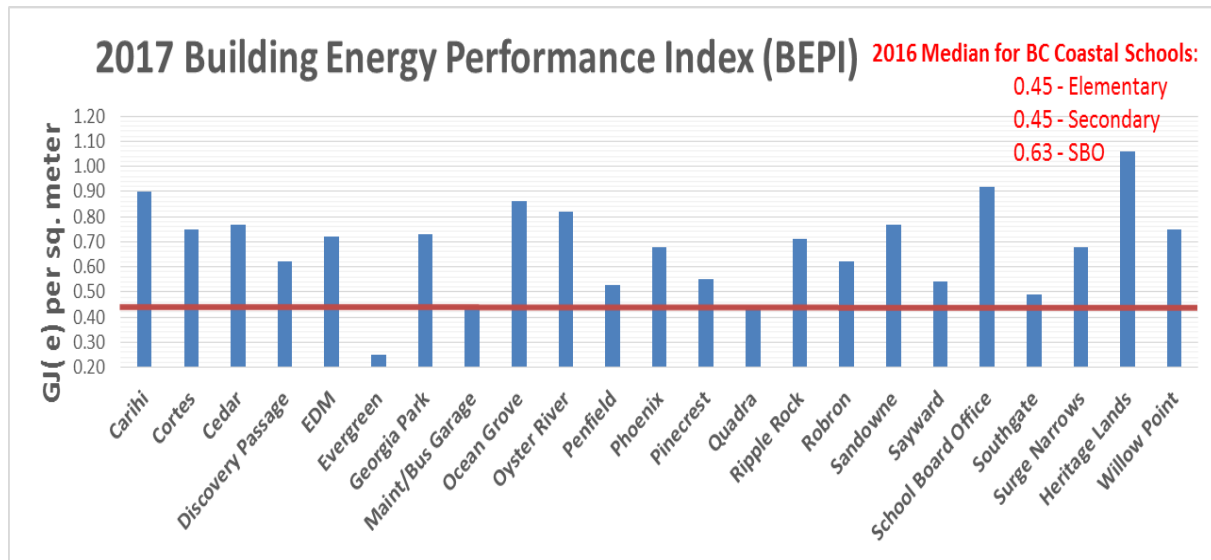
Referring to the following charts, electricity historically accounts for more than one-half of School District 72 utility costs. This fact contributed to the school district decision to become a member of the BC Hydro Energy Manager program from 2009 to 2015. In recent years, however, resources have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

2017 Calendar Year	Normalized Consumption	Normalized Costs	
	GJ	\$	%
Electricity	26,337	832,453	55 %
Natural Gas	42,396	419,588	28 %
Propane (buildings)	1,894	77,349	5 %
Diesel (marked)	361	11,810	.7%
Water, incl irrigation	46,784 m <sup>3</sup>	45,171	3 %
Irrigation	42,407 m <sup>3</sup>	25,422	2 %
Sewage	30,901 m <sup>3</sup>	36,659	2 %
Refuse (extra pickups)	341 yd <sup>3</sup>	65,415 <i>(basic svc and extra pickups)</i>	4 %
Recycling	2,213 yd <sup>3</sup>	8,196	.5 %

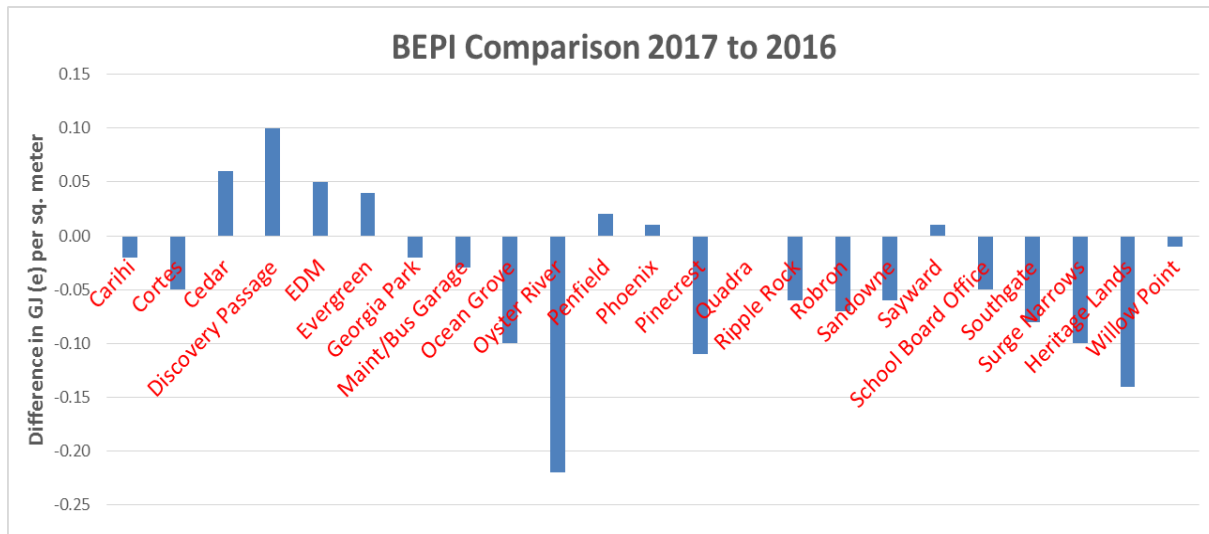
#### 3.2 Savings Opportunity Assessment - Energy Consumption Intensity

While most facilities had an improved Building Energy Performance Index (BEPI) in 2017 compared to 2016, School District 72 continues to have above average higher energy intensity than most schools in the Lower Mainland and Vancouver Island. This indicates further opportunities for energy savings and cost avoidance.



For 2017, the 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. Decreases in both electrical and natural gas consumption are attributed to fewer heating degree days and changing occupancy (lower activity levels and/or changing occupant behaviours). A minor contributing factor was disposal of two portables. North Island College is undertaking a site redevelopment and expansion initiative which, upon completion, is expected to significantly increase energy consumption.
- b. School Board Office. Relative to 2016, overall energy consumption decreased slightly in 2017, but there was a significant increase in natural gas consumption despite fewer heating degree days. This is the result of responding to occupant heating requests by increasing temperature set points in the warehouse and extending the heating season.
- c. Carihi Secondary. Overall energy consumption decreased slightly in 2017 compared to 2016. The decrease in natural gas consumption is attributed to fewer heating degree days and major heating line breaks affecting large portions of the building. Heating line breaks reduced natural gas consumption while repairs were underway, but also increased electrical consumption because space heaters were used to keep the building habitable. Carihi mechanical upgrades have been identified on the School District 72 Capital Plan for several years and will be the top priority on the 2018/19 Capital Plan.



School District 72 buildings with the greatest BEPI increase in 2017 were:

- a. Discovery Passage. This small, closed school experienced increased activity in 2017 due to materials being moved from the Evergreen property, relocation of custodial supplies from the Maintenance Building, and relocation of the paint shop sign making workstation. The move of materials and relocation of the paint shop sign making workstation were necessitated by the planned demolition of the Evergreen property. The relocation of custodial supplies from the Maintenance Building was the required to allow for a partial seismic upgrade of the Maintenance Building.
- b. Cedar Elementary. Compared to 2016, natural gas usage increased significantly in 2017. This is attributed to responding to occupant heating requests by having an earlier boiler start-up in the fall and more heating degree days in the spring than in 2016.
- c. Ecole Des Deux Mondes (EDM). Both electrical and natural gas consumption increased in 2017 compared to 2016. The primary reason for energy consumption increase despite fewer heating degree days is attributed to failing operation of the boilers, which have reached end-of-life. These aged boilers are scheduled for replacement in 2018 with high-efficiency boilers.

## 4. OUR ACTIONS

### 4.1 Program Results 2007-2017

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 are a significant factor when analyzing energy consumption. A cooler winter generally results in higher energy consumption. In School District 72, only two elementary schools rely on electric heat. Therefore, the influence of warmer winters 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. Notwithstanding North Island College requires heating of the Heritage Lands facility as early as August, cooling degree days have a relatively small impact on energy consumption for School District 72.

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 achieved a 1% reduction 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 an 8% reduction in overall energy intensity per HDD.

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. 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.



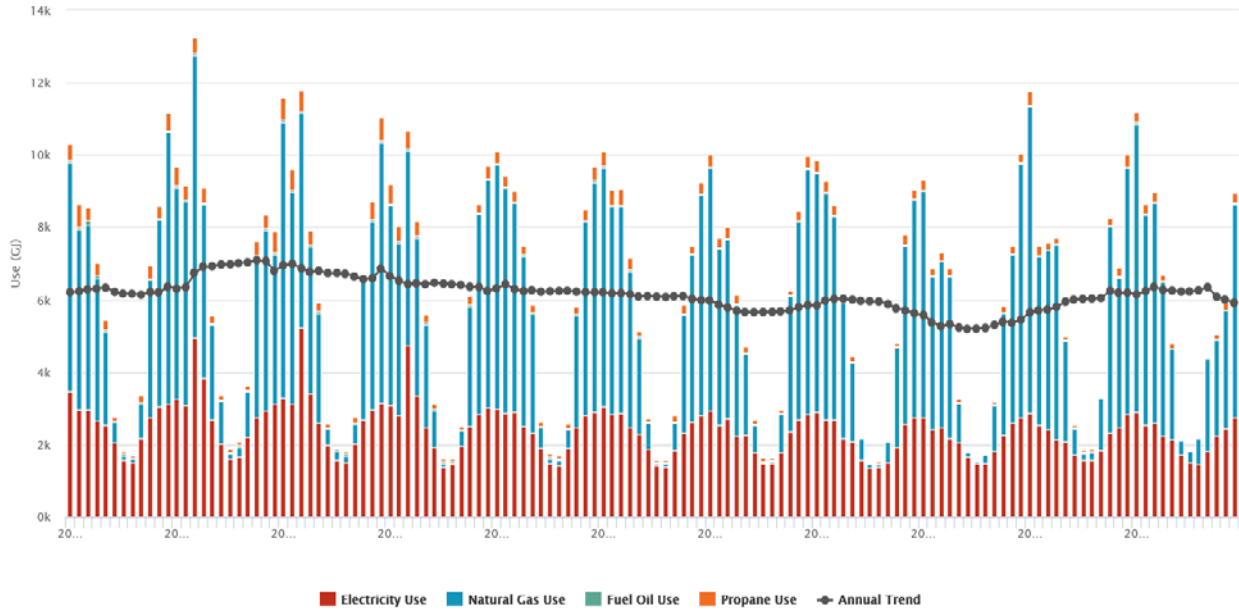
Year	Overall Energy Intensity (GJ(e)/HDD)	Percent Change in Overall Energy Intensity (%)	Natural Gas GJ/HDD % Chg	Electricity kWh/HDD % Chg
2007	0.8642			
2008	0.8860	3%	1%	6%
2009	0.9308	8%	7%	9%
2010	0.8950	4%	1%	8%
2011	0.8183	-5%	1%	-11%
2012	0.8134	-6%	-1%	-10%
2013	0.8449	-2%	4%	-7%
2014	0.8428	-2%	6%	-8%
2015	0.8752	1%	8%	-1%
2016	0.9616	11%	26%	-2%
2017	0.8524	-1%	9%	-9%

The following charts summarize 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 2016/17 was cold compared to recent years, resulting in greater heat demand. A decreasing energy use trend appears to be reemerging in 2017.

Since 2007, overall energy costs have increased slightly. More significantly, electricity costs have steadily increased despite energy conservation projects, while natural gas costs have decreased. This demonstrates School District 72 achieved significant cost avoidance by implementing many electrical conservation projects, particularly while a member of the BC Hydro Energy Manager program.

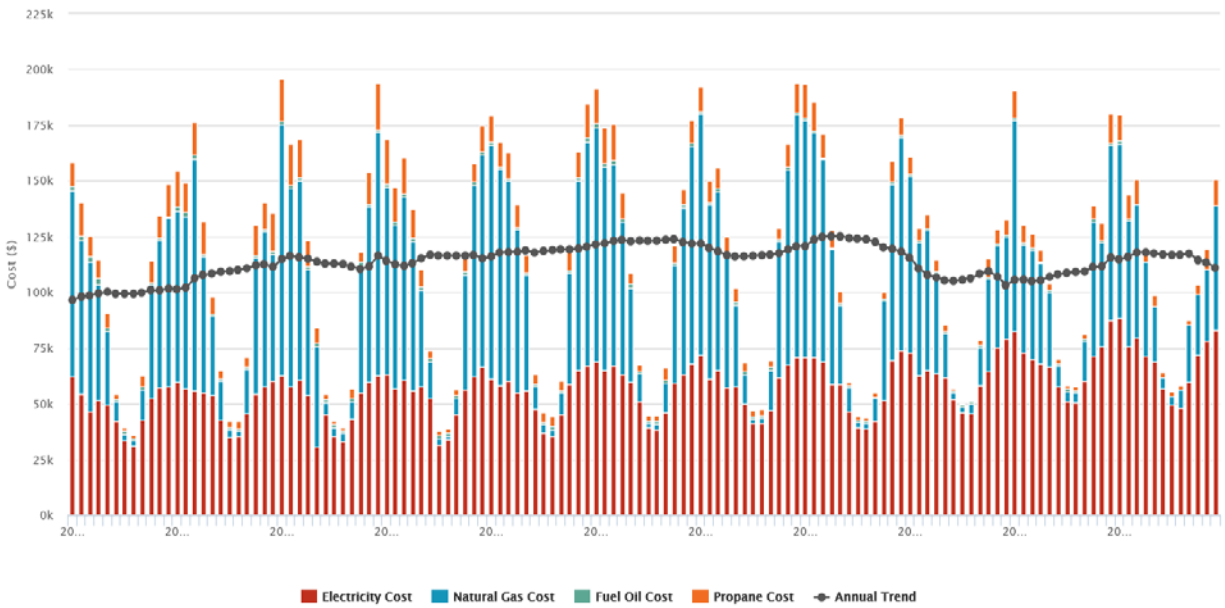
### Energy Use Trend

All Facilities -- 01/2007 to 12/2017



### Energy Cost Trend

All Facilities -- 01/2007 to 12/2017



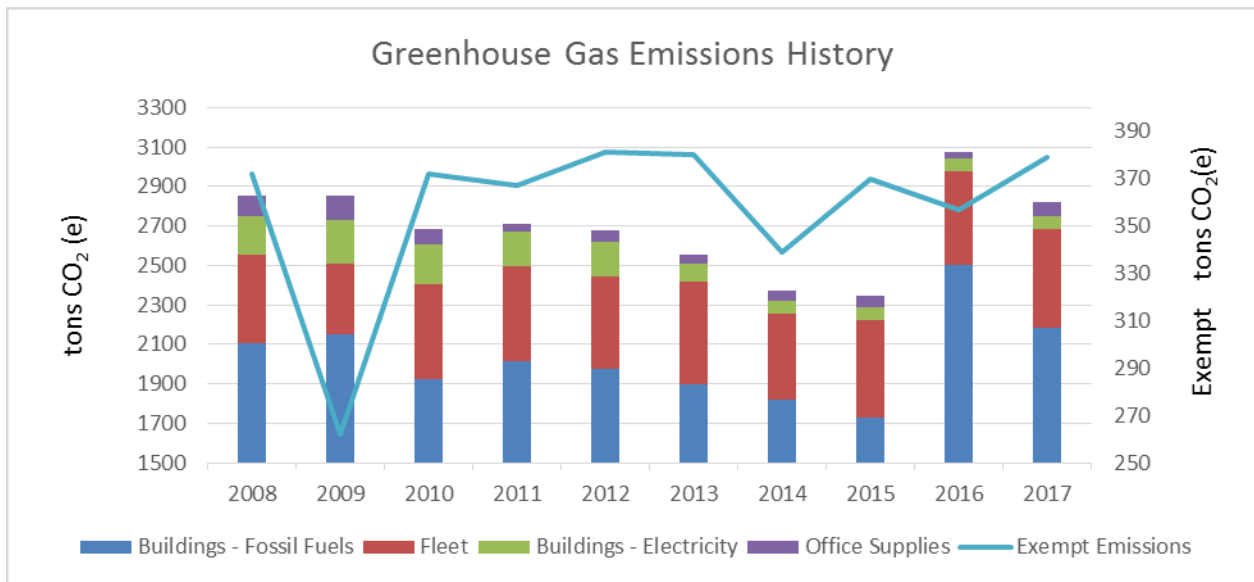
### 4.2 Impact on Greenhouse Gas Emissions

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

In recent years, the greatest challenge to reducing our carbon footprint has been natural gas required for heating. Additionally, office paper consumption increased by 183% in 2017. Office paper consumption contributed 68.4 tons of greenhouse gases to School District 72’s carbon footprint.

Exempt carbon emissions have increased in recent years as a result of increased school bus mileage.

To achieve Carbon Neutrality, School District 72 is required to purchase carbon offsets. For 2017, this will be approximately \$79,181.



**Totals Calendar Year 2017, School District 72 - Campbell River**

	Measure	Quantity	Greenhouse Gases in Tonnes				
			CO <sub>2</sub>	BioCO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	tCO <sub>2</sub> e <sup>1</sup>
<b>Scope 1 (Direct) Emissions</b>							
Mobile Combustion (Fleet)	Litres	189,688.03	469.88	17.36	0.03	0.04	<b>500.83</b>
Stationary Combustion, Reported <sup>3</sup>	GigaJoules	43,331.23	2,167.25	0.21	0.04	0.05	<b>2,182.12</b>
<b>Scope 2 (Indirect) Emissions</b>							
Purchased Energy, Reported <sup>3</sup>	GigaJoules	22,592.82	67.78	0.00	0.00	0.00	<b>67.78</b>
<b>Scope 3 (Business Travel and Office Paper) Emissions</b>							
Office Paper	Packages	10,758.00	68.42	0.00	0.00	0.00	<b>68.42</b>
<b>Total Emissions, Calendar Year 2017</b>			<b>2,773.33</b>	<b>17.58</b>	<b>0.07</b>	<b>0.09</b>	<b>2,819</b>
<b>Carbon Neutral or Offset Exempt</b>			<b>355.10</b>	<b>17.58</b>	<b>0.02</b>	<b>0.02</b>	<b>379</b>
<b>Total for Offsets<sup>4</sup></b>			<b>2,418.22</b>	<b>0.00</b>	<b>0.06</b>	<b>0.07</b>	<b>2,440</b>

1. Each greenhouse gas has been converted to a standard measurement (tCO<sub>2</sub>e) by multiplying its emissions by its global warming potential (GWP). The GWP of carbon dioxide (CO<sub>2</sub>) from both anthropogenic and biogenic sources is 1; methane (CH<sub>4</sub>) is 25, and nitrous oxide (N<sub>2</sub>O) is 298. The Totals for tCO<sub>2</sub>e are shown here rounded to the nearest whole metric tonne as only whole tonnes of tCO<sub>2</sub>e 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 tCO<sub>2</sub>e value from the "Total for Offsets" line represents the quantity of offset purchases required to become carbon neutral.

**4.3 Energy Conservation Targets 2017 and Beyond**

As previously indicated, School District 72 has consistently exceeded energy conservation and greenhouse gas reduction 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, Capital Program, and School Enhancement Programs will consider energy conservation opportunities when developing school renewal projects.

Approved 2017 life-cycle replacement projects with the highest energy conservation opportunities are summarized in the following table.

Location	Description	Cost	Funding Source(s)	Comments
Pinecrest Elementary	Various Mechanical Upgrades	\$957,400 (est)	Ministry of Education – School Enhancement Program	Completion of work identified during boiler upgrade project funded by Annual Facilities Grant. Completion expected by April 2018
Southgate Middle	Upper Wing Boiler Replacement	\$228,675	Ministry of Education – School Enhancement Program and Carbon Neutral Capital Program), FortisBC	Phase Two of Boiler Replacement Project (Phase One funded by Annual Facilities Grant).
Sandowne Elementary	Boiler Replacement	\$218,590	Annual Facilities Grant, FortisBC	
Penfield Elementary	Replace two Unit Ventilators	\$53,461	Annual Facilities Grant	Continuing Life Cycle Replacement program

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

Location	Description	Preliminary Budget	Funding Source(s)	Comments
Penfield Elementary	Replace one Unit Ventilator	\$25,000	Annual Facilities Grant	Current phase of Life Cycle Replacement program
Ocean Grove Elementary	Boiler Replacement	\$152,700	Annual Facilities Grant, Ministry of Education Carbon Neutral Capital Program, Fortis BC	
Ecole Des Deux Mondes	Boiler Replacement	\$139,500	Annual Facilities Grant, Ministry of Education Carbon Neutral Capital Program, Fortis BC	
8 schools	Various door, window, cladding replacements	\$147,300	Annual Facilities Grant	