

The logo for BCSTA, consisting of the letters 'BCSTA' in white, bold, sans-serif font, set against a blue rectangular background.

British Columbia
School Trustees
Association

Sustainability as a part of Boards of Education Governance

Report from
BCSTA Climate Action Working Group

September 2024



2023/2024 BCSTA Climate Action Working Group

Members

Members: Catherine Zaitsoff, Chair (Kootenay Columbia)
Shannon Aldinger (Comox Valley), Helen Zanette (Pacific Rim),
Lois Chan-Pedley (Vancouver), Jenn Comazzetto (Vernon)
BCSTA Board of Directors: Jane Fearing (Rocky Mountain)
BCSTA Staff Member: Gordon Li

Land Acknowledgement

We are honoured to live on this land and are committed to reconciliation, decolonization, and building relationships in our communities and schools.

We do not inherit the Earth from our ancestors, we borrow it from our Children.
– Indigenous proverb

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"In the end, we will conserve only what we love;
we will love only what we understand,
and understand only what we are taught. "
-Babe Dioum

“The journey of a thousand miles starts but with one single step...”

Introduction

In October 2020, Provincial Councilors adopted the following motion:

That BCSTA establish a CCWG comprised of staff and trustees to:

- *inform the BCSTA Board of Directors about the ability of school districts, under the provincial government’s current capital funding programs (including the Carbon Neutral Capital Program (CNCP)), to meet the CleanBC goal for public buildings to reduce emissions by 50% by 2030;*
- *consider examples of schools that demonstrate low/no emissions;*
- *provide recommendations on how the 50% emissions reduction target could be achieved; and,*
- *assist BCSTA in collaborating with the relevant provincial ministries to create and implement a plan to achieve the 50% emissions reduction target.*

The Climate Change Working Group was tasked to:

1. Review all relevant motions previously adopted by the membership regarding Climate Change and/or climate mitigation strategies.
2. Review and document current best practices of schools/school districts that achieve the goal of lowering emissions.
3. Review and document current related BCSTA resources as well as appropriate external resources that might assist Boards in implementing best practices, local policies, and good governance to accomplish the goals as laid out in CleanBC.
4. Provide recommendations for the development of new BCSTA resources to assist member boards in implementing best practices and good governance to accomplish the goals as laid out in CleanBC.
5. Identify and recommend to the Board of Directors possible collaboration opportunities with relevant provincial ministries and existing advocacy organizations in regard to assisting boards with their climate change goals.

The Climate Change Working Group report, and the recommendations, were received by the BCSTA Board of Directors in September 2022.

A BCSTA Ad Hoc Working Group on Climate Change, Climate Action Working Group (CAWG), was formed in the Spring of 2023 with the following Terms of Reference.

We are grateful for Director Alison Watson and the contributions of CCWG (2022) in forging our path forward and setting the stage for this work.



February 24, 2023

BCSTA Ad Hoc Working Group on Climate Change Terms of Reference

During the October 2020 Provincial Council meeting of the BCSTA, Provincial Councillors adopted the following motion:

That BCSTA establish a Climate Change Working Group comprised of staff and trustees to:

- *inform the BCSTA Board of Directors about the ability of school districts, under the provincial government's current capital funding programs (including the Carbon Neutral Capital Program (CNCP)), to meet the CleanBC goal for public buildings to reduce emissions by 50% by 2030;*
- *consider examples of schools that demonstrate low/no emissions;*
- *provide recommendations on how the 50% emissions reduction target could be achieved; and,*
- *assist BCSTA in collaborating with the relevant provincial ministries to create and implement a plan to achieve the 50% emissions reduction target.*

Upon consideration of the final report from the Climate Change Work Group in September 2022, and the findings from the Clean Energy Engineering (CEEN) Capstone Project in collaboration with UBC in January 2023, the BCSTA Board of Directors approved to reconvene the work of a trustee-based working group comprised of trustees and supported by BCSTA and district staff to address climate change objectives identified by the BCSTA Board.

Purpose

The purpose of the Board Working Group on Climate Change is to:

1. Engage member boards of education to determine the support needed to fulfill their governance role in the area of Climate Action.
2. Engage member boards of education to determine the impacts of climate change on school districts, and the challenges in managing these changes.
3. Continue review of current best practices of school districts that achieve the goal of lowering emissions to develop new BCSTA resources to assist member boards to accomplish the goals laid out in CleanBC.
4. Collaborate with UBC Engineering Leadership Program and draft a Capstone Project proposal for Board approval on district climate change policy exemplars.

5. Produce a summary report, including all of the recommended template resources and guidelines, to the Board of Directors regarding the work of the Group and its recommendations by no later than *March 15, 2024*.

Reporting

This Ad Hoc Working Group reports solely to the BCSTA Board of Directors. While the Working Group is welcome to consult with external individuals, groups, or ministries for the purpose of collecting information and strengthening lines of communication, the Group shall not represent the views of the Association; nor commit the Association to any particular course of action or involvement.

Membership

The BCSTA President, in consultation with the Board of Directors, shall appoint the seven (7) members to the Working Group, including one of whom is a Director from the Board. The appointed trustees should come from a variety of member Boards of Education.

The BCSTA President shall appoint the Chair of the Working Group from the appointed members of the group.

BCSTA will request 2 volunteer district staff from across the province to serve in an advisory and support capacity on the committee.

BCSTA's Chief Executive Officer will appoint staff member to provide support to the Working Group, from either internal and/or external sources.

BCSTA's Chief Executive Officer will appoint staff support to the Working Group as required.

Expenses

It is not anticipated that this working group will incur any expenses as all of their work must be completed through electronic communication, thus no budget amount has been allocated to it for face-to-face meetings. The group has, however, been provided a budget of \$2000 for the purchase of potential resources and/or research support.

The appointed Chair of the Working Group shall be responsible for monitoring the budget and expenses, which may not be exceeded without the expressed prior consent of the BCSTA CEO.

Timelines and Meeting Frequency

Meetings will be at the call of the Working Group Chair and may be in person, via telephone, or Zoom video conference. The Working Group will submit its recommendations and final report to the Board of Directors no later than *March 15, 2024*.

The Working Group mandate will be completed upon the submission of its recommendations and final report to the Board of Directors, and shall be disbanded at that time, unless specifically renewed or extended by the Board of Directors.

Suzanne Hoffman

Chief Executive Officer

BC School Trustees Association (BCSTA) on behalf of the BCSTA Board of Directors

Executive Summary

1. BCSTA's Board of Directors received the CCWG final report and recommendations in September 2022 and later convened the Climate Action Working Group to continue the work towards supporting school Boards in fulfilling their governance role in climate action.
2. Feedback from districts in response to inquiries on supports needed for their governance role centered around the key themes of advocating for sustainable funding, guidance in developing climate action policies and strategies, and assistance to make climate action a priority throughout our sector and in our Association.
3. The inquiry into the impacts of climate change on school districts yielded calls to educate Boards on expected impacts, risk management, and mitigation options; as well as urging the province, ECC and other responsible ministries, to develop a framework for assessing and measuring the impacts of climate change on schools.
4. Current best practices of school districts indicate a growing movement in the BC public education sector in addressing climate change. This significant growth in a short period of time provides confirmation of the importance of this work to the member boards of our association.
5. A research project was undertaken, in collaboration with The University of Windsor, to investigate the climate action policies of BC school districts and develop exemplars to enhance climate action in the education sector. This included:
 - Analyze the existing climate action policies established by school boards in BC.
 - Develop climate action exemplars based on best practices identified during the research.
 - Benchmark climate action exemplars with climate action champions.

Our Findings

1. Supports needed to fulfill our governance role in the area of Climate Action

The Climate Action Working Group desired greater engagement with boards of education in response to this question and used varied strategies based on past-experience and established relations with membership. Sixty districts were divided amongst CAWG members using BCSTA Branch framework. Methods, while different for each district or branch, included personal phone calls, e-mails, informal surveys, and branch meeting discussions.

The supports needed to fulfill our governance roles in the area of Climate Action as stated by our respondents are listed in Appendix A. While feedback was wide-ranging, it centered around the following key themes:

1. Sustainable funding
2. Leadership and collaboration
3. Advocacy

1.1 Recommendations

The CAWG would like BCSTA to consider the following supports to assist member boards in their governance roles towards climate action:

1. Advocate for increased and predictable funding that enable capital planning and long-term facilities planning with climate change in mind
2. Facilitate leadership, guidance, and collaboration with co-governor to develop climate action policies and strategies
3. Assist with advocacy, both within our Association and beyond, to move climate action agenda forward
4. Make climate action a strategic priority for BCSTA, and create appropriate climate action policies and strategies
5. Develop guidance to approach municipal governments to discuss collaboration and alignment of plans and strategies toward climate action
6. Continue research and assessments to minimize climate change effects on learning and teaching, and health of our student population

2. Impacts of climate change on school districts, and the challenges in managing these changes

In a similar fashion to the previous item, CAWG engaged boards of education to assess the impact they are experiencing as a result of climate change. These responses are listed in Appendix B. While feedback was wide-ranging, it centered around the following key themes:

1. Cost mitigation
2. Physical and mental health of staff and students
3. Regional differences

2.1 Recommendations

The following feedback from respondents was repeated by many board contacts CAWG members communicated with. They form key actions that we must consider for future planning:

1. Advocate for increased and predictable funding with possible emergency response funding
2. Educate Boards on expected impacts, risk management, and mitigation options, with regular input from rights holders and partner groups, including students
3. Ensure responses are region specific and not a blanket response with a focus on rural vs urban requirements
4. Build database of climate-related disruptions to schools and district for future advocacy
5. Urge the province, ECC and other responsible ministries, to develop a framework for assessing and measuring the impacts of climate change on schools, school districts, and student outcomes

3. Current best practices of school districts that achieve the goal of lowering emissions

CAWG continued the work begun by the previous Climate Change Working Group to compile a collection of best practices currently taking place in school districts to lower emissions. This is ongoing work that continues to receive positive feedback from membership. The feedback is listed in Appendix C. The responses centered around the following key themes:

1. Building upgrades
2. Updated transportation strategies
3. Climate action plans and strategies

The Climate Action Working Group is particularly encouraged by the growing movement in the BC public education sector in addressing climate change as contrasted by research findings from Dr. Ellen Field and Sidney Howlett at Lakehead University in 2022,

Results

Province	Number of School Boards	Climate Action Plans	Climate Change or GHG reductions in Strategic Plan	Climate Change or GHG reductions in Environmental/ Sustainability Plan	Mandatory Reporting	Climate Emergency Declaration	Designated Sustainability Position
BC	60	2	7	3	60	5	7
AB	63	0	0	2	0	0	2
SK	27	0	0	0	0	0	1
MB	38	0	0	1	0	0	1
ON	85	2	1	0	60	5	12
QC	72	0	0	0	0	0	2
NB	7	0	0	0	0	0	0
NS	8	0	0	0	0	0	0
PE	0	0	0	0	0	0	0
NL	2	0	0	0	0	0	0
YT	2	0	0	0	0	0	0
NT	10	0	0	0	0	0	0
NU	6	0	0	0	0	0	0
Total	380	4	8	6	120	10	25

when 2 out of 60 school districts had climate action plans, and 7 out of 60 school districts had climate change as part of their annual strategy plan; and the findings from the currently unpublished research by Dr. Rajeev Ruparathna, Dr. Tharindu C. Dodanwala, and Kartik Patel at University of Windsor, in collaboration with BCSTA in 2024

Region	Number of school districts	Inclusion of climate action in strategic plans	Percentage (%)
Fraser Valley	5	1	20
Kootenay-Boundary	6	3	50
Metropolitan	11	5	45.45
South Coast	3	0	0
Vancouver Island	12	9	75
North West	6	1	16.67
Northern Interior	8	0	0
Thompson-Okanagan	9	4	44.44
Total	60	23	38.33

When 23 out of 60 school districts have inclusion of climate action in their strategic plan. This is a significant growth in a short period of time, and provides confirmation of the importance of this work to the member boards of our association.

3.1 Recommendations

The Climate Action Working Group would like BCSTA to consider the following actions to ongoingly build and share best practices:

1. Advocate for inclusion of sustainability/climate action policies in all districts' strategic plans
2. Consult students around the province on their suggestions for climate action in public education
3. Update BCSTA systems to regularly share best climate action practices e.g. newsletters, branch reports
4. Continued education of school boards via BCSTA re:
 - a. Legislative responsibilities of board re: climate change
 - b. Availability of grants/sources of funding re: climate change
 - c. Provide guidance for boards to ask the right governance questions that support climate change mitigation – i.e.: local procurement, energy assessments
 - d. Leadership related to student mental health response to climate change

4. Collaborate with post-secondary partner to develop a research proposal for Board approval on district climate change policy exemplars

The CAWG was initially tasked to collaborate with UBC Engineering Leadership Program and draft a Capstone Project proposal for Board approval on district climate change policy exemplars. The Capstone Program is reliant on student enrollment in the Mechanical Engineering Leadership department at the University of British Columbia. We were informed by UBC in September 2023 that they would not be able to accommodate our research in the 2023-2024 school year.

The CAWG pursued other collaboration opportunities with post-secondary institutes using relationships established by previous Climate Change Working Group. A proposal was submitted to MITACS*, with Board approval, for a Non-profit Organization Innovation project. This research, ***Developing Climate Action Policy Exemplars for School Districts of British Columbia***, was taken on by the University of Windsor under the oversight of Dr. Rajeev Ruparathna and MITACS advisors.

The project objective was to investigate the climate action policies of school districts in British Columbia (BC) and develop exemplars to enhance climate action within educational institutions. This included:

- Analyze the existing climate action policies established by school boards in BC
- Develop climate action exemplars based on best practices identified during the research
- Benchmark climate action exemplars with climate action champions

The project broke down into 4 phases:

Phase 1 was data collection involving all 60 school districts seeking

- climate action policies
- climate action connections in strategic plans

Phase 2 was content analysis

- identifying common and unique climate action policy themes
- compare BC's climate action policy themes with other regions
- identify the inclusion of climate action in strategic plans

Phase 3 was developing exemplars

- strategic-based climate action exemplars
- policy-based climate action exemplars
- program-based climate action exemplars

Phase 4 was benchmarking

- identification of climate action exemplars from literature
- exemplar comparison
- champion exemplar identification

The results, as mentioned in the previous section, were particularly encouraging and reflected on the importance of climate actions as perceived by boards of education.

*MITACS is a not-for-profit organization that catalyze innovation across Canada by connecting organizations, researchers, and field talents.

1. They provide strategic connections – advisors find and match organizations with top-tier researchers to successfully deliver innovation projects.
2. They provide expert guidance – teams of advisors worked with CAWG to chart our unique roadmap.
3. They find financial support – they contributed to costs by matching our funding and de-risk the project by setting guidelines that meet our needs within our budget.

The full research report can be found in Appendix D. The following themes emerged from the research:

Theme 1: Administrative and managerial initiatives

- Involves planning and policy implementation
- Work as a governance framework

Key emphasis

- Resource allocation
- Sustainable procurement practices
- Staff training and development
- Building awareness
- Continuous improvement

Theme 2: Capital planning

- Allocating financial resources for sustainable infrastructure
- Building retrofits with energy-efficient envelopes (i.e., high thermally performing windows, doors, and roofs)
- Constructing new infrastructure to support technology adaptation (e.g., charging stations for electric vehicles)

Theme 3: Technology adaptation

- Efficient and smart HVAC systems
- Replacing traditional lighting with LED/dimmable LED
- Installing motion-activated lighting
- Hybrid/electric/propane-based vehicles
- Energy-efficient classroom equipment (e.g., replacing computers with laptops and tablets).

Theme 4: Resource and waste management

- Key focus: conserving resources and minimizing waste
- Conserving water: fixing leaks and installing low-flow faucets and showers
- Conserving energy: building tune ups
- Conserving fossil fuel: optimizing driving distances, teaching anti-idling behaviors to the drivers, and conducting virtual meetings to minimize the traveling requirements
- Paper conservation and waste minimization: reuse of non-confidential scrap papers, electronic documentation, printing both sides, and use of highly recyclable papers
- Reduce plastic waste: Bottled water is replaced with filtered water

Theme 5: Renewable energy adaptation

- Geothermal energy
- Solar energy
- Less utilization

Region-based climate action initiatives

Region	Themes				
	(1)	(2)	(3)	(4)	(5)
Fraser Valley	✓	✓	✓	-	✓
Kootenay-Boundary	✓	-	✓	✓	✓
Metropolitan	✓	✓	✓	✓	-
South Coast	✓	✓	✓	✓	-
Vancouver Island	✓	✓	✓	✓	✓
North West	✓	✓	✓	✓	-
Northern Interior	✓	✓	✓	✓	✓
Thompson-Okanagan	✓	✓	✓	✓	✓

Note: (1) = administrative and managerial initiatives, (2) = capital planning, (3) = technology adaptation, (4) = resource and waste management, and (5) = renewable energy adaptation.

4.1 Recommendations

The Climate Action Working Group would like BCSTA to consider the following actions to ongoingly build and share best practices:

1. The BCSTA Board of Directors reviews and shares the report from the University of Windsor with member boards. This could be done with, or independently of, the CAWG report.
2. Share report with ECC to advocate for support, funding, and collaborative action towards establishing strategies listed in exemplars
3. Present findings from the Climate Action Working Group in a concurrent session in a BCSTA professional learning event.
4. Facilitate Climate Action Learning Series to enable deeper discussions of policies and strategies in context to accommodate regional differences.
5. Develop Learning Guide to provide needed resources to member boards.
6. Create a library of current and future BCSTA research including UBC Capstone Project, Lakehead University report and University of Windsor research on BCSTA portal.

Conclusions and Next steps

We are grateful for the support of the BCSTA Board of Directors in advancing climate action initiatives within our school boards. The second iteration of the Climate Action Working Group focused on integrating climate action into school board governance roles leading to productive discussions among provincial trustees. The well-attended session at the BCSTA Academy in late fall 2023 demonstrated growing interest in climate-related issues. Our recommendations come from our passionate CAWG members and BCSTA membership and we look forward to continued movement forward.

Suggested next steps

- i. **Climate Action Initiatives:** Add climate action goals and projects into BCSTA's strategic plan and professional development.
- ii. **Incorporate Indigenous perspectives:** Ensure that climate action work includes and respects Indigenous voices and traditional ecological knowledge.
- iii. **Advocate for sector-specific standards:** Work with the appropriate ministries to create guidelines tailored to the education sector's unique role in climate action.
- iv. **Support a regional approach:** Recognize that climate solutions differ between the regions of our province as well as urban and rural districts. Design resources and planning strategies that address the specific needs of diverse areas.
- v. **Enhance Communication:** Share best practices, create a database of events, successful and not successful solutions.
- vi. **Collaborate with existing initiatives:** Explore partnerships with other climate action groups, such as Climate Caucus, and investigate the possibility of including an education voice in the BC Climate Solutions Council. Suggest continued work with CBSA.
- vii. **Refine feedback mechanisms:** Move beyond surveys to gather input, exploring more interactive and engaging methods of collecting rights holders and partner groups feedback.
- viii. **Reaffirm commitment:** Stress ongoing dedication to addressing climate change through education and operational practices, aligning with the board's role in ensuring student success and fostering environmental stewardship.

Recommendations for the BCSTA Board of Directors

While the CAWG recommends the implementation of all recommendations as laid out under each of the terms of reference requested actions, these are priority suggestions with the overall recommendation that climate action be adopted as a regular part of BCSTA priority actions including BCSTA's strategic plan, and AGM and Academy professional learning development.

- I. Advocate for increased and predictable funding for asset management and planning with a focus on climate action, mitigation, and impact.
- II. Make climate action a strategic priority for BCSTA and create appropriate climate action policies and strategies for our Association.
- III. Adopt a regional approach/response to climate change impacts and the resulting challenges with a focus in rural vs. urban districts.
- IV. Regularly share best practices with membership, stakeholders, and ECC.
- V. Continue exploring partnerships with post-secondary institutions and other climate action groups, such as Climate Caucus' School Board Chapter, to provide leadership and support of climate action.

Resources

<https://climatechangelearningcanada.org/>

<https://toolkit.bc.ca/>

<https://www.theenergymix.com/canadian-schools-radically-underestimated-as-climate-action-hubs/>

<https://www.bccic.ca/where-we-stand-the-integration-of-climate-change-education-in-canadian-schools/>

<https://www.thisisplaneted.org/resources/school-board-member-climate-action-toolkit>

<https://sepn.ca/resources/report-ten-canadian-schools-stories-climate-action/>

Appendix A

Supports needed to fulfill their governance role in the area of Climate Action

Summary statements from interviewees:

- Assistance through advocacy for significantly more funding to retrofit existing buildings
- Increased and steady funding
- We know we could not meet carbon reduction goals as a direct result of lack of funding.
- Guidance to developing Climate Action policy to be included in the Strategic Plan
- Help to create 5 yr Capital Plan and Long-Term Facilities Plan with Climate change in mind.
- Structure to address student concerns about the future
- A holistic approach that looks at more than carbon emissions including sustainable procurement, water conservation, active transportation, indigenizing the lands surrounding school sites
- BCSTA to play a role in advocating for changes to provincial policy with respect to carbon pricing, access to funding programs, and incentives.
- Help to develop climate action plan;
- Continued best practice examples
- Advocate for more funding
- In an election year, maybe we can take a big swing and make the big ask
- Budget support to access the resources needed
- A greater understanding of initiatives coming forth
- Thinking outside the box
- Consider spending a bit more on energy-efficient vehicles when replacements are due
- Support energy/climate assessments (facility builds)
- Check out what is being done internationally
- Allocate appropriate financial resources to support IT projects and initiatives focused on reducing the organization's carbon footprint
- Allocate resources for training IT staff on environmentally friendly practices and technologies
- Budget support to access the resources needed
- A greater understanding of initiatives coming forth

- Biggest support needed to fulfil, not governance role, but reduce GHG emissions is Capital \$\$\$ to build new schools or purchase equipment.
- Also mentioned, in small districts their staff do not have the expertise to know all the climate and emission best practice and do what they can, off the side of their desks.
- The ability to direct funds where the need is. Much funding is targeted (wages and benefits) leaving us little ability to make finance decisions. With our current funding model, the only way we can re-direct funds means we have to cut core educational programs or non-enrolling staff (like EAs or psychologists). When you talk to our partners, while they see need and are great at giving us feedback, the message is do not make cuts that will directly impact students.

Appendix B

Impacts of climate change on school districts, and the challenges in managing these changes

Summary statements from interviewees:

- Flooding
- Heat domes. We need ways to cool old buildings
- Coastal flooding; storm surge events and/or other coastal hazards;
- Overland flooding;
- Water shortage,
- Cultural impacts include threats to identities, languages, and livelihoods
- Erosion
- Biodiversity loss, invasive species, ecosystem changes
- Extreme heat and heat stress; wildfires; extreme cold, snow and ice
- Our District paid \$53,500 in off-sets (This will increase to over \$300,000 per year if no further reductions are made by 2030)
- Rising sea water levels, impacting transportation to schools in certain areas. Students are unable to attend school for short periods. This will become a bigger issue
- High cost of fuel in remote areas
- Localized events that led to disruptions, such as frozen/burst pipes, flooding, fallen trees, smoke, heat dome
- Aging school buildings are costly to maintain - drainage, walls, heating
- Utility bills are higher, as we have to heat to keep pipes from bursting even when schools are closed
- Temperatures in classrooms causing instruction to cease due to being too hot/cold
- Wildfires increasing risk of floods
- Staff absences due to weather-related closures
- Remote working challenges
- Supply chain disruptions (i.e. IT departments may need to diversify their supply chains, maintain strategic stockpiles of critical components, and establish contingency plans to address supply chain disruptions)
- Increased staffing needed to respond to weather-related events
- Mental health impacts – increased fear for future in both kids and adults

- Food security threatened
- Low snowpack, resulting in lack of adequate water supply throughout the year
- Resources to support new needs, mandate/scope of school districts changing, going beyond educating kids, how to finance what is needed especially in remote communities
- Air quality affecting outdoor education (heat/fires)
- IT departments may need to invest in resilient infrastructure, backup power solutions, and disaster recovery plans to ensure business continuity during extreme weather events
- Smoke & Heat Domes-these are examples of extreme climate conditions that show the need for heat pumps that also allow for air cooling in order to keep doors and windows closed and protect our students and staff.
- Burst pipes-this is becoming more problematic in our communities as we see sudden, unexpected cold snaps that are not typical of our region. Building codes have not been tailored for extreme cold weather and we don't have protected pipes the way communities that have consistently faced extreme cold would have.

Appendix C

Current best practices of school districts that achieve the goal of lowering emissions

Summary statements from interviewees:

- Electrical upgrades i.e. LED lighting in 90% of school district, roofing upgrades increased insulation, boiler upgrades, Solar panels on four of our five schools
- Dual heating system a propane boiler and a wood pellet boiler
- Fleet cars are used instead of buses on certain routes
- Victoria has a new [Climate Action Plan](#)
- Receive annual Climate Change Accountability Report; she says Greater Victoria is already paying over \$300,000 per year in off-sets
- Nanaimo has [Environmental Stewardship Action Plan and Action Plan](#)
- Board adopted a Strategic Plan Goal to become leaders in environmental stewardship and sustainability and are in the process of renewing their strategic plan and are proposing to carry this goal forward
- New school builds,
- Electric fleet for transportation
- District electrifying their bus fleet (about 1/3 are now electric)
- Paper free,
- Reducing travel – virtual meetings, (leading by example).
- LED cleaning, reduce printers, fleet vehicles transitioning to hybrid or electric, automatic sensor-based lighting
- Students-led and teacher-led initiatives on the educational side - many districts have student club, there is lots of extracurricular activities and events
- Districts aligning with municipalities, if not actually working together on climate targets
- Putting control systems in place for HVAC and lighting
- Writing new Policies and Procedures as issues arise
- Providing idle-free training to staff
- Enabling proper systems to help people work from home when needed
- Purchasing printers that provide paper-cut services to cut down on wasted paper
- Purchasing laser-fiche for electronic storage of files, eliminating paper where possible
- Building envelope upgrades
- Car-pooling to work/events where possible

- Supporting recycling programs in schools
- Re-using building materials where possible (i.e. renovations)
- Routing software for efficient transfer of students
- When purchasing servers, computers, and other hardware, opting for products that have received energy efficiency certifications, such as Energy Star
- Implementing server virtualization to maximize resource utilization and reduce the number of physical servers needed
- Optimizing data center layout and design for efficient cooling and use energy-efficient cooling solutions
- Using renewable energy sources to power data centers, such as solar or wind power
- Utilizing cloud computing services to leverage shared infrastructure and benefit from the energy efficiency of large-scale data centers
- Taking advantage of cloud-based auto-scaling to dynamically adjust resources based on demand, reducing energy consumption during periods of lower activity
- Implementing power management policies for desktops, laptops, and other devices to ensure they enter sleep mode when not in use
- Encouraging employees to turn off equipment when not needed and adopt energy-efficient practices in the workplace
- Budget support to access the resources needed
- A greater understanding of initiatives coming forth
- Thinking outside the box
- Consider spending a bit more on energy-efficient vehicles when replacements are due
- Support energy/climate assessments (facility builds)
- Check out what is being done internationally
- Allocate appropriate financial resources to support IT projects and initiatives focused on reducing the organization's carbon footprint
- Allocate resources for training IT staff on environmentally friendly practices and technologies
- Apply for grants that will help with the costs of implementing changes that will lower our emissions. An example is the grant that covers the extra cost for electric buses. Regular diesel buses cost approximately \$250,000 and electric buses are an additional \$250,000 doubling the cost to the district. Were the grant not available it would be impossible for a district like SD63 to manage the additional funds needed. With our current economic conditions if that grant is cancelled, we would have no choice but to replace aging buses with diesel.
- Reduce where possible-LED lights as an example

Draft Report

**Developing Climate Action Policy Exemplars
for School Districts of British Columbia**

Report Prepared for the British Columbia School Trustees Association

Submission: July 2024

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Research Assistant: Kartik Patel

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Executive Summary

This study reviewed the climate action policies and strategic plans of 60 school districts in British Columbia, developed climate action exemplars, and benchmarked climate action exemplars with climate action champions. The findings of this study provide an overview of the current status of climate action with school boards in British Columbia and provide suggestions to improve the existing climate action strategies. The key findings of this study are as follows:

- Of the 60 school districts, 53 had climate action policy plans, accounting for 88.33% of the population.
- Reviewing the climate action policy plans led to the identification of five key themes of climate action exemplars, i.e., administrative and managerial initiatives, capital planning, technology adaptation, resource and waste management, and renewable energy adaptation.
- The 60 school districts in the eight regions have various exemplars that come under each identified theme, with some being common and others being unique to the region. Therefore, the climate action strategies vary significantly based on the region of a school district.
- The inclusion of climate action as a strategic priority has been overlooked by many school districts, with only 38.33% (23 out of 60) of the school districts having discussed climate action in their strategic plan.
- This study proposed a novel climate action strategy tailored for British Columbia's school districts by utilizing the aforementioned themes and additional insights from existing literature.
- This new strategy features three key domains: asset management, operation management, and energy management. This framework aims to reduce greenhouse gas emissions by emphasizing the importance of efficient resource and waste management.
- The exemplars and champion exemplars that govern the proposed climate action strategy were identified and proposed as potential solutions to reduce greenhouse gas emissions.

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List of Abbreviations

BC:	British Columbia
DDC:	direct digital control
GHG:	greenhouse gas
HVAC:	heating, ventilation, and air conditioning
LED:	light-emitting diode
MtCO ₂ eq:	metric tons of carbon dioxide equivalent
PSOs:	public sector organizations
U-value	thermal transmittance

1 Introduction

1.1 Background

It has been forecasted that global temperature could increase by 1.1 °C to 5.4 °C by the end of the 21st century [1]. The leading cause of climate change is the increase in greenhouse effect created by elevated anthropogenic greenhouse gas (GHG) emissions [2,3]. One of the foremost outcomes of the United Nations Paris Agreement in 2016 was a commitment to limit the global temperature increase to 1.5°C above the pre-industrial levels [4]. This target requires strengthening climate change mitigation plans more than ever before. Reducing GHG emissions and reducing environmental footprint have been priority themes of Canada's Federal Sustainable Development Strategy [5]. Canada is committed to the Copenhagen Accord and has targeted an ambitious 17% GHG emission reduction by 2020 (612 metric tons of carbon dioxide equivalent (MtCO₂eq)) and 30% by 2030 (517.6 MtCO₂eq) from the 2005 GHG emission level (738 MtCO₂eq) [6].

GHG emissions in British Columbia (BC) should be reduced by 40% by 2030 and 80% by 2050 from 2007 levels [7]. Even though in 2012, BC reduced its GHG emissions by 4.4% from 2007 levels, more recent findings revealed that BC missed the 2020 target by a significant margin and will not achieve 2030 emission reduction aspirations [8]. More aggressive approaches are needed if Canada is to achieve the Copenhagen Accord target in 2020. The Canadian Net-Zero Emissions Accountability Act 2020 has established an ambitious target of achieving net-zero emissions by 2050 [9]. Even though the measures stipulated in the Pan-Canadian Framework on Clean Growth and Climate Change have been helping Canada make significant progress towards its climate action goals, the eventual goal seems distant and needs commitment from all sectors.

The Carbon Neutral Government program mandates that BC's public sector uphold a net zero GHG emissions impact. Public sector organizations (PSOs) encompass health authorities, school districts, universities, colleges, institutes, Crown corporations, and government offices [10]. During the reporting period of 2022, the BC Provincial Government and 129 PSOs collectively reported emissions totaling 768,908 tons of carbon dioxide equivalents (MtCO₂eq) stemming from their operations. School districts account for approximately 25% of public sector GHG emissions [10].

1.2 Objectives

This research investigated the climate action policies of school districts in BC and developed exemplars to enhance climate action within educational institutions. The objectives of this project were as follows: (i) Analyze the existing climate action policies and strategic plans established by school boards in BC, (ii) develop climate action exemplars based on best practices identified during the research, and (iii) benchmark climate action exemplars with climate action champions. The findings of this study provide an overview of the current status of climate action with school boards in BC and provide suggestions to improve the existing climate action strategies.

1.3 State of the Art

In BC, PSOs are increasingly recognizing the urgent need to address climate change through comprehensive action strategies. Both climate change mitigation and adaptation strategies can be identified in the climate action plans of PSOs. One prominent approach involves embracing renewable energy sources in power operations, reducing reliance on fossil fuels, and minimizing carbon emissions [11–13]. Many Canadian businesses are investing in solar, wind, and hydroelectric power to transition towards cleaner energy alternatives. Moreover, organizations are implementing energy-efficient technologies and practices to optimize resource consumption and decrease greenhouse gas emissions [11–13]. These efforts contribute to mitigating climate change and often result in cost savings and enhanced operational efficiency.

PSOs are increasingly adopting circular economy principles to minimize waste and promote resource efficiency [13]. This involves designing products with recyclability and longevity in mind, implementing strategies to reduce, reuse, and recycle materials throughout the supply chain, and partnering with suppliers and customers who prioritize sustainability [13]. By embracing circular economy practices, BC's PSOs reduce their environmental impact, foster innovation, create new revenue streams, and enhance their resilience to supply chain disruptions [13]. By implementing these diverse climate action strategies, BC's PSO organizations are reducing their environmental footprint and positioning themselves as leaders in the global transition to a low-carbon economy.

Several researchers have analyzed the climate action strategies of PSOs across the world. Chan et al. [14] reviewed the financing policies on coal-fired power plants of 56

commercial banks around the world and revealed that eight large banks from East Asia don't have policies for financing coal power plants. Tori et al. [15] compared net zero energy building public policies in the residential building sector in Chile vs. other developing countries. This study has revealed that Chile is yet to develop zero energy-building strategies for the coming years. Biswas and Rahman [16] studied climate action policies with local government organizations in the northern tropical region of Queensland, Australia. This study emphasized the importance of integrating mitigation and adaptation strategies as current policies are more biased towards adopting climate change. Karasan et al. [17] analyzed strategies for GHG emissions reduction in Turkey, considering uncertainty in the process. A decision support system for prioritizing governmental strategies reducing GHG emissions was proposed in this research.

Pietrapertosa et al. [18] studied climate action policies in Southeast European countries. This study revealed that countries have undertaken adaptation actions across sectors. However, these actions have only partially generated a full commitment towards climate adaptation. Byrne et al. [19] derived scenarios for urban transport systems in Germany to meet climate action targets. The scenarios considered the expansion of electric mobility, improvement of specific emission factors, and mobility behavior, especially regarding the use of cars, public transport, and bicycles. Bollo and Cole [20] developed a new conceptual framework that ties these recommendations into a continuous process of building sector policy-making and policy-taking for climate change. Few studies have researched the impact of public policies on climate change impact mitigation in BC. Ruparathna et al. [21] compared GHG emissions of different urban development strategies for fast-growing communities. Ruparathna et al. [22] investigated energy retrofit strategies for public buildings in BC.

2 Methodology

The methodology to achieve the stated objectives is composed of four phases as follows. Figure 2.1 demonstrates the overview of the methodology.

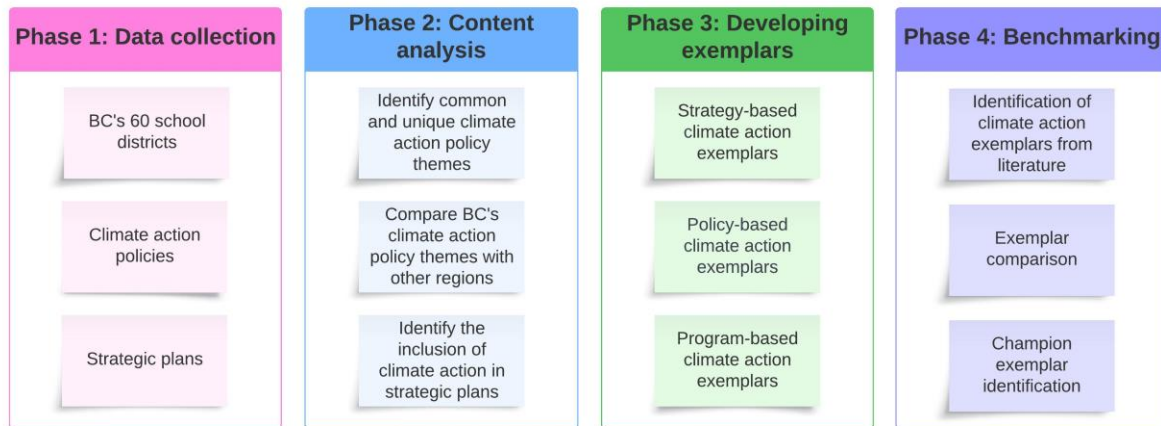


Figure 2.1: Overview of the methodology

2.1 Phase 1: Data Collection

Websites of BC's 60 school districts were explored to identify existing climate action policies. Strategic plans of school districts were collected from the above sources. Published data, including journal papers, industry reports, and government reports, were used to identify innovative climate action strategies public sector organizations use.

2.2 Phase 2: Content Analysis

Content analysis is a research method used to systematically analyze qualitative data to identify patterns, themes, and trends within the data. A content analysis is conducted for existing climate action policies used by school districts to identify similarities and differences. Strategic plans of BC's school districts were reviewed to identify the inclusion of climate action policies.

Data collected in Phase 1 was used for content analysis. Climate action themes used by school districts were used to analyze the content. Content identified in Phase 1 is systematically analyzed, and relevant codes are assigned to data segments according to the coding scheme. Two investigators conducted content analysis to ensure inter-coder reliability. Once the content is coded, data are analyzed to identify patterns, trends, and themes. A qualitative method (i.e.,

thematic analysis) was used to interpret the data. Based on the above findings, insights were drawn by observing relationships between codes and patterns in the climate action strategies.

2.3 Phase 3: Developing Exemplars

Based on the findings from the literature review and data analysis, climate action exemplars outlining practical strategies, policies, and programs were presented for different categories of school districts. Furthermore, strategies adopted by educational institutions in other Canadian provinces and other countries were used to identify the most effective exemplars.

2.4 Phase 4: Benchmarking

Benchmarking climate action strategies involves comparing the performance and effectiveness of different strategies implemented by various entities in addressing climate change. The metrics that are used to evaluate the effectiveness of climate action strategies are identified. Regional and global PSOs that have had exceptional climate action strategies were identified and used as benchmarks. Best practices, strengths, weaknesses, and areas for improvement were identified from the above data as well as expert opinion. Gaps between the performance of the comparators and established exemplars were identified. This information was used to improve the proposed exemplars.

3 Review of Climate Action Policies of BC School Districts

The 60 school districts of BC are categorized into eight regions based on their location. These regions are Fraser Valley, Kootenay-Boundary, Metropolitan, South Coast, Vancouver Island, North West, Northern Interior, and Thompson-Okanagan. The classification of regions and the number of school districts within them are illustrated in Table 3.1. This study has reviewed the climate action policies of each region separately and combined. The review is discussed in the following subsections.

Table 3.1: Regions and school districts

Region	Number of school districts
Fraser Valley	5
Kootenay-Boundary	6
Metropolitan	11
South Coast	3
Vancouver Island	12
North West	6
Northern Interior	8
Thompson-Okanagan	9
<i>Total</i>	<i>60</i>

3.1 Summary

The review of the climate action policies of the 60 school districts of BC resulted in five main themes. They are (1) administrative and managerial initiatives, (2) capital planning, (3) technology adaptation, (4) resource and waste management, and (5) renewable energy adaptation. Overall, three regions, i.e., Vancouver Island, Northern Island, and Thompson-Okanagan, showcased all five themes (refer to Table 3.2). It is worth noting that the practices under these five themes vary depending on the region itself, implying that every region has a set of practices that act as norms.

Table 3.2: Key themes of the regions

Region	Themes				
	(1)	(2)	(3)	(4)	(5)
Fraser Valley	✓	✓	✓	–	✓
Kootenay-Boundary	✓	–	✓	✓	✓
Metropolitan	✓	✓	✓	✓	–
South Coast	✓	✓	✓	✓	–
Vancouver Island	✓	✓	✓	✓	✓
North West	✓	✓	✓	✓	–
Northern Interior	✓	✓	✓	✓	✓
Thompson-Okanagan	✓	✓	✓	✓	✓

Note: (1) = administrative and managerial initiatives, (2) = capital planning, (3) = technology adaptation, (4) = resource and waste management, and (5) = renewable energy adaptation.

3.1.1 Administrative and Managerial Initiatives

The role of administrative and managerial initiatives in reducing carbon emissions in schools is crucial, as it involves strategic planning, policy implementation, and continuous improvement efforts. The administrative and managerial initiatives pave the path for the rest of the four themes of climate action initiatives and work as a governance framework. The emphasis should be on resource allocation, sustainable procurement practices, staff training and development, building awareness, and continuous improvement.

3.1.2 Capital Planning

Capital planning plays a pivotal role in reducing carbon emissions in schools by ensuring that financial resources are allocated effectively towards sustainable infrastructure. The emphasis is on building retrofits with energy-efficient envelopes (i.e., high thermally performing windows, doors, and roofs) and constructing new infrastructure to support technology adaptation (e.g., charging stations for electric vehicles).

3.1.3 Technology Adaptation

The state-of-the-art technology adaptation plays a crucial role in reducing carbon emissions in schools by improving energy efficiency and encouraging sustainable practices. Energy-

efficient buildings comprise efficient and smart HVAC systems, enabling automated heating, ventilation, and air conditioning that can optimize energy use based on occupancy and weather conditions. Replacing traditional lighting with dimmable LED bulbs significantly reduces energy consumption. Besides, installing motion-activated lights would conserve energy utilization. Building automation plays a crucial role in these aspects. Besides, fossil fuel vehicles are being replaced by hybrid/electric/propane-based vehicles as a means of reducing GHG emissions. Energy-efficient classroom equipment has also been prioritized (e.g., replacing computers with laptops and tablets).

3.1.4 Resource and Waste Management

Effective resource and waste management are crucial in reducing carbon emissions in schools by minimizing landfill waste and conserving natural resources. Implementing robust recycling programs, including paper, plastic, and e-waste recycling, significantly reduces the energy required for producing new materials. Conserving resources through water-saving measures, like fixing leaks and installing low-flow faucets and showers, alongside fuel conservation efforts, such as optimizing driving distances, teaching anti-idling behaviors to the drivers, and conducting virtual meetings to minimize the traveling requirements, have been practiced by the schools. A high emphasis was placed on paper as it is one of the resources that schools extensively utilize. Reuse of non-confidential scrap papers, electronic documentation, use of highly recyclable papers, and printing both sides of a paper have been used as measures. The schools also practiced the use of green cleaning products supplemented by sustainable procurement practices. Replacing bottled water with filtered water is used as another mitigation effort to reduce waste.

3.1.5 Renewable Energy Adaptation

Renewable energy is crucial for reducing carbon emissions in schools by providing clean, sustainable power sources that replace fossil fuels. This transition not only decreases the school's carbon footprint but also serves as an educational tool for students and the community. Renewable energy, such as geothermal and solar energy, has been utilized by several schools, but it is not common due to the high levels of initial capital investments. Figure 3.1 illustrates the five-factor model of climate action policies of the school districts of BC.

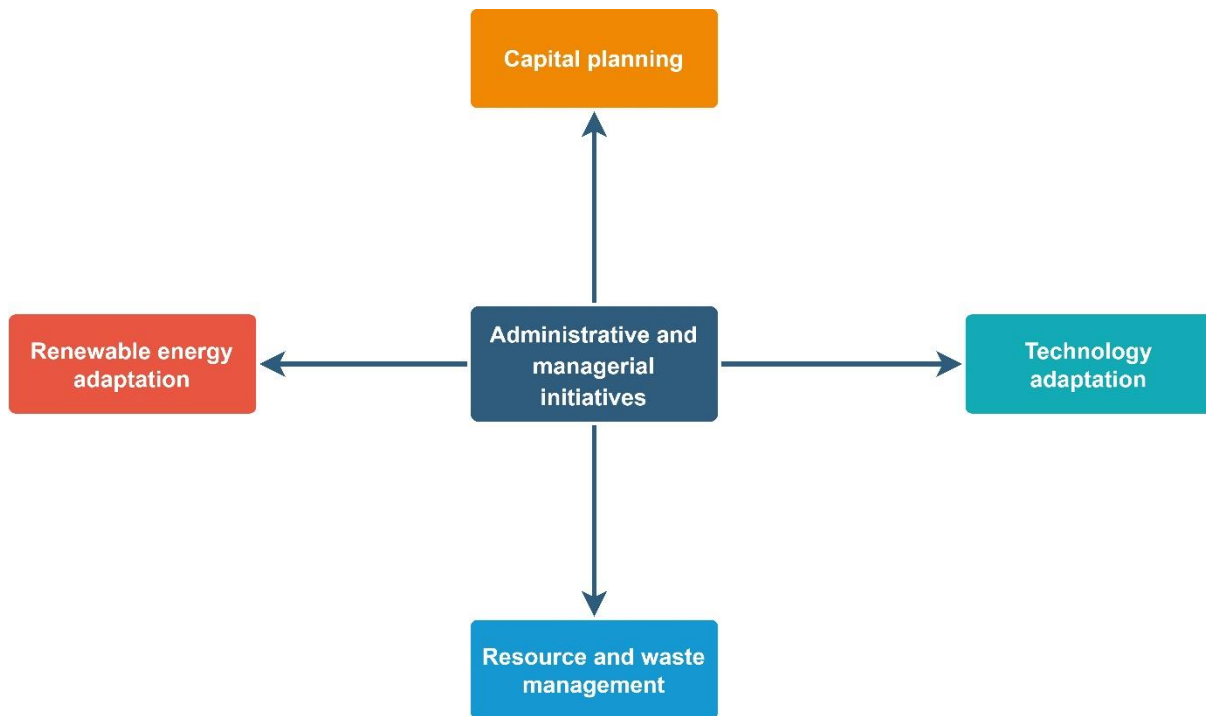


Figure 3.1: Climate action policy framework of BC school districts

3.2 Fraser Valley Region

Out of the five school districts in the Fraser Valley region, three had climate action policies. The following themes were identified for the three climate action policies.

1. Administrative and managerial initiatives
 - Energy and resource conservation, waste minimization, and awareness-building programs, e.g., Go Green Together, curricular materials, using e-newsletters to show energy consumption reports, and waste management tutorials
 - Communicating sustainability initiatives and progress to the Board of Education
 - Inter-governmental and community partnerships to achieve sustainability goals
 - Tracking energy use
 - Implementing GHG gas reduction plan
 - Environment stewardship is used as a decision-making parameter
2. Capital planning
 - Retrofits
 - Electric vehicle charging stations
3. Technology adaptation
 - Lighting: light-emitting diode (LED)

- Heating, ventilation, and air conditioning (HVAC): high-efficiency condensing boilers, high-efficiency wall-mounted on-demand water heaters, and air source heat pump upgrades
 - Building automation
 - Electric vehicle for maintenance staff
4. Renewable energy adaptation
- Alternatives for natural gas

3.3 Kootenay-Boundary Region

Out of the six school districts in the Kootenay-Boundary region, five had climate action policies. The following themes were identified for the five climate action policies.

1. Capital planning
 - Retrofits
 - Thermal efficient building envelope upgrades
 - i. Roof insulation
 - ii. Windows replacement
 - iii. Exterior siding insulation upgrades
2. Technology adaptation
 - Lighting: LED lighting
 - HVAC: heat pump, mechanical system upgrades, geothermal, change the variable frequency drive of HVAC systems
 - Building automation: direct digital control (DDC) upgrades, occupancy sensors, CO₂ sensors
 - Electric buses
 - Hybrid SUVs
 - Lawn mower with tier 4 emissions
 - Energy-efficient computer and appliance upgrades
 - Replacing computers with laptops and tablets
 - Power management software: shut down computers outside of business hours and auto sleep settings on computers
3. Resource and waste management
 - Paper utilization reduction: enterprise resource planning software
 - Environmentally friendly papers (i.e., Grand and Toy)

4. Renewable energy adaptation
 - Solar energy
 - Geothermal energy

3.4 Metropolitan Region

Out of the 11 school districts in the Metropolitan region, eight had climate action policies. The following themes were identified for the eight climate action policies.

1. Administrative and managerial initiatives
 - Waste management tutorials for the students on how to use different bins
 - Continuous review of energy-conservative initiatives
 - Sustainability-oriented decision-making methods
 - Sustainability leadership team
 - Sustainability framework for different priorities (key focus areas, goals, performance, and communication plan)
 - Environment-oriented employee capacity building
 - Training the drivers on economic driving techniques
 - Climate change risk assessment of operations
 - Promote alternate transportation (walking, cycling, carpooling)
2. Capital planning
 - Thermal efficient building envelope upgrades
 - i. Efficient rooftops
 - ii. Efficient glazing
 - Ground greening
3. Technology adaptation
 - Lighting: LED
 - HVAC: efficient boilers and efficient mechanical components
 - Building automation: DDC upgrades
 - Electric vehicles
4. Resource and waste management
 - Different bins based on the waste type
 - Low material consumption
 - i. Reducing paper consumption
 - Waste reduction

- Water conservation

3.5 South Coast Region

Out of the three school districts in the South Coast region, two had climate action policies. The following themes were identified for the two climate action policies.

1. Administrative and managerial initiatives
 - Electrification roadmap for facilities
2. Capital planning
 - Thermal efficient building envelope upgrades
3. Technology adaptation
 - Building automation optimization
 - HVAC: efficient boilers and efficient mechanical components
 - Propane-based school buses
4. Resource and waste management
 - Electricity conservation
 - Fossil fuel conservation
 - Water conservation

3.6 Vancouver Island Region

All the 12 school districts in the Vancouver Island region had climate action policies. The following themes were identified from their climate action policies.

1. Administrative and managerial initiatives
 - Sustainability-oriented decision-making
 - Promote alternate transportation (walking, cycling, carpooling)
 - Tree growing programs
 - Active energy management
 - Zero waste management program
 - Awareness program for the students
 - Training the drivers on economic driving techniques
 - Low-emission paper purchases
2. Capital planning

- Retrofit
 - Energy efficient projects
 - Electric charging station
3. Technology adaptation
 - Lighting: LED
 - HVAC: heat pump
 - Electric buses
 - Electric vehicles for the maintenance crew
 - Fuel-efficient/hybrid vehicles
 4. Resource and waste management
 - Different bins based on the waste type
 - Building tuning to reduce energy use
 - Water conservation
 - Waste minimization
 - Low material consumption
 - i. Reducing paper consumption: tighter control of copiers and printers, software used to store documents electronically, digital permanent records (PR) cards, digital leave management system, and digital forms
 5. Renewable energy adaptation
 - Solar energy

3.7 North West Region

All the six school districts in the North West region had climate action policies. The following themes were identified from their climate action policies.

1. Administrative and managerial initiatives
 - Promote alternate transportation (walking, cycling, carpooling)
 - Building energy audits
2. Capital planning
 - Retrofit
 - Thermal efficient building envelope upgrades
 - i. Additional insulation on the roof
 - ii. Window replacements
 - iii. Door replacements

3. Technology adaptation
 - HVAC: efficient boilers, efficient mechanical systems, heat pumps
 - Lighting: LED, motion-activated lights
 - Electric vehicles
 - Fuel efficient vehicles
 - Workstation tune-ups
4. Resource and waste management
 - Paper: recycled papers, electronic documents, digitalized paystubs, reuse non-confidential scrap papers, using both sides of paper when printing
 - Reducing fuel consumption: anti-idling behavior, virtual meetings to reduce traveling, coordinated maintenance to reduce traveling distance
 - Reducing waste: reduce/replace bottled water with filtered water
 - Green cleaning products
 - Water conservation: plumbing upgrades

3.8 Northern Interior Region

All the eight school districts in the Northern Interior region had climate action policies. The following themes were identified from their climate action policies.

1. Administrative and managerial initiatives
 - Promote alternate transportation (walking, cycling, carpooling, public transportation)
 - Building energy audits
 - Paper use reduction awareness programs
2. Capital planning
 - Retrofit
 - Thermal efficient building envelope upgrades
 - i. Windows
3. Technology adaptation
 - Lighting: LED, compact fluorescent lamps, dimmable LED, motion-activated lights
 - HVAC: efficient boilers, efficient furnace, air handling unit upgrades
 - Fuel efficient vehicles
 - Workstation tune-ups

- Occupancy sensors
4. Resource and waste management
 - Reducing the fuel consumption: anti-idling behavior
 - Paper: reuse non-confidential scrap papers, digital documents, digital payroll system, high recyclable papers
 - Green cleaning products
 - Water conservation: low flow showers or toilets, fix leaks
 5. Renewable energy adaptation
 - Geothermal energy: geo-exchange upgrades

3.9 Thompson-Okanagan Region

All the nine school districts in the Thompson-Okanagan region had climate action policies. The following themes were identified from their climate action policies.

1. Administrative and managerial initiatives
 - Paper use reduction awareness programs
 - Promote alternate transportation (walking, cycling, carpooling, public transportation)
 - Raise awareness of environmental matters at the school level
 - Sustainable procurement practices for the purchase of resources
2. Capital planning
 - Retrofit
 - Energy-efficient building envelope upgrades
 - i. Windows
 - ii. Roof insulation
3. Technology adaptation
 - HVAC: efficient heat pumps, efficient furnace
 - Electric vehicles
 - Lighting: LED
 - Occupancy sensors
 - Energy-efficient classroom equipment
4. Resource and waste management
 - Water conservation

- Paper: digital documents, recyclable papers, paper usage tracking (Ricoh paper tracking system)
 - Reducing the fuel consumption: optimizing driving distances
5. Renewable energy adaptation
- Geothermal energy
 - Solar energy

4 Review of Strategic Plans of BC School Districts

Integrating climate action with broader organizational goals showcases the school district's dedication to contributing positively to society and the environment. The review of the strategic plans of 60 school districts (refer to Table 4.1) illustrated that only 38.33% of the school districts have emphasized climate action as a priority in their strategic plan. The school districts in the South Coast and Northern Interior regions did not include climate action as a priority. Three-fourths of the school districts in the Vancouver Island region have included climate action as a strategic priority and, hence, have been identified as the region with the highest percentage, followed by Kootenay-Boundary and Metropolitan. Therefore, there is a need for school districts to integrate climate action into their strategic priorities.

Table 4.1: Inclusion of climate action in the strategic plan

Region	Number of school districts	Inclusion of climate action in strategic plans	Percentage (%)
Fraser Valley	5	1	20
Kootenay-Boundary	6	3	50
Metropolitan	11	5	45.45
South Coast	3	0	0
Vancouver Island	12	9	75
North West	6	1	16.67
Northern Interior	8	0	0
Thompson-Okanagan	9	4	44.44
<i>Total</i>	<i>60</i>	<i>23</i>	<i>38.33</i>

5 Updated Climate Action Strategy with Exemplars and Champion Exemplars

The climate action policy exemplars identified by reviewing the BC school districts along with literature were incorporated to develop the updated climate action strategy, which is illustrated in Figure 5.1. This novel framework consists of three main domains, i.e., asset management, operation management, and energy management. The goal of these three domains is to optimize resource and waste management, thereby reducing the GHG emissions of the school districts. The asset management domain acts as the key area where operation and energy management are supported by technology-driven capital planning.

This novel framework is further supported by identifying the exemplars and champion exemplars underneath each domain. The details of the exemplars and champion exemplars are presented in Table 5.1. The exemplars and champion exemplars in Table 5.1 are identified through the climate action policy review of 60 BC school districts, climate action policies of other schools, and literature. The champion exemplars are proven approaches that have a high level of impact on GHG emission reduction. The use of heat pumps and building-integrated photovoltaic-thermal collectors have been identified as champion exemplars under the HVAC type category as they utilize renewable energy. The fiber optic daylight systems utilize natural daylight to lighten up the building envelope and are considered a champion exemplar. The DDC systems on the HVAC and lighting are another champion exemplar, which can significantly minimize the energy consumption of the schools. Utilizing Energy Star appliances tends to reduce energy consumption significantly and, hence, is considered a champion exemplar.

Greywater use in the bathroom is a champion exemplary measure of water management. Moving from regular papers to either recyclable papers or/and electronic papers significantly minimizes paper-related emissions and, as such, is considered a champion exemplar. Electric vehicles, as opposed to combustion fuel or hybrid vehicles, are preferred further as electric vehicles have low operational emissions. Finally, the energy type used in buildings and vehicles should be transitioned from fossil fuels to renewable energy sources such as geothermal, solar, wind, biofuels, and hydropower. These sets of champion exemplar practices would enable a significant reduction in the GHG emissions of the BC school districts.

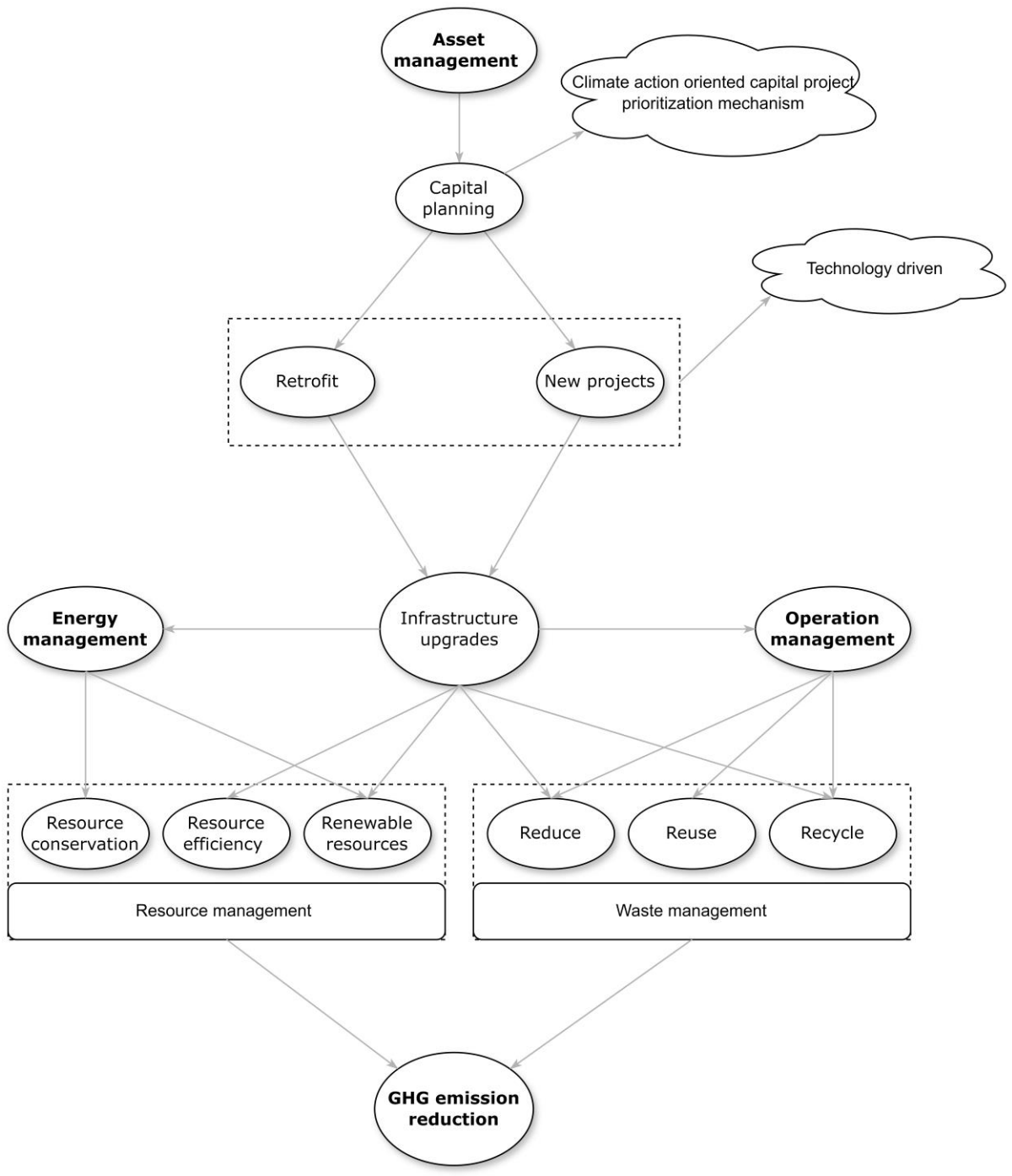


Figure 5.1: Novel climate action strategy framework for the school districts of BC

Table 5.1: Climate action exemplars of the novel strategy

Domain	Description	Exemplars	Source/s
1 Asset management			
1.1 Buildings			
1.1.1 Building envelope			
1.1.1.1 Thermal performance of the components	Low thermal transmittance (U-value) in external walls, roof, ceiling, windows, and external doors reduces the rate of transfer of heat from indoors to outdoors and vice versa. This minimizes the energy demand to maintain indoor temperature.	Building envelope components that satisfy the following U-values should be installed. <ul style="list-style-type: none"> • External walls U-value ≤ 0.063 W/m²K • Roof U-value ≤ 0.038 W/m²K • Ceiling U-value ≤ 0.026 W/m²K • Windows U-value ≤ 0.32 W/m²K • External doors U-value ≤ 0.32 W/m²K 	[23]
1.1.1.2 Air barrier	A continuous air barrier in the building envelope separates indoors from outdoors, minimizing the change in indoor temperature from outdoor conditions. This reduces the energy demand to maintain indoor temperature.	The foundation-to-wall, wall-to-roof, window-to-wall, and door-to-wall joints should be enclosed with airflow-impermeable materials <ul style="list-style-type: none"> • Sealants • Gaskets 	[23]
1.1.2 HVAC system			
1.1.2.1 HVAC type	Energy-efficient or renewable energy-based HVAC systems should be used.	<ul style="list-style-type: none"> • Under-floor air distribution systems • Displacement ventilation systems • Efficient boilers • Heat pumps* • Building-integrated photovoltaic-thermal collectors* 	[24,25]

1.1.2.2 HVAC automatic controls	HVAC automatic controls optimize the HVAC system based on a set of variables such as temperatures, humidity, CO ₂ levels, occupancy, and operating hours.	<ul style="list-style-type: none"> • DDC systems with demand ventilation control, optimum system start and stop, fan pressure optimization, unoccupied ventilation, and chilled water temperature reset* 	[25]
1.1.3 Lighting			
1.1.3.1 Lighting type	Energy-efficient lights or daylight-based systems should be used.	<ul style="list-style-type: none"> • LED lights • Fiber optic daylight systems* 	[26,27]
1.1.3.2 Lighting automatic controls	Lighting automatic controls optimize the indoor lighting based on the indoor natural daylight, occupancy, and operating hours.	<ul style="list-style-type: none"> • DDC systems with dimming, on, and off features* 	[25]
1.1.4 Equipment	The use of efficient equipment reduces energy use.	<ul style="list-style-type: none"> • Energy Star-rated computers and appliances* • Replacing computers with laptops and tablets 	[28]
1.1.5 Bathrooms	The water usage should be minimized.	<ul style="list-style-type: none"> • Low-flow faucets • Low flow showers • Greywater use* 	[29,30]
1.2 Transportation			
1.2.1 Transportation type	Fossil fuel-based transportation should be transitioned to other means with low emissions.	<ul style="list-style-type: none"> • Walking • Cycling • Carpooling • Hybrid vehicles • Electric vehicles* 	[31]
1.2.2 Driving technique	Low fuel consumption behaviors should be taught to drivers.	<ul style="list-style-type: none"> • Teaching anti-idling behaviors to the drivers 	[32]
1.2.3 Driving distance	The total driving distances should be minimized.	<ul style="list-style-type: none"> • Optimizing driving distances of school buses based on the locations • Conducting virtual meetings, where applicable 	[33]

2 Operation management			
2.1 Procurement practices	Sustainable procurement practices should be prioritized.	<ul style="list-style-type: none"> • Low emission and recyclable resource prioritization in the procurement evaluation criteria* 	[34]
2.2 Paper management	Paper usage should be minimized to reduce the waste.	<ul style="list-style-type: none"> • Reuse of non-confidential scrap papers • Using both side of a paper for printing • Electronic documentation* • Recyclable papers* 	[35,36]
2.3 Awareness management	Awareness building will help the community understand the significance of climate change.	<ul style="list-style-type: none"> • Climate change awareness program for the staff and students 	[37,38]
2.4 Waste management			
2.4.1 Waste bin program	Waste segregation aids in the recycling process	<ul style="list-style-type: none"> • Different colored waste bins to segregate waste 	[39]
2.4.2 Plastic waste management	Filtered water should be used to minimize the use of plastic water bottles.	<ul style="list-style-type: none"> • Reverse osmosis water filters in the buildings* 	[40]
3 Energy management			
3.1 Energy type	The energy type used in buildings and vehicles should be transitioned from fossil fuels to natural gas or renewable energy.	<ul style="list-style-type: none"> • Natural gas (i.e., ethane, propane, and butane) • Renewable energy (i.e., geothermal, solar, wind, biofuels, and hydropower)* 	[3,11,12]
3.2 Energy monitoring	The monthly energy usage should be tracked and analyzed, and based on that, conservation measures should be developed.	<ul style="list-style-type: none"> • Active energy monitoring and conservation measures 	[41,42]

Note: * indicates the champion exemplars

6 Conclusions

This study reviewed the climate action policies and strategic plans of 60 BC school districts and identified five key themes of climate action policies, i.e., (1) administrative and managerial initiatives, (2) capital planning, (3) technology adaptation, (4) resource and waste management, and (5) renewable energy adaptation. Based on these themes and additional input from the literature, a novel climate action strategy with exemplars and champion exemplars was proposed for the BC school districts. This framework consists of three key domains, i.e., (1) asset management, (2) operation management, and (3) energy management. This novel framework is comprehensive by nature and can be utilized to reduce GHG emissions in BC school districts by prioritizing effective resource and waste management.

Future studies should consider developing a performance evaluation scale for the climate action strategy framework proposed by this study. This will enable the climate action-based performance evaluation of each school district. Future research should further consider the cost-benefit of the exemplars proposed by this study. Since many organizations have limited budgets, obtaining insight into the cost-benefit of exemplar implementation would aid the decision-making process of the school district management.

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