2017 CARBON NEUTRAL ACTION REPORT





EXECUTIVE SUMMARY

This Carbon Neutral Action Report for the period January 1st, 2017 to December 31st, 2017 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2017 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2018 and beyond.

In 2017, the Delta School District produced a total of 3,003.49 tonnes of CO_{2e}. The district has paid \$77,883.75 for 2,961 tonnes of CO_{2e} to claim carbon neutrality, where16 tonnes of CO_{2e} were attributed to adjustments from previous years and 52 tonnes of CO_{2e} were exempt.

When comparing weather normalized values of tonnes of CO_{2e} emitted, the district has reduced its emissions by 38% compared to 2010. Between 2010 and 2014, the carbon emissions for the district had been in a downward trend due to large scale projects implementing heat pump technology. Since 2014, the emissions have plateaued. The "low hanging fruit have been picked". Nevertheless, the district will continue to strive to implement emission reduction measures where feasible.

Emissions reduction measures in 2017 include:

- Replacement of gas fired rooftop units with dual fuel air source heat pumps with auxiliary gas
- Replaced fluorescent fixtures with LED technology
- Replaced gymnasium heating system
- Replaced exterior lighting with LED technology
- Offered Energy Conservation Grants to schools
- Participated in the Energy Wise Network Program in Partnership with BC Hydro
- Introduced the Green Mentorship Program (Student Driven)

Emissions Reduction Measures Planned for the Future:

- Replacement of gas fired rooftop units to incorporate heat recovery and enhance performance
 of solar wall
- Implementation of printer management system
- Complete lighting upgrades
- Replace gas-fired RTUs
- Replace domestic hot water systems

We are pleased to present the following report on our pursuit of becoming carbon neutral.

Doug Sheppard, Superintendent of Schools

Herb Wenzel Director of Facilities & Planning

Debra Eng Energy Manager, Project Engineer



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GREENHOUSE GAS EMISSIONS

COMPARED TO 2010 BASELINE

This Carbon Neutral Action Report for the period January 1st, 2017 to December 31st, 2017 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2017 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2018 and beyond.

In 2017, the Delta School District produced a total of 3,003.49 tonnes of CO_{2e} from all sources reported in SmartTool. Sources include electricity, natural gas and propane used in buildings as well as fleets vehicles and paper consumption.

OFFSETS APPLIED TO BECOME CARBON NEUTRAL IN 2017

Based on the summary report provided by SmartTool summarized in Table 1, 52 of the 3,003 tonnes of CO_{2e} emitted are "Offset Exempt" where the total amount the district is required to offset is 2,951 tonnes. Out-of-Scope Emissions include refrigerants estimated to be less than 1 percent of the District's emissions. The value was estimated from the refrigerant recharge amounts of R-134a and R-404a (HFCs). The emissions from refrigerants are deemed to be out-of-scope and have not been included in the total District greenhouse gas emissions profile. The district has paid \$77,883.75 for the offset of 2,967 tonnes of CO_{2e} (16 tonnes of CO_{2e} of which was attributed to adjustments from previous years) to claim carbon neutrality.

Emission Source	2010	2011	2012	2013	2014	2015	2016	2017
Buildings								
Electricity	247.68	243.4	233.3	141.8	91.95	92.68	97.41	99.69
Natural Gas & Propane Fleet	2,983.68	3269.4	2,871.10	2,520.10	2,022.56	1,748.00	2,079.99	2,469.00
Gasoline, Propane & Diesel	359.69	367.1	378.3	452.4	360.6	215.17	240.4	230.15
Biodiesel	32.51	36	30.6	13.2				
Office Paper	437.23	167.2	219.3	216.4	196.55	202.05	189.87	204.65
Exempt					-51	-73	-96	-52
Total Emissions (tCO _{2e})	4,060.79	4,083.1	3,732.6	3,343.9	2,620.66	2,184.9	2,511.67	2,951.49

Table 1 Greenhouse Gas Emissions Breakdown from SmartTool

The breakdown of the emissions source is illustrated in Figure 1. Majority of the greenhouse gas emissions are attributed from the use of natural gas for the purpose of providing heat to the buildings. Electricity is also used to provide heating through the use of heat pumps as well as resistive heating in very few instances. In the past



3 years, the emissions from fleet vehicles remain consistent within 6%. Emissions from paper consumption have been consistent within 10% for the past 6 years.





HEATING DEGREE DAYS

Heating degree days (HDD) is a common variable used to track the demand for heating in buildings. Table 2 compares the total CO_{2e} emissions and HDD for the past 8 years.

	Table 2 Greenhouse	Gas	Emissions Annual	Comparison
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Emissions to Offset	2010	2011	2012	2013	2014	2015	2016	2017
Total Emissions	4,060.79	4,083.10	3,732.60	3,343.90	2,620.66	2,184.90	2,511.67	2,951.49
Compare Emissions to 2010 baseline	0%	1%	-8%	-18%	-35%	-46%	-38%	-27%
Heating Degree Days (HDD) @16degC balance, YVR	2,021	2,362	2,225	2,266	2,085	1,947	1,951	2,362
Emissions Normalized to HDD	4,324.01	3,720.08	3,610.14	3,175.67	2,704.87	2,414.95	2,770.43	2,689.08
Emissions Normalized to HDD to 2010	0%	-14%	-17%	-27%	-37%	-44%	-36%	-38%



The average HDD in Delta for the past 8 years is 2,152 HDD and has ranged +/-10%. The emissions normalized to HDD are calculated for to compare emissions between the years with respect to heating requirements. The values are depicted in Figure 2. In 2015, the district experienced an irregular drop in emissions. The anomaly cannot be explained.



Figure 2 Weather Normalized CO_{2e} Emissions



EMISSIONS REDUCTION PROGRAM

JOURNEY OF CARBON REDUCTION

The large scale carbon emission reduction projects took place in 2009 through 2013, hence the downward trend in the years prior to 2014. In the past 4 years, carbon emissions reduction projects have been smaller and impacting few sites.

The emissions in 2016 and 2017 are relatively similar to 2014 levels and will likely continue to on the same path until the next large scale emissions reduction project.

For more than 20 years, the Delta School District has been striving to reduce our carbon footprint through countless projects ranging from fine-tuning equipment operation to replacing rooftop units and lighting fixtures. In addition to hardwire replacement programs, the District has continued to encourage resource conservation within the schools as well as in the home.

RETROFIT PROJECTS



REPLACED RTUS

The district replaced 15 antiquated gas fired rooftop units with air-source heat pumps with auxiliary gas. The dual fuel units have been implemented in majority of the sites in the district and have proven to significantly reduce carbon emissions. The units provide heating via the heat pumps in the shoulder seasons and heating through natural combustion only when the outdoor air is too low for optimum heat pump efficiency.

REPLACED GYMNASIUM HEATING SYSTEM AND DOMESTIC HOT WATER HEATING SYSTEM AT SEAQUAM

Three antiquated gas fired air handling units were replaced with a hydronic heating system with 2 air handling units with heat recovery ventilation using heating water from a new high efficiency condensing boiler system. A mid-efficiency domestic hot water heater and large storage tank was replaced with 2 high efficiency and 2 high efficiency domestic hot water heaters and 2 small storage tanks. The project was estimated to yield a savings of 985 GJ per year equivalent to approximately 49 tCO_{2e} per year.





REPLACED GYMNASIUM RTU BURNERS

Antiquated gas fired rooftop heating units serving 11 gymnasiums through the district were replaced with newer gas fired burners. The new burners are mid-efficiency but are more efficient than the 30 year old units.



EXTERIOR LIGHTING

High pressure sodium area lighting was replaced with lower power input LED fixtures. The lighting output from the new units is higher than or equal to the original units that had higher power inputs. This upgrade has been completed at half of the schools, with installation at the remaining schools planned for the following year.

REPLACED FLUORESCENT FIXTURES WITH LED TECHNOLOGY

Lighting fixtures with fluorescent technology were replaced with LED technology. Fluorescent tubes were replaced with LED tubes in 3 highschools. All school gymnasiums in the district have been retrofitted with LED fixtures.





SUSTAINABILITY ENGAGEMENT

ENERGY CONSERVATION GRANT

An Energy Conservation Grant is a program geared towards encouraging school green teams to focus on the energy aspect of sustainability. The grant was available to every school. As the activities were geared towards energy conservation, the grant was funded from the utility budget. The program includes:

- Phase 1:
 - Create a Green Team, commit to the energy conservation pledge and present the school's commitment to staff and students. The pledges were posted on the wall near the



entrance of the school to declare commitment to conservation to any visitors.

• Phase 2:

Choices include:

- o incorporate a BC Hydro Energy Saving Kiosk into a school program,
- o run a "Sweater Days" campaign,
- o conduct "Energy Audits that Lead" to Action,
- o remove all non-district issued (power consuming) equipment,
- o create an "Innovative Activity"
- Phase 3: Present the team's completed activities to school staff and submit a sustainability plan for the following year.

Each activity has been assigned a grant dollar value and the schools were rewarded after photos of the activities were submitted for use in the District social media.



ENERGY WISE NETWORK

The district has committed to engaging employees in conservation through participation in the Energy Wise Network Program provided in partnership with BC Hydro and Fortis BC. The program provides tools and education on how to reach out to staff when creating and implementing engagement campaigns.





GREEN MENTORSHIP PROGRAM

In the Green Mentorship Program, Grade 11 and 12 students are mentoring peers in other secondary schools to create a community of green leaders. These students have come together to form the Delta Youth Sustainability Network (DYSN). These students then reach out to their neighbourhood elementary schools to educate the students about energy conservation and green actions.







Photo credit: Delta Youth Sustainability Network, Enviro-Action Conference 2017

Campaign Overview

Grade 11 and 12 students at Seaquam secondary are mentoring their peers in secondary schools to grow a community of green leaders. These students make up the Delta Youth Sustainability Network (DYSN). These students in turn reach out to their elementary feeder schools to teach students about energy conservation and green actions ensuring a new generation of leaders when they reach secondary school.

DYSN students organized the Enviro-Action conference in October 2017 where mentors shared their knowledge and helped school start Green Teams and other initiatives. A *Delta Green Celebration* is planned for May where students will present on their activities and celebrate their successes.

Students connect through online monthly meetings to support each other and plan for new activities. A DYSN <u>Facebook</u> page is also available to share resources and ideas. "In 2017, we have 11 students from grade 9 to 12 who have signed up for our Green Team with our two sponsor teachers."

Lam Hong, Grade 9 Student, South Delta Secondary



Learn more

Contact info Michael lachetta DY SN Student Network champion at Seaquam Secondary <u>miachetta@</u> <u>deltasd.bc.ca</u>



DELTA GREEN COMMITTEE

The Delta Green Committee began in 2009 with the purpose of making the Delta School District and all of its facilities more sustainable. The overall goals of the Committee are:

- To help staff take initiative in how we operate our schools to become more energy-efficient;
- To raise awareness on conservation; and,
- To reduce waste.

The Committee brings people together to spread knowledge, reach stakeholder groups, and to make progress towards its goals. The Committee is composed of students (Delta Youth Sustainability Network), teachers, vice-principals and principals, facilities staff, and executives.

The Committee's Vision statement is:

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

Some of the recent work of the Committee has undertaken includes:

- Turning the Sustainability Policy into a Procedure;
- Implementing and evaluating the summer/winter/spring break Shut Down campaigns;
- Deciding how to introduce the four-bin waste stations into each school and related information-sharing to students and staff on how use them properly;
- Sharing feedback on initiatives happening in the District; and,
- Sharing custodial data to make decisions and future reduction of appliances for energy saving.

The Committee encourages sharing of ideas about conservation and sustainability from anyone in the District, and will review each idea or suggestion as a Committee. Staff and students are welcome to join the monthly meetings.







PLAN FOR 2018

BURNSVIEW GYMNASIUM HVAC UPGRADE

At Burnsview Secondary, four antiquated gas fired RTUs serving the gymnasium and weight room are going to be replaced with high efficiency gas fired units. Two of the four units serve the weight room and will be replaced with heat recovery ventilators that recover heat from the change room exhaust to preheat the ventilation air going into the weight room.

Two mid-efficiency gas fired units currently serving the gymnasium provide heat and ventilation air based on the temperature sensor and CO₂ sensor respectively. There is also an existing solar wall that provides tempered ventilation air directly into the gymnasium through a fan. The tempered air from the solar wall is only used when the supply air temperature is above the supply air temperature from the heating units. The system is going to be modified by ducting the solar wall air outlet to the return air plenum of the gymnasium heating units. The tempered air from the solar wall can be used as long as the unit is in heating mode. The



estimated savings from this project are 750GJ equivalent to 37tCO_{2e}.



PRINTER MANAGEMENT SYSTEM

Near the end of 2017, the contract for the multifunction devices and printers throughout the district was due for renewal. This allowed the district to refine the distribution of equipment, providing devices where needed and removing devices not needed. The new contract also provides a new print management system.

The new print management system has many benefits including paper saving features. Documents would be sent to the devices



like a typical set up but the print job would not be released until the user scans their individual scan card at the device. The user has the option to remove unwanted print jobs, the print jobs will automatically be deleted from the queue if not released within 4 hours. This system would reduce the number of abandoned print jobs.

Details of the print job would be tracked where principals have access to reports summarizing the paper usage by each teacher among other information. This feature introduces a sense of accountability in paper usage of all users.

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LIGHTING UPGRADES

The district has planned for lighting upgrades at 10 sites using LED technology. The fixtures being replaced include exterior high pressure sodium, fluorescent tubes and fluorescent fixtures. The projects are estimated to save 300,000kWh equivalent to 3.24 tCO_{2e}.



PLANS FOR FUTURE

REPLACEMENT OF GYMNASIUM & SECONDARY SCHOOL SHOP RTUS

Antiquated gas fired rooftop heating units serving gymnasiums and secondary school shops will be replaced within the next 5 years to more efficient systems.

REPLACEMENT OF DOMESTIC HOT WATER SYSTEMS

Mid-efficiency gas fired domestic hot water heaters and boiler plants will be replaced with high efficiency options including high efficiency heaters and boilers with smaller storage capacity. Decentralization will also be visited as an option to reduce heat loss through hot water stored in piping throughout buildings.



Part 1: CNAR Survey

1. General Information

Name: Debra Eng

Contact Email: deng@deltasd.bc.ca Organization Name: Delta School District 37 Sector: School District

2. Stationary Sources (eg. Buildings, Power Generators): Fuel Combustion, Electricity use, Fugitive Emissions.

During 2017, did your organization take any of the following actions to support emissions reductions from buildings? (please select all that apply)

Conducted an energy audit/study of building(s) in the organization's portfolio.; Performed energy retrofits of the organization's building(s)

If you selected "Performed energy retrofits of the organization's building(s)":

How many buildings were retrofitted?: 17

If you selected "Built, or are building new LEED Gold or other "Green" buildings":

How many new "Green" buildings?:

Did your Organization perform any retrofits during 2017? Please describe briefly:

lighting upgrades to LEDs and replaced gas fired HVAC units with ASHPs.

2a. Stationary Sources (eg. Buildings, Power Generators): Fuel Combustion, Electricity use, Fugitive Emissions.

2a. Stationary Sources (eg. Buildings, Power Generators): Fuel Combustion, Electricity use, Fugitive Emissions.

Please briefly describe your organization's plans to continue reducing emmissions from its stationary

sources:

a) Over the next 1-5 years

Replace gas fired heating units with energy efficient models. Replace existing lighting with more efficient options. Optimize use of existing solar walls. Implement energy/paper saving functions on to copiers where print jobs are not released until user signed into multi-function machine.

b) Over the following 6-10 years

Optimize use of existing solar hot water panels. Replace gas fired heating units with energy efficient models. Replace existing lighting with more efficient options.

3. Mobile Sources (Vehicles, Off-road/portable Equipment): Fuel Combustion:

During 2017, did your organization take any of the following actions to support emission reductions from its mobile sources? (please select all that apply)

Replaced existing vehicles with more fuel efficient vehicles (gas/diesel)

If you selected "Replaced existing vehicles with more fuel efficient vehicles (gas/diesel)":

How many vehicles ?: 7

If you selected "Replaced existing vehicles with hybrid or electric vehicles":

How many vehicles?:

3a. Mobile Sources (Vehicles, Off-road/portable Equipment): Fuel Combustion:

Please briefly describe your organization's plans to continue reducing emissions from its mobile sources:

a) Over the next 1-5 years

Trade in older vehicles for more fuel efficient models.

b) Over the following 6-10 years

Trade in older vehicles for more fuel efficient models.

4. Supplies (Paper): Indicate which actions your PSO took in 2017:

During 2017, did your organization take any of the following actions to support emissions reductions from paper supplies? (please select all the apply)

None of the above

4) Supplies (Paper): Indicate which actions your PSO took in 2017: - Other? Please describe briefly:: We do not have a policy to enforce the use of recycled content paper but all schools were made aware of the availability of recycled content paper. The board office has implemented the use of 30% recycled content paper.

If you selected "Had a policy requiring the purchase of recycled content paper":

State the required recycled content here (30%, 50%, 100%):

If you selected "*Had a policy requiring the purchase of alternate source paper (bamboo, hemp, wheat, etc)*", which type of alternate source paper did you use?

Please briefly describe your organization's plans to continue reducing emissions associated with its office paper use in future years.

Users are made aware of their paper use with the new printing/copying system with metrics (papercut system). Reports are generated by the schools by the principals and they share the numbers. Users are accountable for the amount they use, some may implement quotas. The new papercut system eliminates the "accidental" print jobs by no releasing print jobs until the user scans in at the printer.

5. Other Sustainability Actions

a) Business Travel

During 2017, did your organization take any of the following actions to support emissions reductions from business travel? (please select all that apply)

None of the above

b) Education/Awareness

During 2017, did your organization have any of the following programs or initiatives to support sustainability education and awareness? (please select all that apply)

A Green, Sustainability or Climate Action Team; Support for professional development on sustainability (e.g. workshops, conferences, training)

c) Other Sustainability Actions

During 2017, did your organization have any of the following programs or initiatives to support sustainability? (please select all that apply)

An operations policy or program to facilitate the reduction and diversion of building occupant waste (e.g., composting, collection of plastics, batteries) from landfills or incineration facilities