2023 PSO CLIMATE CHANGE ACCOUNTABILTY REPORT(CCAR)

SCHOOL DISTRICT NO. 71 (SD71)

COMOX VALLEY SCHOOLS

Comox Valley Schools
A Community of Learners
INNOVATIVE • INQUISITIVE • INCLUSIVE

We acknowledge with respect and gratitude that this report was produced on the Unceded Traditional Territory of the K'ómoks First Nation, the traditional keepers of this land on which Comox Valley Schools operates.

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Executive Summary

As a Public Sector Organization (PSO), this report meets the legislative requirements under the Climate Change Accountability Act (Section 8.1) and the Carbon Neutral Government (CNG) Regulation. To be considered carbon neutral, Comox Valley Schools (SD71) has paid $43 575 for the retirement of offsets reflecting 1743 tonnes of carbon dioxide equivalents tCO2e produced and reported by our district in 2023. Our emissions included: 67.4 tCO2e from paper use, 186 tCO2e from mobile energy use (e.g. fleet) and 1489 tCO2e from stationary energy (e.g. buildings) use.

Comox Valley Schools success story of the year is our noteworthy emissions reduction of 410 tCO2e, from 2022. This significant reduction is attributed to continuous optimization efforts supported by a BC Hydro initiative in 2023. The continuous optimization efforts focused on auditing and reviewing our building systems and implementing strategic scheduling and controls programing with a team of professionals. This highlights how critical understanding our building use and occupancy are for achieving optimal performance out of our current systems.

Strategic initiatives to reduce our greenhouse gas (GHG) emissions and energy consumption stem from legislated targets along with willingness to actively reduce our emissions, rather than purchase offsets, demonstrating leadership and accountability by taking meaningful actions to improve the efficiency of our current systems. The district's 2023 tCO2e emissions are down 751tCO2e from 2010 emissions (the year we started tracking and reporting), which is a reduction of 30%, meaning we are on track to achieving the 2030 reduction target of 40%, set by the province.

To achieve long term emissions targets SD71 will continue focusing significant efforts and investments on reducing our stationary emissions, which comprise around 85% of our emissions. We will continue to target and apply for funding directed towards reducing the energy consumption from buildings, specifically towards fuel switching and electrification projects.

PART 1. Legislative Reporting Requirements

Declaration Statement

This Climate Change Accountability Report (CCAR) for the period January 1st, 2023, to December 31st, 2023, summarizes our greenhouse gas (GHG) emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2023 to reduce our GHG emissions, and our plans to continue reducing emissions in 2024 and beyond.

By June 30, 2024, School District No. 71 (SD71), also referenced as Comox Valley Schools, will post this CCAR to our website at www.comoxvalleyschools.ca, under reports.

Emissions Reductions and Plans

A. Stationary Sources (e.g. buildings, power generation)

Comox Valley Schools is committed to minimizing GHG emissions and has met the challenges of rising heating costs and increased demand on aging facilities. Energy efficiency is a key strategy in SD71's approach to minimizing GHG emissions from stationary sources. Senior management plays an active role in seeking out and securing funding opportunities that will result in GHG emission reductions. The following four principles are of key importance when assessing the need for replacing equipment:

I. Creating healthy environments, including air, temperature and noise for students, teachers, and support staff
II. Reducing energy consumption

III. Reducing energy waste
IV. Increasing equipment and system efficiency

When reviewing existing mechanical systems in service within SD71 and evaluating recommendations to upgrade or replace with new systems, the new systems are assessed to meet the following minimum requirements:

- significantly reduce the carbon emissions produced by the building systems;
- conserve energy (electricity and fossil fuels) and decrease operating costs;
- demonstrate a successful approach to addressing climate change.

When looking at building retrofits for SD71, energy conservation measures that are practical and cost-effective are reviewed and assessed for implementation with a goal to ensure estimated savings are optimized and maintained during the useful life of the initiative and beyond. It is SD71's intent to tie together climate adaption policies with planned capital upgrades to ensure future work reduces GHG emissions and improves infrastructure resiliency.

Ongoing plans to continue reducing emissions from stationary sources include making sure our building heating and cooling management systems (HVAC) are operating in the way they are intended. Comox Valley Schools is integrating strategic and tactical energy management planning and systems into our processes and is reviewing, assessing, and analysing mechanical systems to ensure they are programed effectively and efficiently for our educational institutional needs and goals, leading to reduced emissions.

Energy Efficiency Projects Completed in 2023 include:

I. Continuous Optimization Program (COP) – BC Hydro initiative providing financial impetus to audit and implement energy saving measures at various district sites with funding from SD71 operating funds and BC Hydro rebates.

II. Phase 2 – HVAC upgrade – Installation of solar photovoltaic array, at Glacier View Secondary with funds from Carbon Neutral Capital Program (CNCP).

III. Phase 1 – **HVAC and LED lighting upgrades –** Installation of Energy Recovery Ventilation (ERV) Equipment and LED lighting at Denman Island Community School with funding from provincial CNCP and Annual Facilities Grant (AFG). The second phase of the project plan for 2024 is to install a photovoltaic array.

I. Continuous Optimization Program (COP)

Key actions in 2023 to reduce GHG emissions focused on participating in a Continuous Optimization Program (COP) with BC Hydro (BCH) and REDE Engineering. The focus of the program is on improving the efficiency of the organization's most energy-intensive systems, such as heating, ventilation, and air-conditioning (HVAC), with simple, low-cost solutions. The COP is an initiative is directed towards assisting consumers find energy savings in large commercial and institutional buildings with out having to undertake major capital investments. REDE Engineering, an approved BCH service provider for the program, was retained to complete an in-depth review of SD71 building controls to find energy savings opportunities through programming changes. REDE Engineering and Ainsworth, building automation and controls specialist, have been steadily implementing recommended changes. The energy savings have been dramatic and are noticeable in a year over year reduction of 22% in stationary fuel emissions. The recommended and implemented controls changes will remain operational going forward, resulting in lasting system wide efficiencies for years to come. Ongoing optimization and energy efficiency strategies are key to SD71's emissions reductions from stationary sources. Energy efficiency, fuel switching and electrification alongside climate adaptation considerations will be reviewed when considering retrofits and capital projects.

Comox Valley Schools is following Existing Building Commissioning (EBCx) trends and will continue optimizing be (i.e. 'tuning up') the performance of existing equipment and systems and identifying low-cost or no-cost operational improvements. EBCx is a broad term that includes recommissioning, retro-commissioning and ongoing commissioning. The benefits of the EBCx framework may include energy savings, increased occupant comfort, extended equipment life, improved indoor air quality, avoided costs, reduced greenhouse gas emissions, and enhanced operations and maintenance (O&M) staff skills. Natural Resources

Canada has two reference documents that provide useful information: *Tuning Up – A Framework for Existing Building Commissioning* and *Recommissioning Guide For Building Owners and Managers*.

II. Installation of Solar Photovoltaic Array at Glacier View Secondary

The Solar Photovoltaic System (PV) installed at Glacier View Secondary is estimated to yield approximately 8000 kWh of electricity and reduce CO_2 emissions by 574 kg, annually. The PV system will provide exceptional value to the operational efforts of the site. The system will generate clean renewable energy for 35-40 years. The array can be expanded as budget and roofing allow. With the ability to generate electricity with solar, the district has some protection from escalating utility prices while ensuring the school is utilizing clean emission solar electric power.

Figure 1 – Glacier View Secondary PV Array Control Panel

Figure 2 – Glacier View Secondary Rooftop PV Array

Figure 3 – Glacier View Secondary

Figure 4 – Glacier View Secondary Rooftop PV Array

The sun is a clean, renewable, energy resource. Increased use of solar energy builds energy security, reduces greenhouse gas emissions, and moves us toward a sustainable energy future. Energy from the sun can be harnessed to generate electricity using Solar Photovoltaic panels. A solar Photovoltaic system is an energy generating technology that produces electricity directly from sunlight. Electricity is created when solar radiation activates electrons in a semiconducting material usually diffused with impurities to enhance the flow of electrons. The electrons generate an

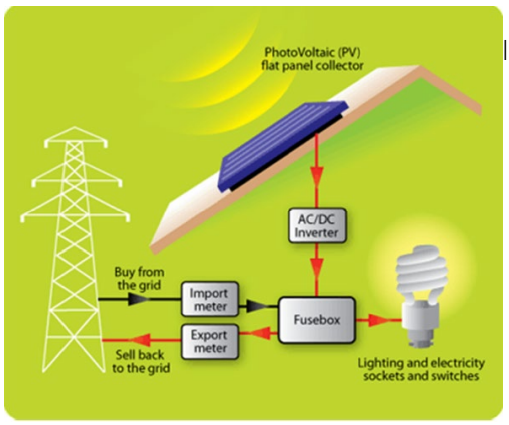


Figure 5 – PV System Schematic

electrical voltage and current that is then carried through wires to an electrical circuit. This is called the photovoltaic effect.

III. Denman Community School HVAC and LED lighting upgrades

Ongoing light-emitting diode (LED) lighting upgrades were completed in various school classrooms and office spaces. Denman Community School saw the largest inventory upgrade in 2023. The new LED lighting consumes 40% less electricity, has lower maintenance and a much longer life span than the former fluorescent tube lighting, which contains mercury and uses heat to create light. Using LED technology can not only cut electricity costs in school districts, it can also help improve student learning and campus safety. Shown to improve mood, reduce eye strain, and reduces absenteeism, LED lighting has a direct impact on students, teachers, and the learning environment.

Figure 6 – Denman Community School

Denman Community School also saw the installation of an Energy Recovery Ventilator (ERV), a proportional control roof top ventilation unit. The heating requirement for ventilation air is the single largest energy demand in the mechanical system. The new proportional control system replaced an aging out On-Off control unit and provides more efficient heating. The basis of the On-Off control system is that full power is supplied to the system until the desired setpoint is reached. Once the pressure feedback reaches and surpasses the setpoint, the power is completely turned off to the heater. This results in a relative amount of energy waste. The proportional control system pre-heats the air and provides air turnover in a more efficient way than the On-Off method; it can maintain an accurate room or discharge temperature without the typical variations of the On-Off unit. The new heater is electronically controlled to deliver anywhere from zero to 100% of it's capacity, precisely and smoothly matching the heat demand of the system. Energy savings of approximately 18% are anticipated with the new unit.

B. Mobile Sources (e.g. fleet vehicles, off-road/portable equipment)

Mandating greater vehicle fuel economy is a straightforward way to reduce GHG's from motor vehicle use. Optimal fuel performance is a driving factor embedded within SD71's vehicle policy and mileage & fuel consumption tracking. Finding ways to reduce fuel consumption promotes fuel efficiency and reduces emissions; the SD71 vehicle policy incorporates tips from Natural Resources Canada including idling reduction tips and strategies. Management reviews the vehicle policy with maintenance staff annually. The policy includes notes on GPS tracking, highlighting that we track vehicle location, speed, acceleration, harsh braking, and cornering.

The district continues to remove older fleet vehicles and purchase newer vehicles that are fuel-efficient and produce less emissions. In 2023, we purchased our first Battery Electric Vehicle (BEV), a Ford E-Transit work van. Researching and investigating suitable equipment for trades vehicles that are lower or zero emissions along with exploring strategic avenues for decarbonizing the SD71 fleet continued in 2023. Namely, through a collaborative effort with GHD Consultants in producing a Fleet Decarbonization Report, which included a fleet assessment, service assessment and Zero Emission Vehicle (ZEV) transition scenarios. Funding for the report came from SD71 operating funds, augmenting a grant from CleanBC. A summary of the Fleet Decarbonization Report is included in Appendix C. Transition scenarios will be reviewed for feasibility and implementation operability. Stable funding options, along with assurance we can get the vehicles we need at appropriate costs in reasonable time frames will be

Figure 7 – E-Transit BEV

Figure 8 – E-Transit BEV

Figures 9&10 – BEV Charging Station

necessary for a cleaner fleet and will direct resource and organizational capacity in the development and application of recommendations provided by GHD.

C. Paper Consumption

Comox Valley Schools continues efforts focused on updating business processes to online formats, using technology to mitigate paper consumption. Paper consumption makes up a nominal part of our overall emissions: 3.87% of total emissions in 2023, up from 2.38% in 2022. The year over year paper emissions increase of 1.5%, relative to significant reductions in stationary fuel emissions of 22%, year over year, along with the fact our district is growing and seeing increased enrollments, is not a focal point for SD71. Our district will continue integrating technology into business processes, updating to more electronic formats, along with centralizing printing stations and removing individual printers; however, the district's core focus for GHG reductions will be targeted towards maintaining the significant gains we've made in stationary fuels and plans around fleet decarbonization.

2023 GHG Emissions and Offsets Summary Table:

Comox Valley Schools, SD71, 2023 GHG Emissions and Offsets Summary	
GHG emissions for the period January 1 - December 31, 2023	
Total BioCO_2	*6.51*
Total Emissions (tCO_2e)	*1750*
Total Offsets (tCO_2e)	*1743*
Adjustments to Offset Required GHG Emissions Reported in Prior Years	
Total Offsets Adjustment (tCO_2e)	*0*
Grand Total Offsets for the 2022 Reporting Year	
Grand Total Offsets to be Retired for 2022 Reporting Year (tCO_2e)	***1743***
Offset Investment ($) *[Grand Total Offsets to be Retired for 2022 Reporting Year x $25 per tCO_2e]*	*(1743+ 0) x $25* *= **$43 575***

Retirement of Offsets:

In accordance with the requirements of the *Climate Change Accountability Act* and Carbon Neutral Government Regulation, School District No. 71 (**the Organization**) is responsible for arranging for the retirement of the offsets obligation reported above for the 2023 calendar year, together with any adjustments reported for past calendar years (if applicable). The Organization hereby agrees that, in exchange for the Ministry of Environment and Climate Change Strategy (**the Ministry**) ensuring that these offsets are retired on the Organizations 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.

Clean Government Reporting Tool (CGRT) GHG Offset Summary:

	School District 71 - Comox Valley
	2023
Direct Fuel Combustion	
t CO2e, GHG, All	1422
Purchased Energy	
t CO2e, GHG, All	67.6
Mobile Energy Use	
t CO2e, GHG, All	186
Office Paper	
t CO2e, GHG, All	67.4
Fugitive Emissions	
t CO2e, GHG, All	n/a

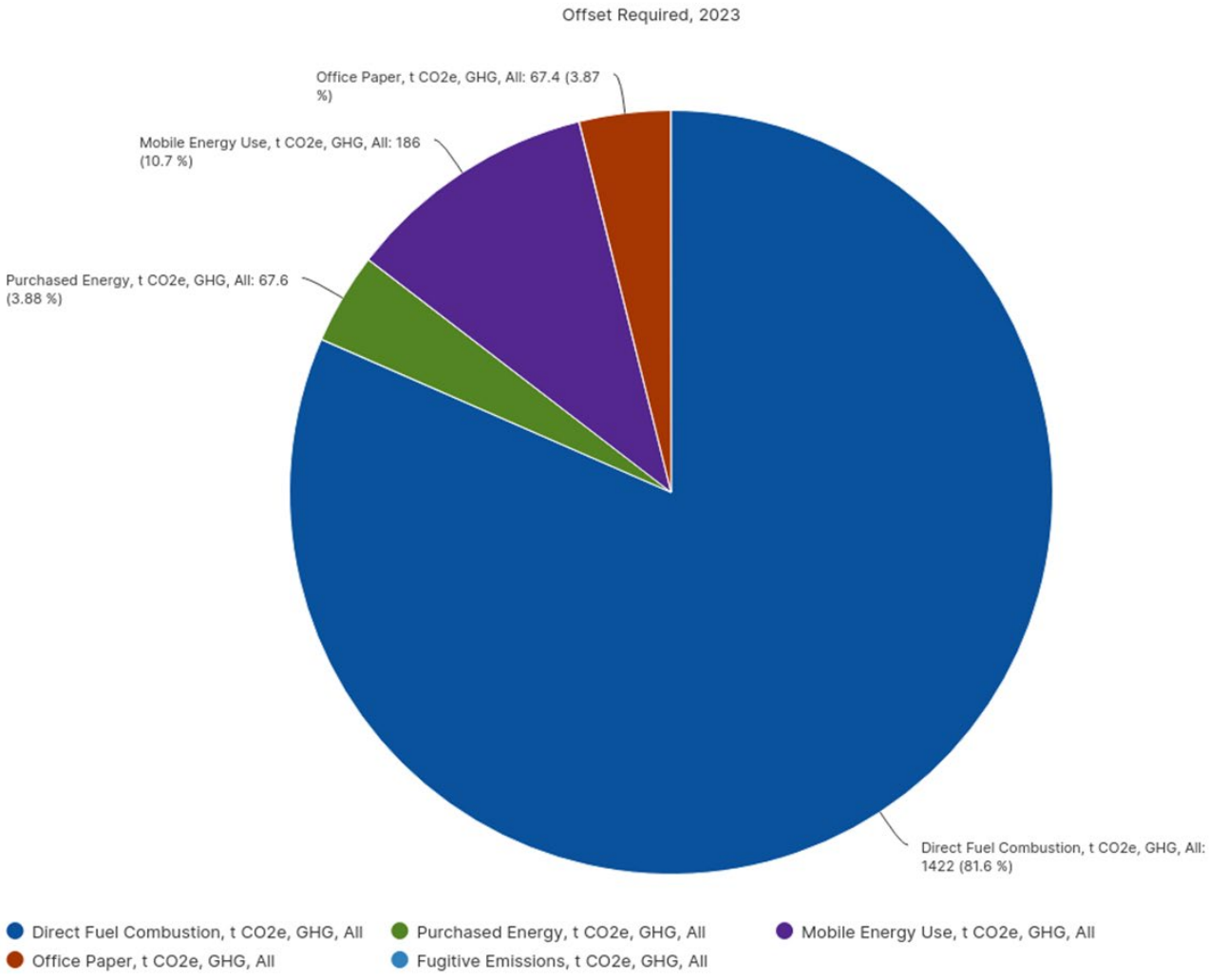


Figure 11 – CGRT graph showing proportional GHG emissions in tCOe by SD71 in 2023

PART 2. Public Sector Leadership

2A. Climate Risk Management

Along with accounting for GHG emissions, SD71 is preparing for a changing climate and managing climate related risks. Comox Valley Schools incorporates climate risk management strategies into its operational and capital planning via energy management and building resilience infrastructure planning alongside GHG targets, operational budgets, and available resources.

During 2023, SD71 added electric heat pumps to all portable classrooms in the district. This fuel switching initiative (e.g. many of the portable were previously run by propane powered furnaces) has helped increase student and staff comfort through the seasons, particularly during unseasonably warm temperatures approaching summers, when portables can become unbearably hot. Additionally, SD71 has been installing window film at select sites annually to block intense sun from a penetrating through southern facing windows with the most exposure.

Comox Valley Schools participated in a pilot project offered through the Climate Action Secretariat (CAS), offering participants the opportunity to use their Climate Readiness Tool. The Climate Readiness Tool has been developed for Ministries and Public Service Organizations (PSOs) in the province to self-assess, report and monitor progress on building overall organizational capacity for climate adaptation. By understanding strengths and areas for improvement, Ministries and PSOs can enhance their readiness and effectively respond to climate-related impacts. Participating in the pilot, prompted SD71 to review and reflect on five fundamental competencies: Assessment, Leadership and Culture, Staff Capacity, Mainstreaming, and Collaborations and Partnerships in terms of four maturity levels: Getting Started, Progressing, Advanced, and Robust in relationship to preparing and navigating the challenges of climate change impacting our district. Generally speaking, SD71 is working in the 'Getting Started' maturity level. Our district has found that with our educational sites being situated in a large geographic area (e.g. multiple sites in multiple locations throughout multiple regions), our current climate adaptation efforts tend to focus on emergent issues at higher risk locations vs. those that are not as susceptible to climate related operational issues. Comox Valley

Schools is interested in learning and partnering with government, industry experts, organizations, and stakeholders throughout our regions to continue progressing our awareness and knowledge around Climate Readiness – our ability to focus on, plan for, monitor and report on building capacities and systems to adapt to a more volatile and uncertain climate.

2B. Other Sustainability Initiatives

As part of its *Value Statement,* The Board of Education of SD71, Comox Valley Schools, embraces, and encourages Global Awareness and Environmental Stewardship. Furthermore, Organizational Stability & Environmental Stewardship is one of four strategic priorities of the district's *Strategic Plan* with the goal of cultivating environmental stewardship by fostering the following actions:

- Align outdoor and environment learning opportunities for long-term sustainability
- Reduce carbon emissions and environmental footprint
- Support the establishment and augmentation of school garden projects
- Reduce the use of single-use plastics throughout the district
- Implement strategies for zero waste by increasing recycling and composting efforts in all facilities
- Augment the Active Travel Program and public transit commute initiatives

Additionally, senior management continues to assist teachers, support workers, parents, and students in their educational environmental & sustainability activities and initiatives throughout SD71 and community. For example, at the start of the 2023-2024 school year the operations department issued 'Energy Report Cards' to each school (see example in Appendix D). The idea behind providing schools with a summary of their annual energy consumption aligned with operational strategies integrating our Board level strategic priority of Organizational Stability and Environmental Stewardship. By sharing a simple quantifiable and qualifiable resource we are encouraging awareness and education around energy management, highlighting how efforts around balancing utility consumption with occupant and organization need can contribute to increased energy efficiency and conservation. Energy management and conservation efforts encompass district wide strategies working

towards optimizing energy efficiency, reducing greenhouse gas emissions, and supporting the provincial government's carbon neutral commitment.

Additional sustainability initiatives include tree planting and protecting the trees we have through restoration efforts focusing on high traffic, trampled forested areas. The following pictures show a before and after example of restoration efforts at one of our school sites.

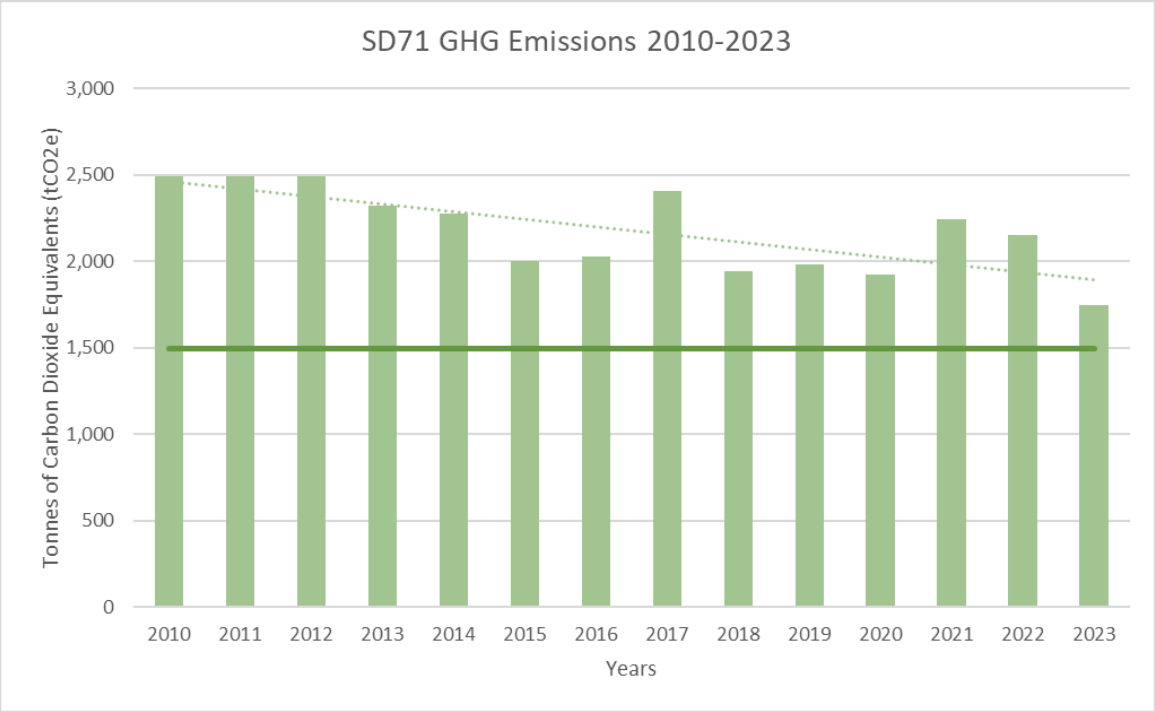
Figure 12 – Before – trampled forest area

Figure 13 – After – restoration of trampled forest area

2C. Success Stories

Reviewing data from 2010, the year SD71 started collecting and reporting data on GHG emissions, reveals we are tracking to meet the 2030 GHG reduction target of 40% and will surpass the minimum reduction of 16% for 2025. Since 2010, SD71 has reduced our overall emissions by 751 tCO2e, which represents a 33% reduction. Of note, during the 2023 reporting year we reduced our emissions by 410 tCO2e, which is more than half of all previous years combined and represents a 19% reduction year over year from 2022. The driver of the significant reduction in 2023 is a direct result of energy savings through COP efforts.

The graph below illustrates SD71's historical GHG emissions. The horizontal dark green line indicates the 2030 reduction target from 2010 emissions levels. The general trend for the district is illustrated by the angled lighter green line and the columns show emissions in tonnes of carbon dioxide equivalents annually over the years.



. The table below outlines 2023's GHG reductions compared to our 2010 baseline year.

Emissions Source	2023 GHG Emissions (tCO2e)	2010 GHG Emissions (tCO2e)	2023 Results Compared to 2010 Baseline
Stationary (e.g. buildings)	1490	2239	-33%
Fleet	186	205	-9%
Paper	67	115	-41%
Total Emissions	1743	2494	-30%

Comox Valley Schools saw a 33% decrease in stationary (buildings) emissions in 2023 compared to 2010. Reviewing this against the district's square footage, which has largely remained the same since 2010, along with our student population numbers that have increased approximately 20%, indicates the district is gaining efficiencies from our energy upgrades while incurring intensified room usage due to increasing enrollment over time.

Comox Valley Schools will continue to integrate strategic and tactical energy management planning and systems into our processes. A key metric used to quantify the energy consumption of a building, expressed in kilowatts per square meter per year: Building Energy Performance Index (BEPI), is a useful tool we use for reviewing and monitoring operational systems performance. The metric provides insight and guidance into optimization and reviewing gaps and barriers in our systems. SD71's continuous optimization and energy

efficiency strategies will encompass an electrification assessment in the coming years. We are continuously evaluating or buildings and systems and are actively completing our second full mechanical inventory and assessment in all facilities, which will guide ongoing maintenance and equipment replacement to maximize efficiency.

Looking Ahead

Comox Valley Schools aims to contribute to the 2030, 2040 and 2050 emission reduction targets as set out by the BC government (see Appendix B for .an overview of on GHG reporting). To meet the 2030 targets, we will need to further reduce our GHG emissions an additional 10%, and 40% and 60% respectively to meet 2040 and 2050 targets. Senior leadership team members within SD71 will work with provincial capital funding branch and our school board trustees to align new policies and compliance strategies to support net-zero emissions plans.

Public sector leadership is something SD71 takes to heart. Comox Valley Schools is aligned with the province's commitment to climate action. A key question SD71 has been reflecting on in operational strategies is how do we de-carbonize? In 2021 two key documents: British Columbia's Building Electrification Road Map and Clean BC's Roadmap to 2030 were released highlighting some key concepts around moving towards de-carbonization, such as fuel switching, electrification, support for building envelope improvements and heat pumps. Additionally, the provincial 2023 Climate Change Accountability Report , and the Climate Preparedness and Adaptation Strategy - Actions for 2022-2025, highlight that meeting emissions targets and building community resilience to ensure we are well prepared for the impacts of a changing climate requires collaborative climate action, working in partnership at all levels of government, locally, provincially, and federally, along with industry, civil society and the independent Climate Solutions Council, which is made up of leaders representing First Nations, environmental organizations, industry, academia, youth, labour and local government. Comox Valley Schools is fostering relationships locally and provincially with key stakeholders learning and increasing our knowledge base, collaborating, and learning within our communities in alignment with provincial climate leadership.

Building emissions are the largest segment of our GHG's, making up approximately 85% of

our annual emissions. The emissions are the result of stationary fuels, namely natural gas, at this time, 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. Capital and operations planning will identify and incorporate future energy efficiency projects, including electrification initiatives that will reduce consumption in district facilities. Project assessments and initiatives will factor in the *Annual Facility Grant (AFG)* project planning process, the *Annual Capital Plan,* the *Long Range Facilities Plan (LRFP)*, and *Carbon Neutral Capital Program (CNCP)* funding requests.

Planned Energy Efficiency Projects for 2024:

I. Ongoing continuous optimization and recommissioning of building controls for remaining 25% of district sites, as part of BC Hydro COP Initiative.

II. Installation of a solar photovoltaic array at Denman Island Community School as part of Phase 2 upgrades with funding from CNCP and Annual Capital Plan, School Enhancement Program (SEP) funding.

III. Building envelope upgrades - windows and cladding at North Island Distance Education School (NIDES), as part SEP through Annual Capital Plan funding.

IV. Comox Elementary HVAC upgrade, new boiler plant, as part of AFG.

V. Energy Recovery Ventilation (ERV) roof top units at Georges P. Vanier Secondary as part of AFG.

Executive Sign-off:

MAY 30, 2024

Signature | Date

JEROMY MORROW | SUPERINTENDENT

Name (please print) | Title

APPENDICES

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Appendix A: Overview - Comox Valley Schools

Comox Valley Schools (SD71) is a positive, progressive, and growing school district situated on the east coast of Vancouver Island on the traditional territory of the K'omoks First Nation. Located within the Valley are the municipalities we serve: City of Courtenay, Town of Comox, Village of Cumberland, and the Regional District, including the surrounding communities of Black Creek, Merville, Royston, Union Bay, Hornby Island and Denman Island. Each location providing their own unique services and community cultures. School District No. 71 (SD71) is one of 60 school districts in British Columbia.

QUICK FACTS – SD71 serves:

- 1 Regional District
- 3 Municipalities
- 2 Islands
- 1 First Nation
- 10,000 + students

Vancouver Island

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 Community School (Gr. 6-9)

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

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

SD71's Vision and Mission Statement (Board of Education 2019 – 2023):

"An inclusive learning community that embraces diversity, fosters relationships, and empowers all learners to have a positive impact on the world. To inspire engaged, compassionate, resilient lifelong learners and cultivate a collaborative community together."

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Appendix B - Overview - GHG Reporting

In 2007, the BC 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, BC's GHG emissions are to be reduced by the following listed targets set for the Public Sector Organizations (PSOs) and regulated by the Carbon Neutral Government:

- By 2025, BC will reduce GHG emissions by 16 percent, compared to 2007 levels
- By 2030, BC will reduce GHG emissions by 40 per cent, compared to 2007 levels
- By 2040, BC 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 PSOs 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 BC-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. Comox Valley Schools has implemented the 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-BC carbon offsets. Fourthly, reporting annually on progress through the Climate Change Accountability Report (CCAR) and finally, verifying data and emissions through the BC government online application Clean Government Reporting Tool (CGRT) to convert GHG emissions into a unit of measure. All PSOs enter their data into CGRT which then converts this data into tonnes of carbon dioxide equivalents (tCO_2e).

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Appendix C – GHD Fleet Decarbonization Summary Report

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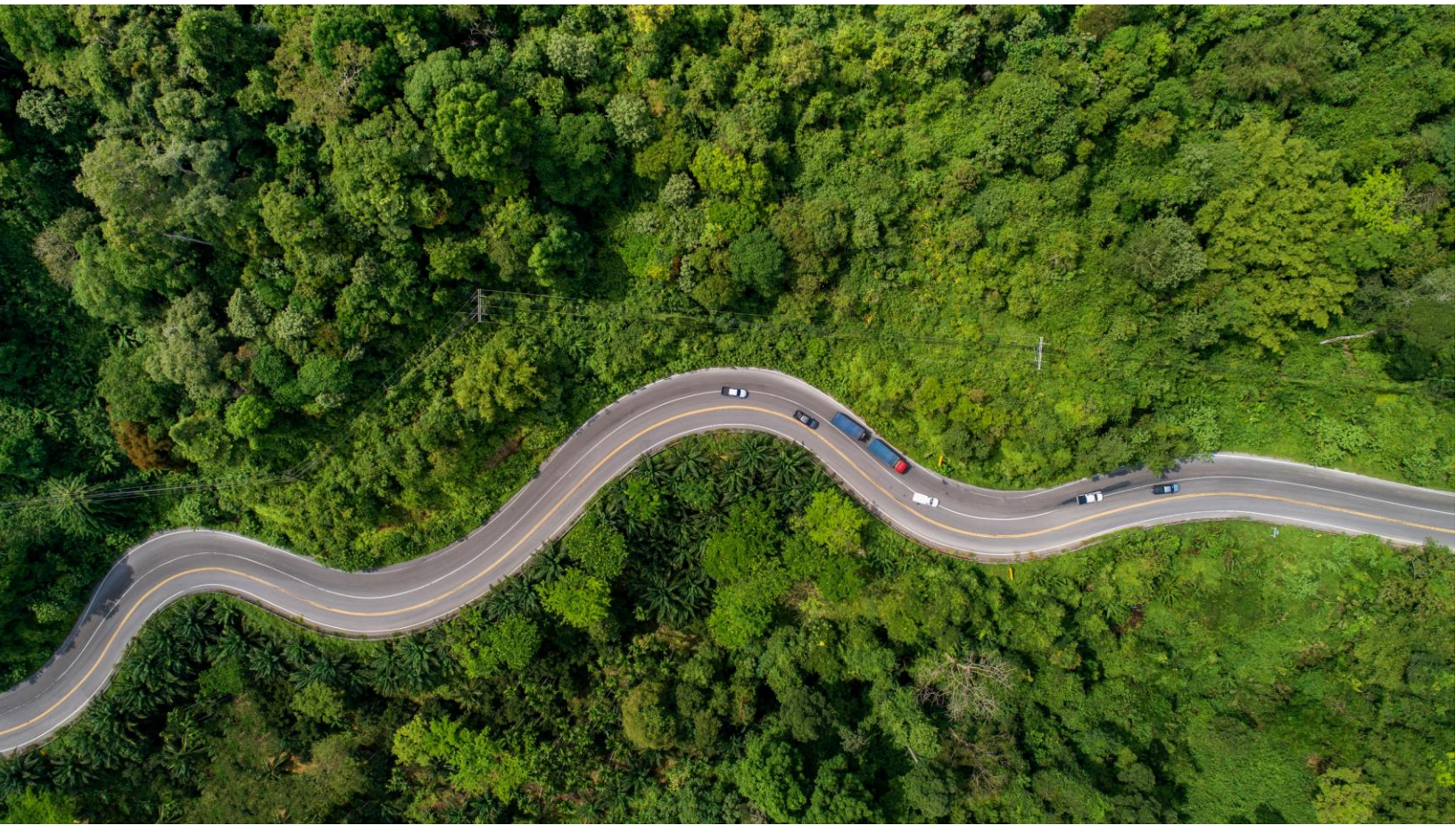
Fleet Decarbonization - GHD ZEVO

Summary Report

School District 71 (Comox Valley)

June 30, 2023

→ **The Power of Commitment**



Project name	ZEV Ready Plan – School District 71 (Comox Valley)
Document title	Fleet Decarbonization - GHD ZEVO | Summary Report
Project number	12602911
File name	Summary Report

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1. Introduction

This report represents a summary derived from the complete ZEV Ready Report prepared for School District 71. It provides a comparison of Total Cost of Ownership (TCO) between Battery Electric Vehicles (BEVs) and Internal Combustion Vehicles (ICE) for each key vehicle segment – cargo vans, SUVs, sedans, and utility trucks. It also provides the recommended replacement order and schedule for the upcoming 5 years (2023 to 2028). While this summary roadmap is a brief overview, a full analysis of financial, environmental, electrical, and infrastructure implications of each scenario is available in the complete ZEV Ready Report.

This analysis is subdivided into three hypothetical transition scenarios:

- A "business as usual" scenario (Scenario 1) where all fleet vehicles are replaced with comparable Internal Combustion Engine (ICE) vehicles
- A provincial guideline electrification scenario (Scenario 2) where all vehicles are replaced with electric at a pace which allows the District to meet the BC Government target of 40% emissions reduction by 2030
- A budget electrification scenario (Scenario 3) where all vehicles are replaced with electric vehicles at the same rate as scenario 1, adhering to the District's vehicle purchase budget of $150,000 annually

1.1 Overview of Scenario Parameters

This analysis incorporated financial data provided by the District, as well as external data to calculate both Capital Expenditure (CAPEX) and Operating Expenditure (OPEX). The major components of CAPEX for each scenario are the initial purchase price for vehicles, and for the transition scenarios (2 & 3), the initial cost of electrical and charging infrastructure. OPEX includes fuel, electricity, maintenance for both vehicles and infrastructure, tires, lubricant, and insurance, and are summarized in the table below.

Further breakdown, including a year-by-year financial forecast and item-by-item cost breakdowns, as well as more information on the components of these parameters are available in the full ZEV Ready Report, or in the Financial Analysis and Financial Drillthrough tabs of the District's Fleet Assessment dashboard (**link**).

Scenario	Transition Scenario	Fleet Type of ZEVs and fleet replacement rate per annum	Financial (TCO, CAPEX, OPEX)	Environmental (CO_2 emissions, air quality (NOx, SOx, VOCs, PM2.5, PM10)	Energy & Infrastructure (peak demand, # of chargers)
1	Business as usual	1-2 vehicles per year, depending on established District budget	$10.1 M total cost of ownership OPEX highest of all scenarios	No reduction	N/a
2	Provincial guideline electrification	2-4 vehicles per year to EVs, keeping pace to meet provincial target 50% more vehicles purchased over study period than Scenario 1 or 2	$10.5 M total cost of ownership May be eligible for up to 400k in infrastructure rebates (BC Hydro)	49% emission reduction by 2030 100% reduction by 2037	Typical Peak Demand capacity: 147 kVA. 45 L2 EVSE + 1 50kW DCFC

		1-2 vehicles per year to EVs.	$9.0 M total cost of ownership	28% emission reduction by 2030	Typical Peak Demand capacity: 147 kVA.
3	Electrification based on budget	Same replacement plan as Scenario 1 / Business as usual except with EVs	May be eligible for up to 400k in infrastructure rebates (BC Hydro	100% reduction by 2045	45 L2 EVSE + 1 50kW DCFC

1.2 Vehicle Selections

Based on the District's required capabilities and range, fourteen replacement vehicles, corresponding to different vehicle classifications and drive types, were selected for analysis as summarized in the table below. Prices are accurate as of August 2023 and do not include taxes or destination fees.

Classification	Type	Make and Model	EV Range	MSRP	Rebate
Cargo Vans	BEV	Ford E-Transit Cargo Van	203 km	$71,450	$(10,000)
Cargo Vans	ICE	Ford Transit Cargo Van		$53,555	
Cutaways (Flatdeck)	BEV	Ford E-Transit Cutaway	203 km	$67,955	$(10,000)
Cutaways (Flatdeck)	ICE	Ford Chassis Cab		$60,819	
Dump Truck	BEV	Isuzu N-Series EV (TBD 2025)	378 km	$150,000 (estimated)	
Dump Truck	ICE	Isuzu Dump Truck		$137,158	
Sedans	BEV	Chevrolet Bolt EV	354 km	$41,567	$(3,000)
Sedans	ICE	Nissan Sentra		$23,597	
SUV	BEV	Chevrolet Bolt EUV	402 km	$43,172	$(3,000)
SUV	ICE	Nissan Kicks		$24,372	
Utility Trucks	BEV	Ford F-150 Lightning (98 kWh)	368 km	$69,000	Potentially Eligible *($3,000)
Utility Trucks	ICE	Ford F-250		$58,479	
Passenger Vans	BEV	Greenstar EV Star	240 km	$178,900	$(131,520)
Passenger Vans	ICE	Ford Passenger Van XL		$63,875	$(10,000)
Cargo Vans – Not Modelled	BEV	Greenstar EV Star Cargo	250 km	$149,500	$(124,784)
Cutaways – Not Modelled	BEV	Greenstar EV Star CC	250 km	$160,000	$(127,800)
Cube Vans – Not Modelled	BEV	Greenstar EV Cargo +	250 km	$193,500	$(139,436)
Utility Trucks – Not Modelled	BEV	Ford F-150 Lightning (131 kWh)	492 km	$97,395	Not Eligible

1.3 Replacement Order

The replacement timeline, as established during the first workshop held on April 21, 2023, was also restricted by the available budget for Scenario 1 (business as usual) and Scenario 3 (budget electrification). The $150,000 cap on yearly purchasing meant at most two vehicles could be replaced in a given year, with some years only one replacement occurring, and in some years this budget had to be exceeded in order not to make the replacement timeline longer than would be safe to operate a vehicle. Even with the budget adjustment, a 22-year replacement cycle rather than a ten- or twelve-year replacement cycle was required in order to remain within range of the budget. Yearly vehicle purchase costs vary between $106,000 and $171,121, with an average yearly cost of approximately $132,171.

For scenario 2, the replacement order was the same but the timeline was accelerated in order to achieve the desired provincial targets of 40% reduction in emissions by 2030. In this scenario, between 2 and 4 vehicles were replaced per year with yearly purchase costs ranging from $150,863 to $284,395 with an average cost of $202,663. Even in this accelerated scenario, the replacement interval per vehicle is 15 years, which is longer than the District's desired purchase interval of 10 years as per existing replacement policy.

The replacement order for the first five years for transition scenarios 1 and 2 are listed in the tables below.

Replacement Order

Scenario: Scenario 1 | **Scenario 2** | Scenario 3

Units	Description	Replacement Date	Vehicle Replacement Scenario	Vehicle Lifespan
GR 03 11	Ford	2023	Ford F-150 Lightning (98 kWh)	15
GR 06 08	Sierra 3500 2Whdr Ext & Crew Cab Flat Deck Pickup	2023	Ford F-150 Lightning (98 kWh)	15
GR 09 07	SIERRA 2500 HD SL EXT CAB 4WD	2023	Ford F-150 Lightning (98 kWh)	15
EL 05 12	ECONOLINE E250 CARGO VAN	2024	Ford E-Transit Cargo Van	15
GR 02 11	Silverado 3500 2Whdr Pickup	2024	Ford F-150 Lightning (98 kWh)	15
PL 07 06	EXPRESS 3500 CARGO VAN EXT	2024	Ford E-Transit Cargo Van	15
CR 02 07	EXPRESS 1500 CARGO VAN	2025	Ford E-Transit Cargo Van	15
CR 12 06	EXPRESS 2500 CARGO VAN	2025	Ford E-Transit Cargo Van	15
MN 02 06	SILVERADO 2500 HD LT EXT CAB 4WD	2025	Ford F-150 Lightning (98 kWh)	15
EL 04 06	SAVANA 1500 CARGO VAN	2026	Ford E-Transit Cargo Van	15
GR 06 03	GMC Other Trucks - Diesel	2026	Isuzu N-Series EV	15
CR 03 17	EXPRESS 2500 CARGO VAN	2027	Ford E-Transit Cargo Van	15
CR 11 07	EXPRESS 3500 CARGO VAN	2027	Ford E-Transit Cargo Van	15
PL 09 06	EXPRESS 2500 CARGO VAN	2027	Ford E-Transit Cargo Van	15
CR 10 06	EXPRESS 2500 CARGO VAN	2028	Ford E-Transit Cargo Van	15
EL 03 06	SAVANA 1500 CARGO VAN	2028	Ford E-Transit Cargo Van	15
PL 01 11	EXPRESS 2500 CARGO VAN	2028	Ford E-Transit Cargo Van	15

Replacement Order

Scenario: Scenario 1 | Scenario 2 | **Scenario 3**

Units	Description	Replacement Date	Vehicle Replacement Scenario	Vehicle Lifespan
GR 03 11	Ford	2023	Ford F-150 Lightning (98 kWh)	23
GR 09 07	SIERRA 2500 HD SL EXT CAB 4WD	2023	Ford F-150 Lightning (98 kWh)	23
GR 02 11	Silverado 3500 2Whdr Pickup	2024	Ford F-150 Lightning (98 kWh)	23
GR 06 08	Sierra 3500 2Whdr Ext & Crew Cab Flat Deck Pickup	2024	Ford F-150 Lightning (98 kWh)	23
EL 05 12	ECONOLINE E250 CARGO VAN	2025	Ford E-Transit Cargo Van	23
PL 07 06	EXPRESS 3500 CARGO VAN EXT	2025	Ford E-Transit Cargo Van	23
CR 12 06	EXPRESS 2500 CARGO VAN	2026	Ford E-Transit Cargo Van	23
MN 02 06	SILVERADO 2500 HD LT EXT CAB 4WD	2026	Ford F-150 Lightning (98 kWh)	23
CR 02 07	EXPRESS 1500 CARGO VAN	2027	Ford E-Transit Cargo Van	23
EL 04 06	SAVANA 1500 CARGO VAN	2027	Ford E-Transit Cargo Van	23
GR 06 03	GMC Other Trucks - Diesel	2028	Isuzu N-Series EV	23

1.4 Business Cases

A brief summary of results are shown in Tables 4.5-4.10 below, separated by vehicle type, calibrated for the average yearly travel distance of 9369 km/year (based on District's real fleet data) and a service life of 15 years, which is higher than the average prescribed lifespan per vehicle of typically around 10 years, but lower than the replacement frequency of 22 years that the budget requires.

	Cargo Vans					
	Ford Transit Cargo Van		Ford E-Transit Cargo Van		Costs / Savings (-)	
	First Year	Year 2 – Life	First Year	Year 2 – Life	First Year	Year 2 – Life
Vehicle and Infrastructure	57,081	0	61,750	0	4,669	0
Fuel	2,690	28,030	348	3,631	-2,341	-24,399
Maintenance	1,511	13,570	1,342	12,053	-169	-1,516
Total	**61,282**	**41,600**	**63,440**	**15,685**	**2,159**	**-25,915**

	Cutaways (Flatdecks)					
	Ford F-450 XL		Ford E-Transit Cutaway		Costs / Savings (-)	
	First Year	Year 2 – Life	First Year	Year 2 – Life	First Year	Year 2 – Life
Vehicle and Infrastructure	67,359	0	80,984	0	13,625	0
Fuel	3,520	36,678	395	4,115	-3,125	-32,562
Maintenance	1,511	13,570	1,342	12,053	-169	-1,516
Total	**72,389**	**50,247**	**82,721**	**16,169**	**10,332**	**-34,078**

	Dump Trucks					
	Isuzu Dump Truck		Isuzu N-Series EV		Costs / Savings (-)	
	First Year	Year 2 – Life	First Year	Year 2 – Life	First Year	Year 2 – Life
Vehicle and Infrastructure	137,158	0	158,750*	0	21,592	0
Fuel	3,442	35,872	561	5,847	-2,881	-30,025
Maintenance	1,511	13,570	1,342	12,053	-169	-1,516
Total	**142,111**	**49,442**	**160,653**	**17,900**	**18,542**	**-31,542**

	Sedans					
	Nissan Sentra		Chevrolet Bolt EV		Costs / Savings (-)	
	First Year	Year 2 – Life	First Year	Year 2 – Life	First Year	Year 2 – Life
Vehicle and Infrastructure	18,298	0	46,897	0	28,599	0
Fuel	1,073	11,179	216	2,256	-856	-8,923
Maintenance	1,511	13,570	1,342	12,053	-169	-1,516
Total	**20,881**	**24,749**	**48,455**	**14,309**	**27,574**	**-10,439**

	SUVs					
	Nissan Kicks		Chevrolet EUV		Costs / Savings (-)	
	First Year	Year 2 – Life	First Year	Year 2 – Life	First Year	Year 2 – Life
Vehicle and Infrastructure	20,998	0	48,897	0	27,899	0
Fuel	1,141	11,892	191	1,986	-951	-9,906
Maintenance	1,511	13,570	1,342	12,053	-169	-1,516
Total	**23,650**	**25,462**	**50,429**	**14,040**	**26,780**	**-11,422**
	Utility Trucks					
	Ford F-250		Ford F-150 Lightning (98kWh)		Costs / Savings (-)	
	First Year	Year 2 – Life	First Year	Year 2 – Life	First Year	Year 2 – Life
Vehicle and Infrastructure	56,499	0	90,145	0	33,646	0
Fuel	2,823	29,419	314	3,272	-2,509	-26,147
Maintenance	1,511	13,570	1,342	12,053	-169	-1,516
Total	**60,833**	**42,989**	**91,801**	**15,325**	**30,968**	**-27,664**
	Passenger Bus					
	Ford F-450		Greenstar EV Star		Costs / Savings (-)	
	First Year	Year 2 – Life	First Year	Year 2 – Life	First Year	Year 2 – Life
Vehicle and Infrastructure	54,397	0	53,613	0	-784	0
Fuel	3,138	32,704	580	6,040	-2,559	-26,664
Maintenance	1,511	13,570	1,342	12,053	-169	-1,516
Total	**59,046**	**46,274**	**55,535**	**18,094**	**-3,512**	**-28,180**

1.5 Conclusion

The District stands to achieve significant financial savings of up to **11% in the next 27 years**, as well as **reduce emissions 100% by 2037 or 2045** by pursuing vehicle electrification.

A transition plan has been derived to ensure the department's yearly budget expenses are evenly distributed, and are close to the $150,000 per year budget cap for budget scenarios, while offering a feasible and reasonably affordable pathway to meeting provincial guideline targets in scenario 2.

Electrical infrastructure upgrades to enable this transition have been determined to be $825k.

For more information on the in-depth results of this report, assumptions, calculations, or other information, see the full ZEV Ready Plan Final Report, as well as the District's Power BI Dashboards.

ghd.com

The Power of Commitment

Appendix D – Energy Report Card Example

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School District No. 71
(Comox Valley)

Energy & Carbon

INFORMATION FOR CLASSROOMS

Rede BUILDING ENERGY EFFICIENCY

GLOSSARY

BEPI
Building Energy Performance Index - A calculation of annual energy consumption by unit of floor area. The BEPI can be used to easily compare buildings of different sizes. These results are used to focus efforts on poorly performing buildings. BEPI is measured in ekWh/m2.

L12M - Last 12 Months
The key metric of BEPI is reported on an annual basis. The "Last 12 Months" measure is used to display mid-year results. This rolling 12-month calculation steps 2 months back in time (when we typically have complete utility data), and then provides a summary of the previous 12 months' performance.

ekWh
Equivalent kilowatt hour - A standardized unit of measure that allows multiple energy sources, such as electricity [kWh], natural gas [GJ], and propane [L] to be added together.

Weather Normalization
To accurately compare utility data from year to year, the data must be normalized for weather. This removes the impact of variations in weather, enabling comparison of utility data from year to year to determine if overall energy use has gone down.

GHG (tCO2e)
Greenhouse gas emissions, as measured in tonnes of equivalent carbon.

OPPORTUNITIES FOR IMPROVING ENERGY PERFORMANCE

Power Consumption
- Turn off lights when leaving a room, or on a sunny day when lights aren't needed.
- Power down devices when not in use.
- Limit the use of discretionary appliances such as personal fridges, microwaves, kettles and heaters.
- Assign one student in the classroom each week to be the energy-efficiency steward.

Heating & Ventilation
- Close exterior doors and windows during cold weather, when the building's heating system is running.
- Establish a green team to review energy performance data. Identify and troubleshoot problem areas.
- Notify your facilities team if ventilation and heating systems appear to be running when the building is unoccupied.

OPPORTUNITIES FOR REDUCING GREENHOUSE GAS EMISSIONS

Fuel Efficiency
- Reduce consumption through the measures listed above
- Replace old equipment, such as boilers, with newer, more efficient models.

Fuel Switching
- Replace fossil fuel-burning equipment (those that use natural gas, propane or diesel) with equipment that runs on electricity. such as a heat pump.

Transportation
- Switch from gasoline vehicles to electric or hybrid vehicles.
- Use active transportation options such as walking, cycling, or public transportation.

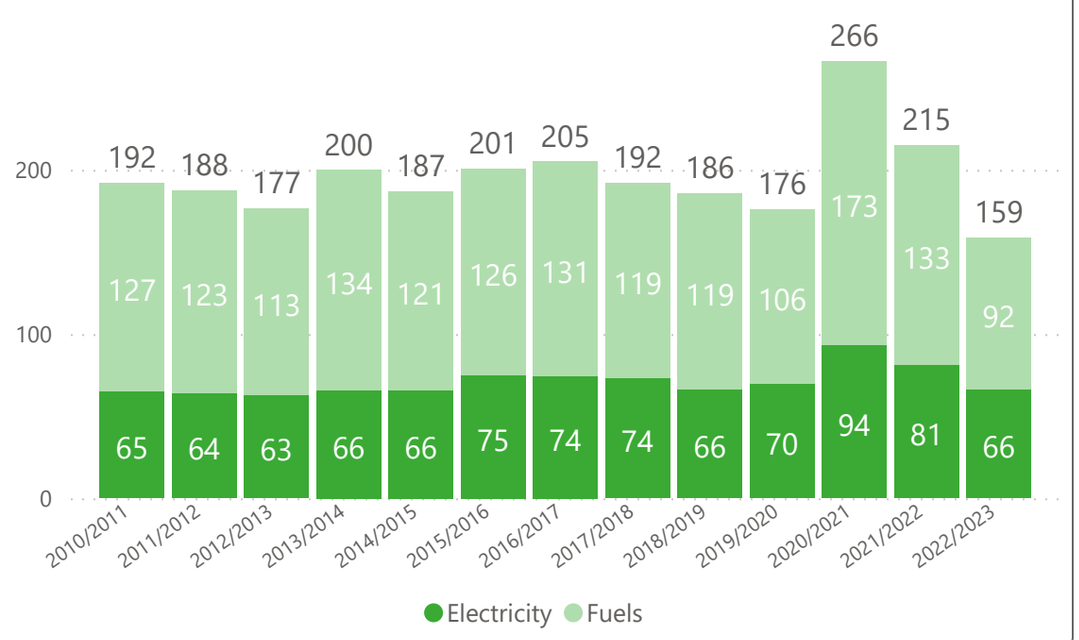
School District No. 71
(Comox Valley)

Huband Park Elementary

Historical Performance

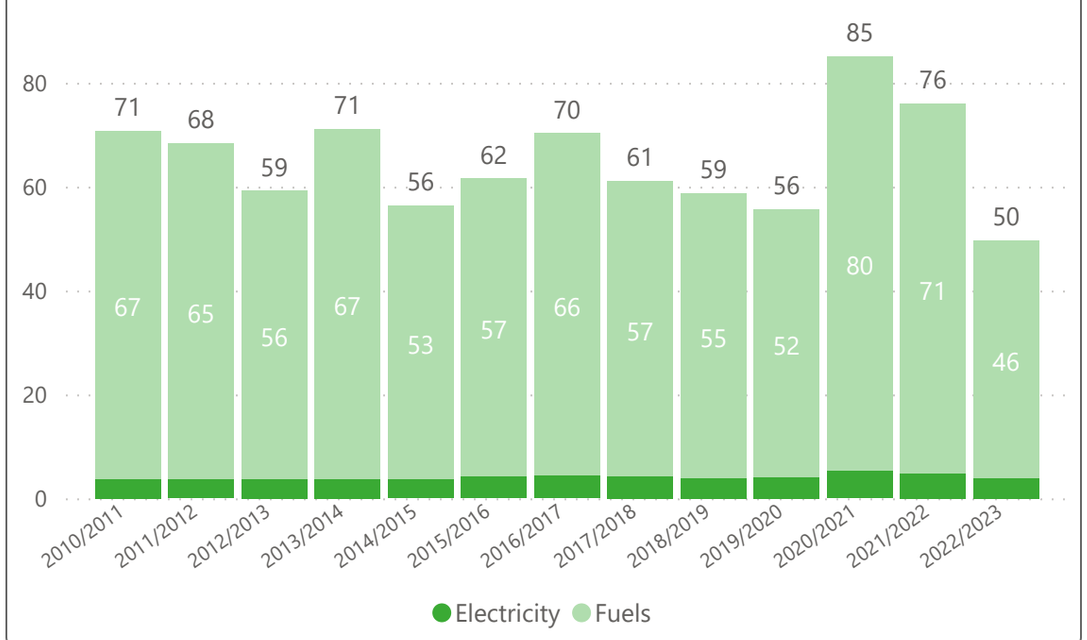
Rede BUILDING ENERGY EFFICIENCY

Building Energy Performance Index (ekWh/m2)



These values are weather normalized.

GHG Emissions (tCO2e)



These values are not weather normalized.

Last 12 Months Average		
68	92	160
Electricity	Fuels	Total

2030 BEPI Target		
50	40	90
Electricity	Fuels	Total

Last 12 Months Total
50
GHG Tonnes L12M

2030 GHG Target
59 - 64%
Reduction from 2010

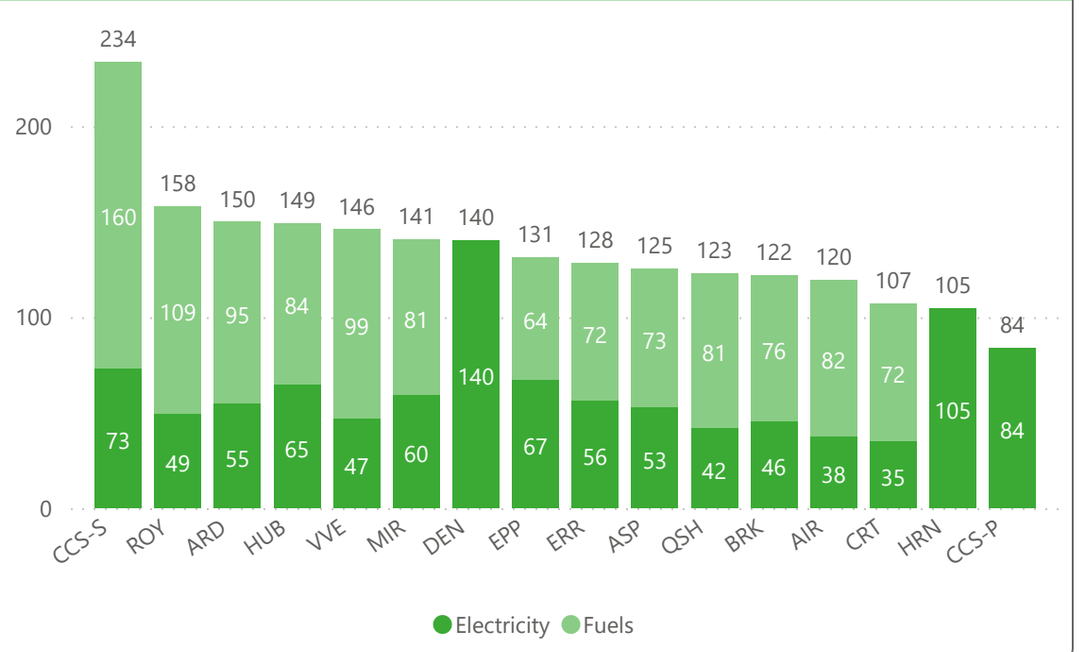
School District No. 71
(Comox Valley)

Elementary Schools

Relative Performance
2022-23

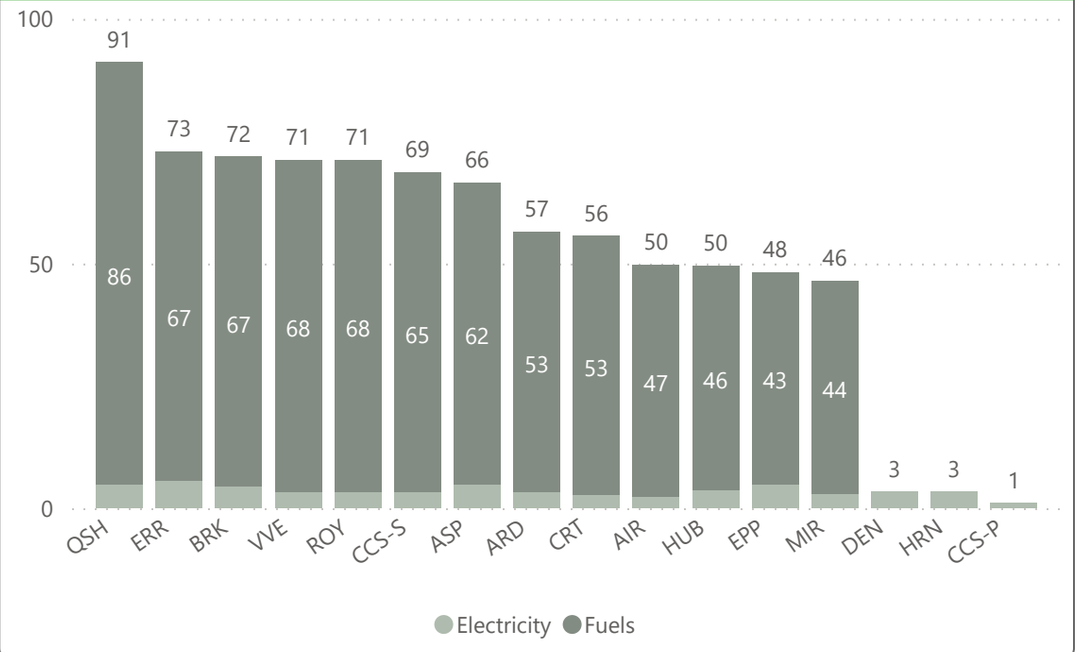
Rede BUILDING ENERGY EFFICIENCY

Building Energy Performance Index (ekWh/m2)



These values are not weather normalized.

GHG Emissions (tCO2e)



These values are not weather normalized.

2022-23 Average		
55	79	135
Electricity	Fuels	Total

2030 BEPI Target		
50	40	90
Electricity	Fuels	Total

2022-23 Total
827
GHG Tonnes

2030 GHG Target
59 - 64%
Reduction from 2010