



NANAIMO LADYSMITH
PUBLIC SCHOOLS

Year 10, Q1 Report
August, 2019
Rob Lumsden
Energy Manager

Success For All

School District 68 (Nanaimo-Ladysmith)

K-12 Education

~14,922 Students

~2,100 Staff

37 Active Sites

28 Elementary Schools (gr k-7)

1 Distance Learning School (gr k-12)

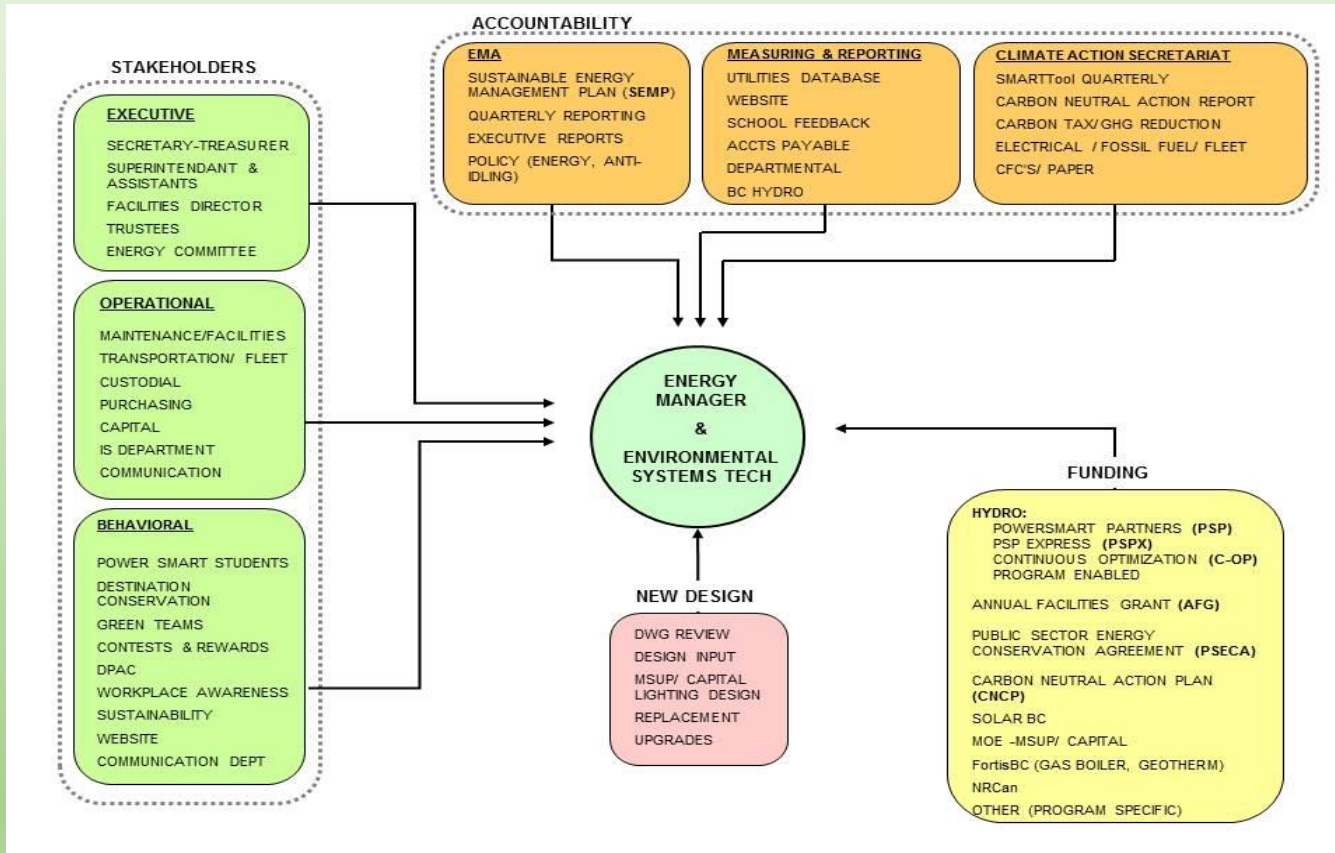
7 Secondary Schools (gr 8-12)

~9 Rental & Closed Facilities

2 Admin/Facilities Buildings (cluster of buildings)

85 Portables

Organization and Influence





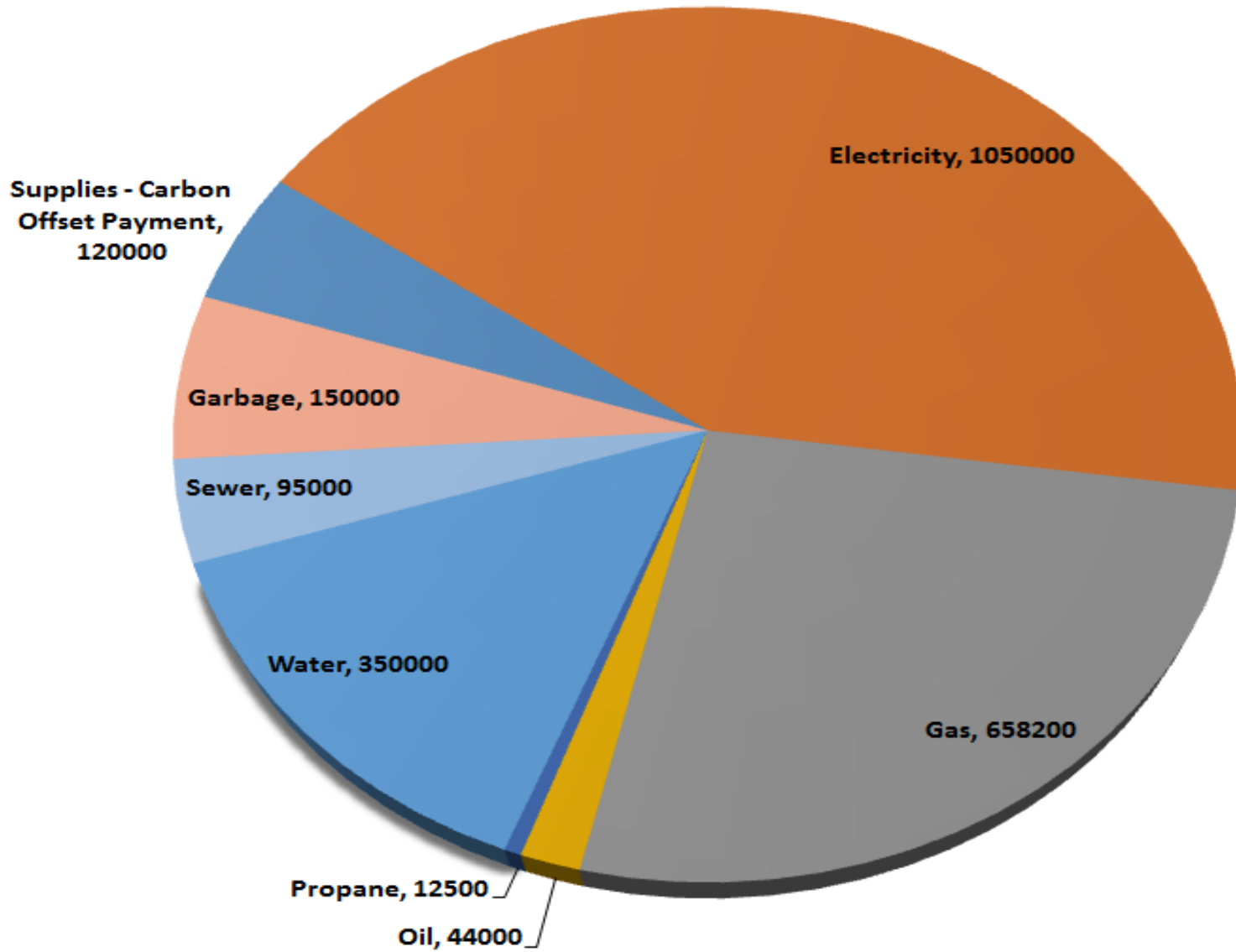
Sustainable Energy Management Plan

3 year plan registered with BC Hydro; updated annually

Sets Energy targets, Lighting upgrades, Heating upgrades, Behavioral Programs, Long term goals, and Stakeholder engagement plans

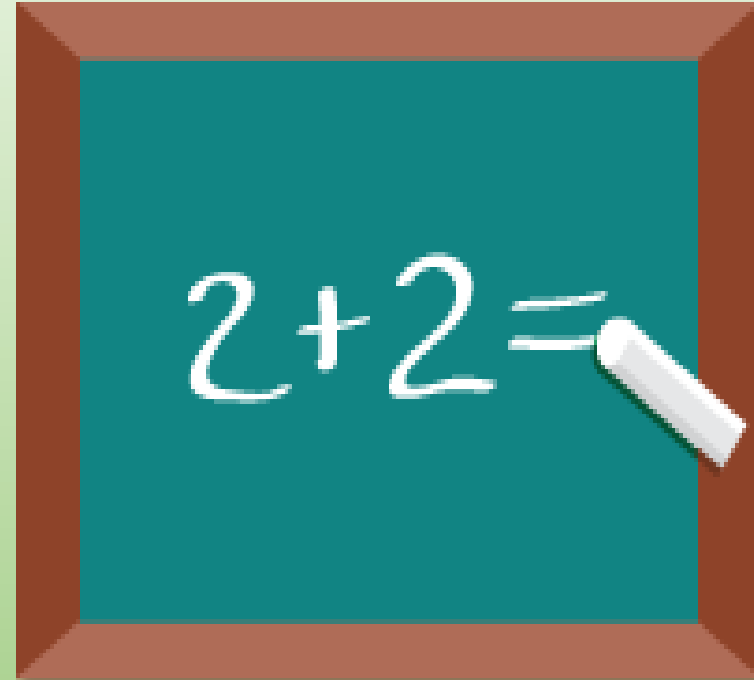
Energy Management Assessment done by BCH periodically to help achieve our common goals in Energy Conservation

Utility Budget 2019/20



The Challenge

- **Water** 7.5% increase each year 2017-2020
- Sewer increase 4% each year 2017-2020
- **Electricity** increase 8% over 5 years
 - Heating fuels market driven
- **Carbon Offset** increasing \$5/tonne annually until 2021
- Natural gas prices are expected to stay low allowing us to reallocate funds from this area to cover other utility increases



Reducing Utilities in Our Facilities



Heating Upgrades

Furnace and Boiler upgrades outfitted with new technology save on fuel, GHG emissions, save on maintenance costs, and are healthier for the inhabitants . New portables have heat pumps c/w fresh air damper connected to CO2 monitor-saves on energy

Lighting Upgrades

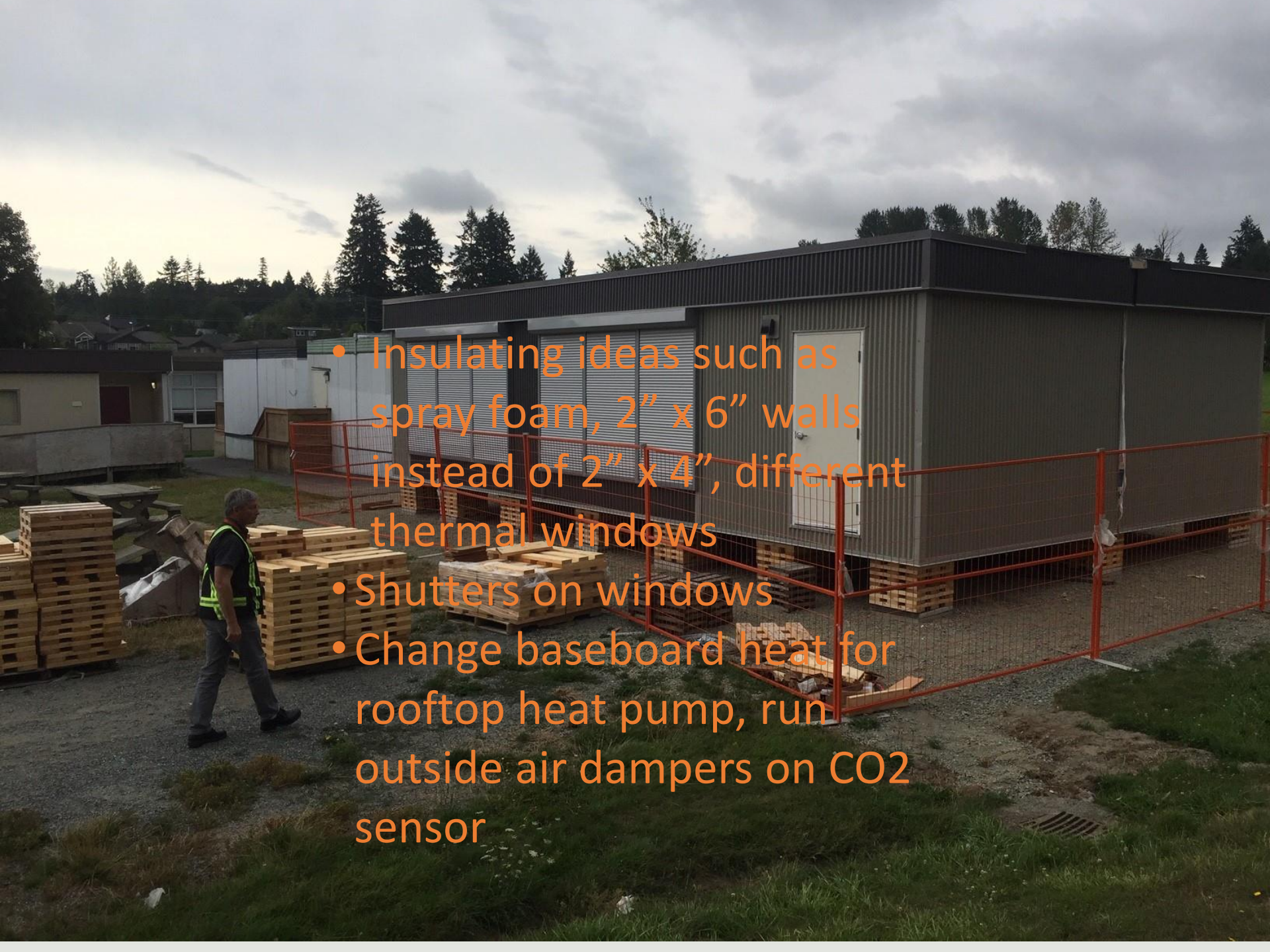
Power Smart lighting initiatives (Led lights, dimming, occupancy sensors, building controls, Dark Schools)


Networked Irrigation Controls

Controllers linked to weather station, schedules automatically adjusted to save on water consumption
*All high water bills investigated

EST

Monitors WO's, corrects control issues, regulates schedules of equipment to reduce run times
Monitors PUMA exception report and acts on them
Helps distribute trade calls on priority
Scrutinizes utility bills

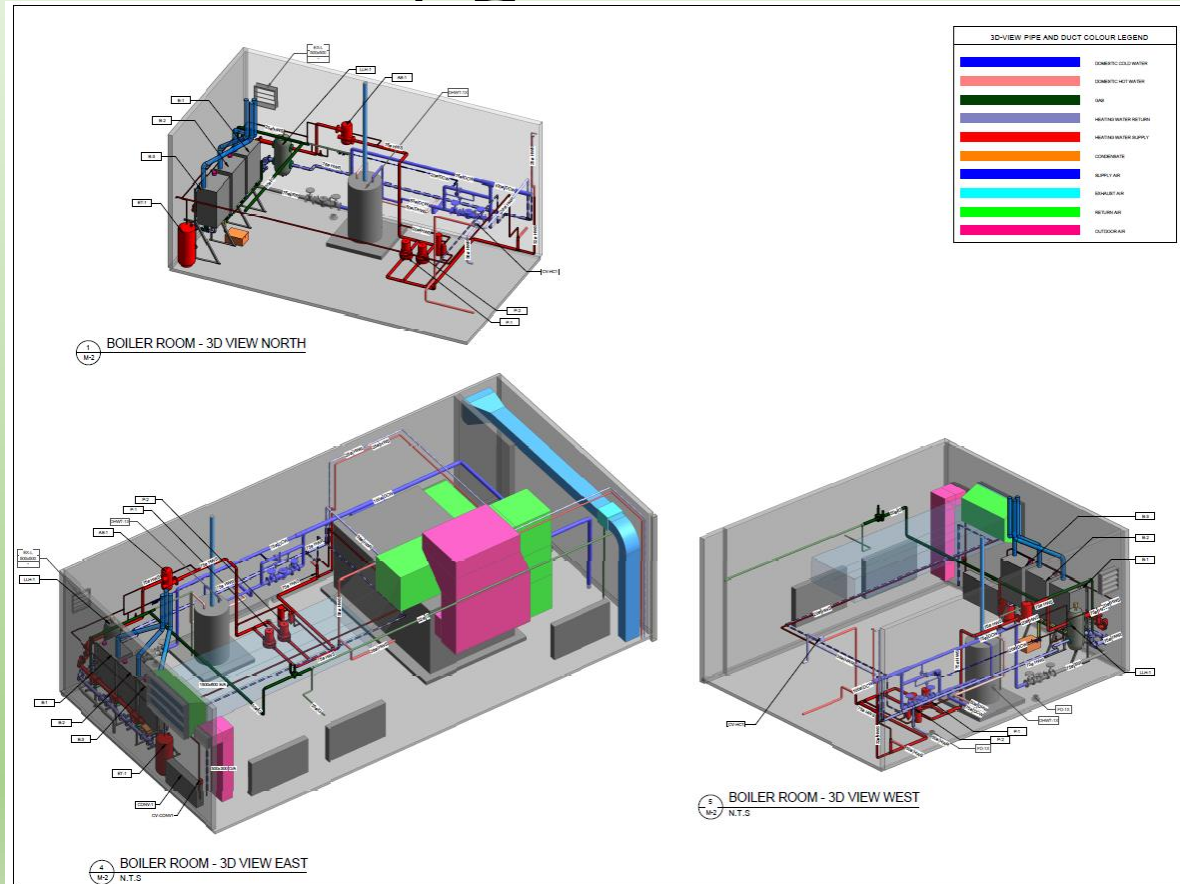
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- Insulating ideas such as spray foam, 2" x 6" walls instead of 2" x 4", different thermal windows
 - Shutters on windows
 - Change baseboard heat for rooftop heat pump, run outside air dampers on CO2 sensor

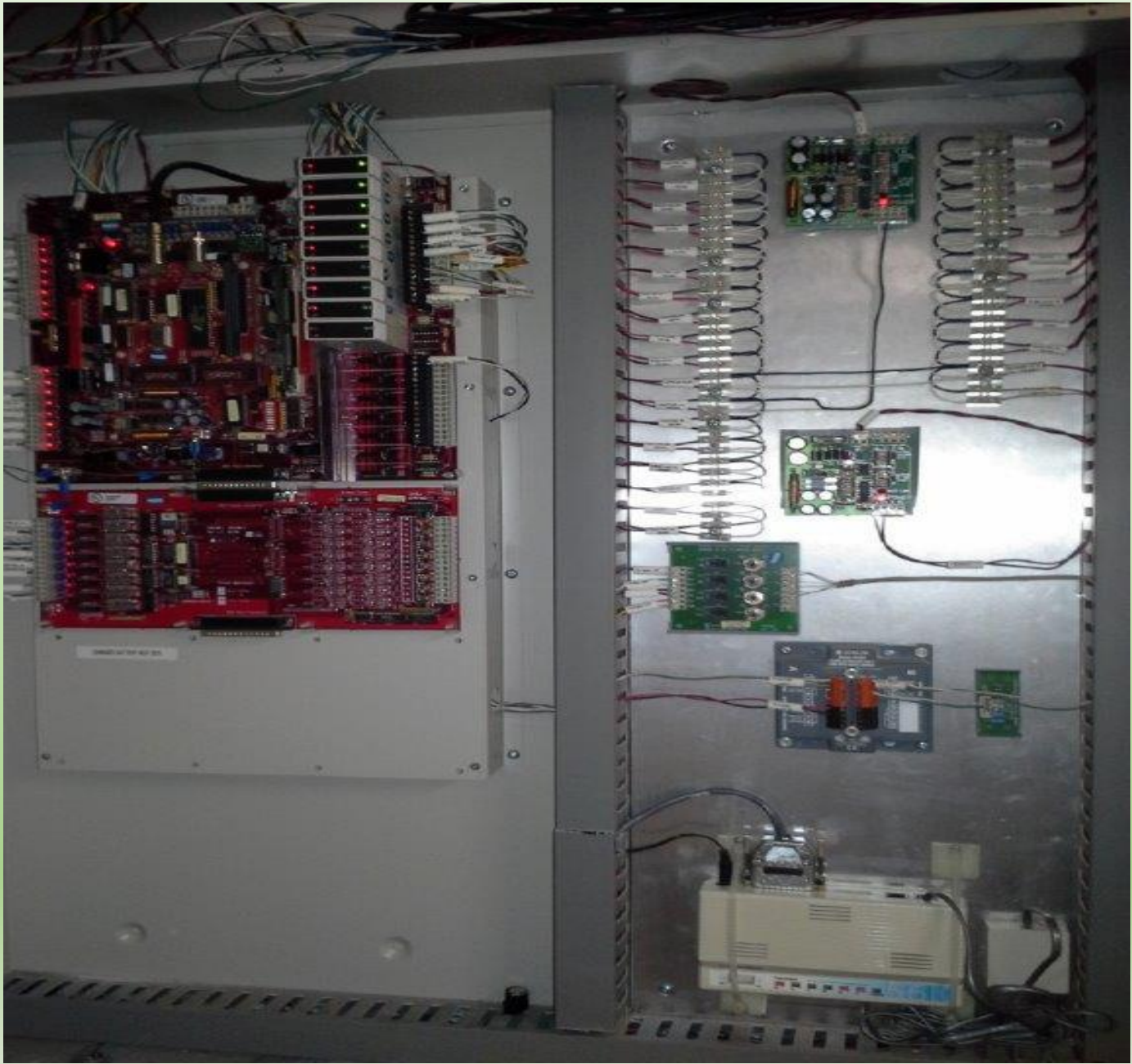


LED lights, Occupancy sensors, and networked thermostats are now standard and always updated when a portable is moved. We would like to advance the technology used with each successive build.

Cinnabar Boiler Upgrade

- 2 inefficient failing boilers were replaced with Condensing Boiler technology, offering opportunities of 85-95% efficiency
- Green House Gas emissions were reduced by 20-30%
- Supports our Districts direction of becoming sustainable, both financially and environmentally
- Project was completed within heating season but with minimal effect on Staff and Students
- **New DDC system and gym heating coil this summer**



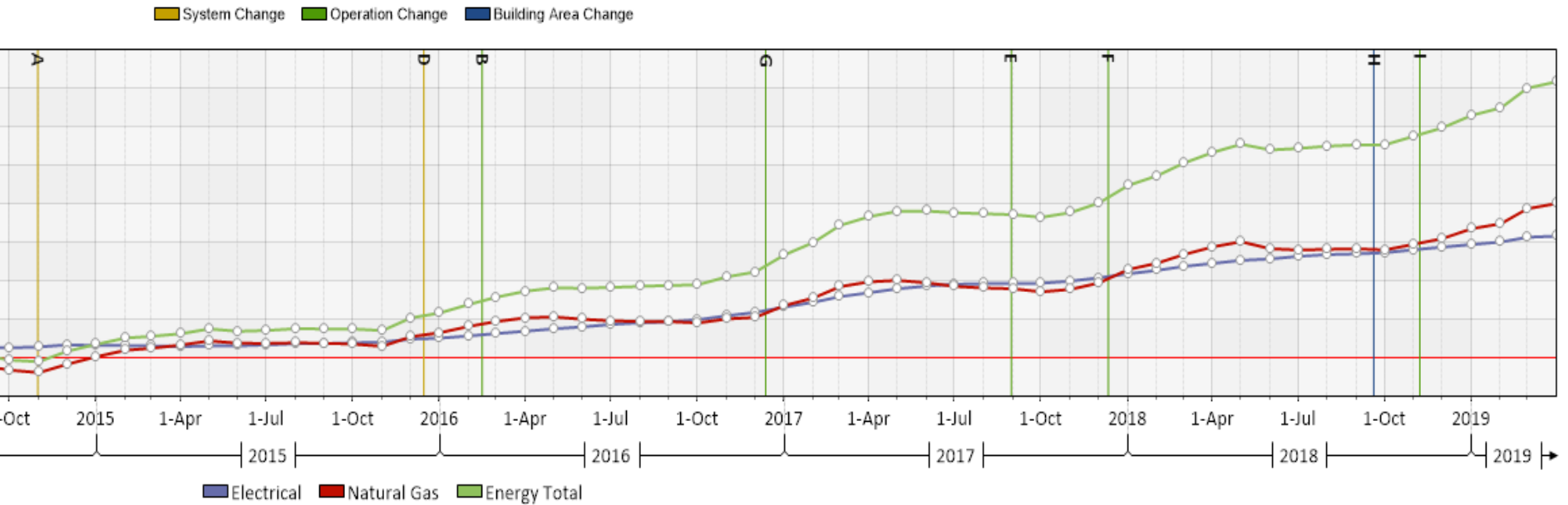


CUSUM: Site

Export as

SD#68 Nanaimo-Ladysmith- Baselines: 2012/2013 (2011275-F13)

323 Cinnabar EL



Key	Category	Scope	Annotatee	Date	Description
A	System Change	Meter	Cinnabar EL » Gas-323-01	2014-10-31	Return fan air flow balanced
B	Operation Change	Project	2011275-F13	2016-02-15	Energy cup & School schedule changes
C	System Change	Meter	Cinnabar EL » Elec-323-01	2014-02-12	lighting change
D	System Change	Meter	Cinnabar EL » Elec-323-01	2015-12-15	lighting change
E	Operation Change	Meter	Cinnabar EL » Elec-323-01	2017-08-30	portable thermostat change
F	Operation Change	Project	2011275-F13	2017-12-11	Energy cup Challenge
G	Operation Change	Project	2011275-F13	2016-12-12	Energy cup
H	Building Area Change	Meter	Cinnabar EL » Elec-323-01	2018-09-19	new portable install
I	Operation Change	Meter	Cinnabar EL » Gas-323-01	2018-11-07	condensing boiler install

Weather Normalized Data for Natural Gas and Electrical Consumption

323 Cinnabar EL





PARK AVE SYSTEM UPGRADE TO BOILERS

- 25% decrease in both energy and CO₂ emission
- removes older furnaces and adds a high efficiency boiler plant.

Based on the calculation of average heating energy used over the last four years it is estimated to save about 13.3 ton of CO₂e annually.

Cusum savings to date



- Total Energy cost avoidance in our buildings as a result of all initiatives

Year	Electrical - Consumption - Savings - CUSUM - kWh	Fuel Total - Consumption - Savings - CUSUM - ekWh	Energy Total - Consumption - Savings - CUSUM - ekWh	Energy Total - Cost - Savings - CUSUM - \$
2003/2004	1,281,667.09	1,336,452.87	2,618,119.96	191,358.85
2004/2005	2,791,499.55	2,982,832.11	5,774,331.66	406,806.79
2005/2006	4,552,476.32	7,071,096.99	11,623,573.31	820,458.03
2006/2007	6,838,838.64	12,514,658.74	19,353,497.38	1,368,459.70
2007/2008	9,768,966.61	18,629,993.46	28,398,960.07	1,956,589.95
2008/2009	12,812,510.94	26,097,441.67	38,909,952.61	2,715,483.95
2009/2010	16,033,588.04	32,365,572.96	48,399,161.00	3,438,221.40
2010/2011	19,398,179.54	38,095,438.82	57,493,618.36	4,213,570.56
2011/2012	22,617,331.82	43,206,291.49	65,823,623.30	4,871,490.66
2012/2013	25,822,866.72	47,611,412.99	73,434,279.72	5,492,802.22
2013/2014	29,433,519.04	52,907,873.03	82,341,392.08	6,260,961.95
2014/2015	33,340,910.68	57,473,450.75	90,814,361.43	6,996,874.19
2015/2016	37,876,202.63	63,945,035.49	101,821,238.12	7,958,241.89
2016/2017	42,669,576.19	70,937,431.94	113,607,008.13	9,061,304.61
2017/2018	45,376,880.05	74,565,910.00	119,942,790.04	\$ 9,562,237.17

Energy Cup Challenge

Competition whereas students can be awarded points for energy saving activities. Emphasis on education, forming habits, and spreading the word. Participating schools accumulated 697 sweater days this year.

Take a bite out of our electricity bill with

Lights out Lunch



Let's win the Energy Cup Challenge and save energy by turning off the lights at lunch time.

Turn Down the Heat Throw on a Sweater



Help us win the Energy Cup Challenge and save energy by putting on your best sweater!

2018-19 Energy Cup

- Focus on **Self-Seeding Advocacy** where points will be awarded for students sharing their initiatives with other Schools
 1. Presentations by students to other Schools on their initiatives
 2. Inviting other schools to join in the 3 Energy Wise Campaigns
- Helps our Organization promote the initiatives
- Ensures future generations become aware of initiatives earlier in our Schools

2018-19 Energy Cup & Energy Wise Network

- 697 sweaters days (4 schools lowered temps. by at least 1 deg. everyday of the **2 month** challenge)
- 15 low wattage heaters issued (170w vs. 1500w)
- The campaign & initiatives were successful
- New campaign materials and dates set

Energy Cup High School

- 1st Nanaimo Senior Secondary**
- 2nd Dover Bay Senior Secondary**
- 3rd Cedar Senior Secondary**

Energy Cup Elementary

- 1st Departure Bay Elementary**
- 2nd Mountainview Elementary**
- 3rd Pauline Haarer Elementary**

Dover Bay Energy Club Presentation of Award



Carbon Neutral Reporting

This year the District purchased:

13,214 boxes of paper (66,070,000 sheets)

255,690 liters of fuel for Vehicles

8,184,272 kwhs of Electricity

52,251 GigaJoules of Natural Gas

1,156 GigaJoules of Heating Oil

200 GigaJoules of Propane

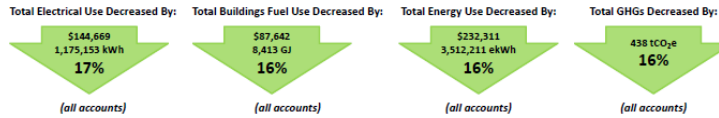
Puma Exception Report

Exception Report: February 2019

Project: SD#68 Nanaimo-Ladysmith– Baselines: 2012/2013 (2011275-F13)



A) 2018/2019 Fiscal Year-To-Date Results:



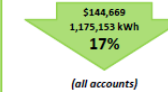
The following tables list meters showing change beyond ±10% in total year-to-date consumption compared to their baseline. Meters showing change beyond ±25% have been bolded. Year to Date results are calculated on the energy data for the current fiscal year and is up-to-date as possible. More detail on the completeness of data is provided in the Last Reading Dates section.

Electrical:

Meters with decreased consumption compared to their baseline:

Code	Site		Meter		Actual		Savings		
	Name	Account	Name	Account	kWh	\$	kWh	\$	%
213	Woodlands SEC	94734232841	Elec-213-01	94734232841	116,168	13,753	190,486	22,890	62%
209	Cedar SEC	1081257	Elec-209-01	1081257	337,734	37,925	183,592	21,348	35%
210	Dover Bay SEC	94784676001	Elec-210-03	94784676001	553,034	65,400	123,383	14,938	18%
215	Wellington SEC	94751059011	Elec-215-01	94751059011	347,580	41,922	114,504	13,870	25%
377	Rutherford EL	94782144251	Elec-377-01	94782144251	55,853	6,898	97,495	11,951	64%
202	Ladysmith SEC	94794000031	Elec-202-01	94794000031	294,940	34,008	85,541	10,332	22%
327	Davis Road EL	94798255401	Elec-327-01	94798255401	10,779	1,462	64,664	8,770	86%
610	DAC/Maintenance	94741073582	Elec-610-01	94741073582	406,332	39,799	62,432	6,112	13%
336	Fairview EL	3357977	Elec-336-01	3357977	94,763	11,918	42,426	5,354	31%
341	Georgia Avenue EL	94738033651	Elec-341-01	94738033651	109,290	13,600	41,254	5,116	27%
355	McGirr EL	94784675001	Elec-355-01	94784675001	108,312	12,935	33,117	3,882	23%
323	Cinnabar EL	1969497	Elec-323-01	1969497	95,856	11,869	26,243	3,222	21%
371	Quarterway EL	94748705131	Elec-371-01	94748705131	105,848	13,033	25,312	3,116	19%
376	Rock City EL	94752166601	Elec-376-01	94752166601	83,426	10,271	23,898	2,944	22%
381	South Wellington EL	94761228801	Elec-381-01	94761228801	8,628	1,184	22,741	3,286	72%
380	Seaview EL	94800129601	Elec-380-01	94800129601	59,739	7,673	20,889	2,651	26%
328	Departure Bay EL	94751900911	Elec-328-01	94751900911	72,528	8,968	19,043	2,363	21%
385	Woodbank Primary	94763210051	Elec-385-01	94763210051	40,369	5,231	18,377	2,385	31%
340	Gabriola EL	94773009301	Elec-340-01	94773009301	84,256	10,245	18,363	2,255	18%
680	Curriculum Res.Center	94714009901	Elec-680-01	94714009901	1,652	313	16,897	3,106	91%
344	Hammond Bay EL	94781314001	Elec-344-01	94781314001	84,818	10,034	15,946	1,930	16%

Total Electrical Use Decreased By:



Cost savings are calculated based on the monthly total cost (including admin, taxes, demand charge, etc) per unit consumption.
Year refers to fiscal year ending in June

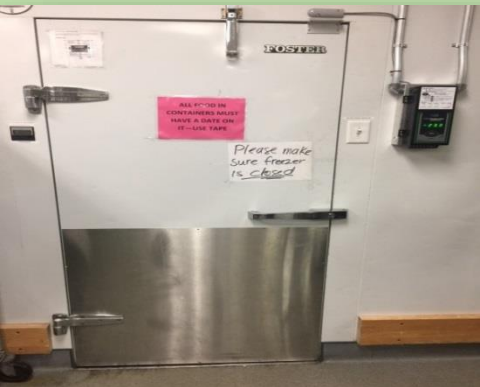
What is Going on Now

- Park Avenue Heating upgrade (under construction)
- 3 inefficient old gas furnaces and 3 rooftop units replaced with central gas boiler, unit heaters in classrooms enabling individual room control
- Moving/Adding as many as 7 portables this year
- Repurposing 4 computer labs, replacing desk top computers with mobile computer carts; where possible we decommission the cooling system for the room and upgrade to efficient heat source
- Roofing Program in effect-insulation upgraded as part of project
- 2019/20 Lighting Contracts signed, will be tendering for TLED lamps and ballasts

Summer Refrigeration Operation Wastes Power and Water

Near empty reach in fridge's, Water cooled walk in Coolers & Freezers as well as ice machines left running over entire summer break

Principals and staff to be given background info, Chef's will also be alerted before semester end to reduce quantities.



Pilot Flame Wastes Gas/Electricity

Equipment with open pilots, that are left on over vacation periods, introduce **heat** and require roof top exhaust operating for **ventilation**
Chefs to be given checklist for a complete shutdown of all systems.



Heat Recovery/Electrification Opportunity

- The Regional District of Nanaimo upgraded their sewer outfall line within 2m of Hammond Bay Elementary.
- With the assistance of CNCP/AFG funding, NLPS has installed water source heat pumps to absorb consistent and reliable heat from the outfall.
- A phase 2 SEP mechanical upgrade is substantially complete. (Unit ventilators installed in all classrooms; provides individual heating control)
 - Bring the Schools ventilation up to current ASHRAE standards
 - maximize the systems efficiency
- Carbon footprint of the School is estimated to be reduced by up to 78%.

Challenges

Aging Infrastructure

Water Leak Detection

- Monitoring water consumption on invoices
- Investigate high water consumption at any site immediately
- **Irrigation control upgrade**

Re working operating control software on 3 schools with Rainbird sprinkler systems, may add 2 more control systems at Dover Bay and Wellington. Networked control systems can vary watering schedules daily; (50% yesterday because it was cloudy, 40% today because it is cool, 100-120% tomorrow because it will be hot). Water will be saved, electricity also if a booster pump is being used.

Lighting Updates 2019/2020

- Lighting contracts received from BC Hydro
- 90% of work involves lamp replacement with LED (and some ballast changes)
- Outdoor LED fixtures, Photocells
- Occupancy Sensors/Controls in Classrooms

Nanaimo Ladysmith Pubic School Lighting Study Summary		
School	Energy Savings kWh	Project Cost
John Barsby	66,016.00	\$ 61,863.00
NDSS	80,396.00	\$ 62,233.00
Cedar Community Secondary	48,569.00	\$ 33,644.00
Cinnabar Elementary	20,378.00	\$ 21,202.00
Fairview Community Elementary	21,120.00	\$ 18,762.00
Forest Park Elementary	18,929.00	\$ 16,442.00
Frank Ney Elementary	9,903.00	\$ 10,289.00
Pleasant Valley Elementary	19,062.00	\$ 15,603.00
Rock City Elementary	14,692.00	\$ 13,879.00
Seaview Elementary	11,446.00	\$ 11,030.00
Uplands Elementary	11,152.00	\$ 10,556.00
Total	302,599.00	\$ 275,503.00



SD68 5 Critical Action Items:

1. Policy
2. Targets/Reporting
3. Plans/Actions
4. Teams/Committees
5. Employee Awareness/Training

1. Policy

- Administrative Procedure in place to support our scope of work and reach our goals of Energy Management initiatives.

Administrative Procedure 509 – Energy Conservation Program



AP 509 – Energy Conservation Program

Purpose

The district shall establish and maintain an Energy Conservation Program to ensure the most efficient, effective and economic use of all energy resources, without prejudice to educational priorities

2. Targets/Reporting

- Set regular targets through SEMP and receive regular reports through PUMA to trouble shoot variances.
- Monthly email to schools advising them of their energy consumption and cost patterns
- 'Energy Intensity' slide proves we are achieving appreciable and continuing energy savings
- 'Cusum and Exception' reporting alerts us to energy consumption that we analyse and act on if needed

3. Plans/Actions

- 18/19 lighting project complete, new plan being submitted for 19/20
- Plan for lighting improvements will be outlined in SEMP
- Looking beyond boiler plants to fuel switching & other heating systems
- Utilizing CNCP funding (submitted 3 projects to Ministry in June)
- Monitor all utility invoices ourselves, question incongruities, visualize what might be happening to change from baseline information.
Investigate if warranted.

4. Teams/Committees

- Energy Cup/Energy Wise Network
- Green Teams
- Working closely with Maintenance Dept. reviewing work orders and problems with equipment
- Hold meetings with specialized groups for input
- EST continually monitors building systems looking for problems and solutions

5. Employee Awareness

- Communicating Energy Management initiatives to key stakeholders
- Marketing Energy behaviour programs thru SD68 Communications newsletter.
- Presentations to the Board and Senior Management on energy initiatives (lighting plan, behavioural program, etc...)
- Call an Energy meeting with varied trades, managers, or interested groups for specialized feedback. (IE: carpenter re dust extractor)
- Instructing chefs and cooking staff on energy initiatives



**NANAIMO
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THANK YOU

