Greater Essex County District School Board

2023 Climate Action Plan

Land Acknowledgement

We acknowledge that we are on land and surrounded by water, originally inhabited by Indigenous Peoples who have travelled this area since time immemorial. This territory is within the lands honoured by the Wampum Treaties: agreements between the Anishinaabe, Haudenosaunee, Lenni Lenipe and Allied Nations to peacefully share and care for the resources around the Great Lakes. Specifically, we would like to acknowledge the presence of the Three Fires Confederacy and Huron/Wendat Peoples. We are dedicated to honouring Indigenous history and culture while remaining committed to moving forward respectfully with all First Nations, Inuit and Metis.

Memorandum of Understanding

This plan was developed by the Greater Essex County District School Board to align with our local municipalities and assist in achieving our local and federal greenhouse gas reduction targets. Through the lens of demonstrating ethical stewardship, we acknowledge our duty to act and mitigate our individual contribution to global warming and ensure our larger community can adapt to expected future climate change. As a school board whose primary mission is to support and prepare youth for the future, we have a responsibility to teach and model sustainable practices, not only for our student body, but for our community as well.

Terms and Acronyms

Carbon Footprint: Refers to the quantity of greenhouse gas emissions released by an actor

Carbon Neutrality: Refers to a state where any greenhouse gas emissions generated are balanced by either sequestration of emissions elsewhere, or by the purchase of third-party carbon offsets.

Circular Economy: an economy in which participants strive to minimize the use of raw materials, to maximize the useful life of materials and other resources through *resource recovery*, and to minimize waste generated at the end of life of products and packaging (as defined in the *Resource Recovery and Circular Economy Act, 2016*).

Food Waste: The edible parts of plants and animals produced or harvested but not consumed.

GECDSB: Greater Essex County District School Board

GHG: "Greenhouse gas emissions" refers to gases released which have an increased warming effect in the Earth's atmosphere. Most of our Board GHGs emissions result from the operation of our buildings, transportation and food waste, however they are also tied to the purchase, production and transportation of items that we use daily

Organic Waste: Inedible parts of plants and animals, as well as other organic material that may be processed along with *food waste*.

Scope 1, 2 and 3: Refers to the different types of emission sources that can be linked to an organization as defined by the GHG Protocol. Scope 1 refers to emissions that are directly created on-site, Scope 2 refers to indirect emissions for energy, and Scope 3 refers to other indirect emissions (waste, commuting, etc.)

STEM: Science, Technology, Engineering and Math

UCD: The Utility Consumption Database is an online energy management tool that compiles the electricity, water, natural gas and alternative fuel usage for school buildings in the Province of Ontario. The tool contains customized reports that provide an in-depth analysis of energy emissions, cost and performance.

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1. Introduction

I. Purpose

The GECDSB in conjunction with their strategic plan, has adopted three pillars to ensure student success and well-being. Under the pillar of demonstrating ethical stewardship, a climate action plan has been developed, recognizing that climate change is real and inevitable. This will require robust and permanent change to how the Board conducts its business.

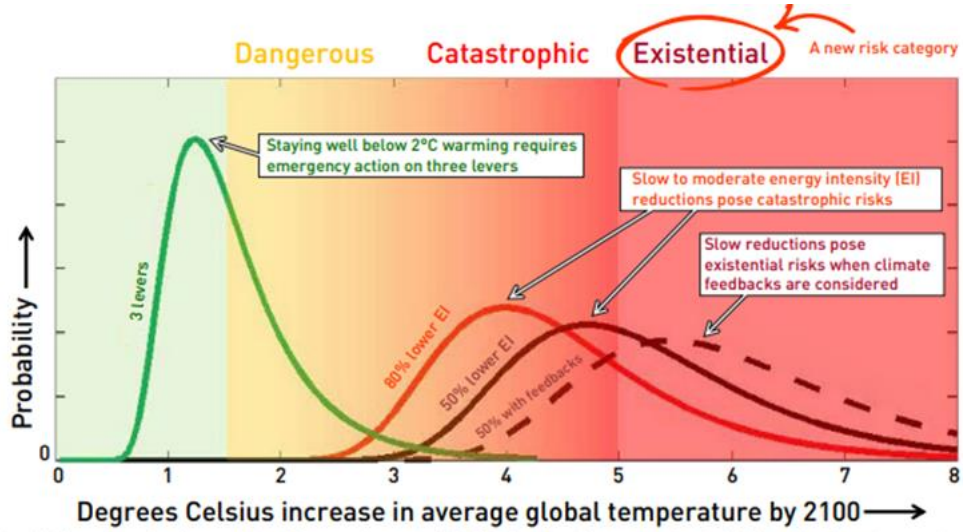
A climate action plan is a strategic and detailed framework for measuring total GHG emissions and creating reduction targets. The plan, as detailed in this report, includes priority action items, implementation measures and cost requirements where applicable, to work towards the reduction of emissions and prepare for our climate future. To future-proof, this plan will allow the Board to help foster climate resilient children, address climate anxiety and support the net zero emissions timeline of 2050 put forward by the Federal Government of Canada. Together, this plan will act as a guide, allowing the Board to partner locally in climate action alongside our municipalities, and other organizations like the Windsor-Essex Health Unit and the Essex Windsor Solid Waste Authority.

To acknowledge that our planet cannot sustain current human behaviour, at least 38 countries, including Canada, have declared a state of climate emergency and promised to enact legislation to significantly reduce GHG emissions with an aim to limit global temperature increase to 1.5 degrees Celsius. On November 19, 2020, the Government of Canada announced that there will be federal legislation to move toward net zero by 2050. Over 440 Canadian municipalities have joined in the emergency declaration, creating their own targets for GHG reduction, including the City of Windsor, the County of Essex and the Town of Amherstburg. Three Ontario school boards have also declared a climate emergency, two trustee-led at Upper Grand District School Board and the Rainbow District School Board, and one student trustee-led at Halton District School Board.

II. Background

Since the Industrial Age, our climate has changed at an unnatural rate, and it is scientifically recognized that greenhouse gases (GHG) produced by human activity have caused an increase in global temperature of approximately 1°C. The world has experienced the many effects of global warming, including changing weather patterns, more intense storms, increased flooding, rising sea levels, reefs dying due to increased water acidity, thawing glaciers and polar ice, and more frequent droughts. Locally, we are experiencing hotter and longer summers, more extreme weather events, increased precipitation, more frequent hundred-year floods and milder year-round temperatures, which leads to increased vector-borne diseases from ticks and mosquitoes, such as Lyme disease and West Nile virus. There are also many mental health impacts, such as stress and anxiety, associated with the damage caused by extreme weather events.

It has been determined that the world average temperature cannot increase beyond 1.5°C without devastating effects. If we do not act now to change our behaviour to significantly decrease our GHG emissions, we are on a path to experience an increase beyond 3°C by the year 2100, which will have catastrophic impacts on human health, our communities, entire ecosystems, and wildlife. Left uncontrolled, it will render parts of the world uninhabitable and create global food and water scarcity. Climate change unaddressed is our most significant existential threat.



A simplified version of a diagram from Ramanathan et. al. (2017) showing the range of probabilities of various temperature outcomes by 2100. It illustrates four scenarios (from left): a "well below 2°C" scenario with strong action on the three levers described above; a scenario in which the energy intensity (EI- the ratio of energy use to economic output) decreases by 80% (compared with 2010); a scenario in which EI decreases by only 50%; and a 50% EI decrease scenario that includes carbon cycle feedbacks.

III. How GECDSB Contributes

The four most prevalent greenhouse gases are carbon dioxide (CO_2), methane (CH_4), Nitrous Oxide (N_2O) and hydrofluorocarbons (HFCs). Most of the Board GHG emissions result from the operation of its buildings, transportation and food waste, however they are also tied to the purchase, production and transportation of items that are used daily including food, paper, school supplies, office equipment, and furniture.

Natural gas-fired equipment used for facility heating and for domestic hot water heating produce harmful carbon dioxide emissions as a combustion by-product. In the 2018-2019 school year, the Board emitted almost 10,800 tonnes of GHG emissions associated with its facilities' natural gas use.

Transportation is one of the largest contributors to GHG emissions in the developed world. A poorly maintained vehicle can increase fuel consumption up to 15% and release even more GHG's (Automotive Industry Association of Canada). The Board owns 51 fleet vehicles used by its maintenance, operations and media departments. Many employees are also required to use their personal vehicle for travel from site to site and to commute to and from work. A typical passenger vehicle emits about 4.6 tonnes of CO_2 per year (*US EPA*).

Idling vehicles also emit other air pollutants such as volatile organic compounds, nitrogen oxide, carbon monoxide and particulate matter. These pollutants also contribute to global warming and are linked to various respiratory and cardiovascular illnesses. At many of the Board's schools, children are driven in personal vehicles, despite the availability of school and public transportation or the ability to walk or bike. School parking and residential streets surrounding schools are congested with idling cars, which not only pollute the air, but also contribute to avoidable additional GHG emissions.

Wasted food that ends up in the garbage and in the landfill, produces methane when it decomposes. Methane is 25 times more potent than carbon dioxide as a greenhouse gas and it is estimated that 7% of global GHGs are due to preventable food waste. In the 2022/2023 school year, waste audits revealed that on average 24% of the waste generated at a board owned site is food waste.

IV. Transition to Climate Action

Though a climate action plan is a formalized way of approaching how the Board will act as an organization going forward, environmental stewardship is not something new to GECDSB; it is a continuation of work that began in the early 1990's. Initiatives focused on energy usage, occupant behaviour and most recently single use plastics reduction and waste minimization have been instrumental in paving the way for our sustainable future.

In November 2021, the Board declared a climate emergency acknowledging the impact of greenhouse gases on the climate and our contribution to the problem. The Board is committed to adopting a climate action lens to its existing structure, operations, and behaviour of its staff, students, and community partners. As part of this declaration, the Board is committed to developing and implementing a climate action plan. This will align with the Energy Conservation and Demand Plan, a legislative requirement of the Electricity Act. The Board will work to measure the carbon footprint from its buildings, transportation, food waste, and carbon handprint. The Climate Action Plan will also include other areas of the Board's operations that it controls where there is potential to reduce its carbon footprint. Long-term the Board will consider areas like transportation of students and food waste (organics). It is also important to note that although occupant behaviour and water consumption are not detailed as direct GHG contributors, the Board considers these important and will include them in the plan.

2. Mission/ Vision Statement

The Greater Essex County District School Board recognizes and embraces the unique responsibility of school boards to support students, staff and school communities in learning about and practicing global sustainability. The Board is committed to protecting the environment and inspiring all in the community to embrace environmental stewardship which includes efforts to refuse, rethink, reduce, reuse and recycle. Reflecting on our role in preserving the environment and our duty to protect the planet for current and future generations, the Board will minimize its global impact through ongoing sustainability measures and provide educational learning opportunities.

3. Stakeholder Input

I. Climate Action Committee

Beginning in November 2022, the Climate Action Committee was formed to begin the process of understanding the scope and critical components of the climate action plan. It was determined that the working group of the Climate Action Plan Committee needed to be key decision-makers at the Board who could positively affect change with their departments. At a minimum, it was determined that the key members of the working group would be:

- Superintendent of Business,
- Superintendent of Program or designate,
- Manager of Facility Services,
- Supervisor of Purchasing,
- Energy and Environmental Officer, and
- School Administration (Elementary and Secondary)
- Communications Department

The climate action committee met monthly to identify key stakeholders within the organization, gain a better understanding of what climate action would mean at the school level, and discuss the implementation process. As the individual stakeholders were identified, the committee developed presentations and surveys to ensure the proper expertise and effective collaboration was achieved. All information gathered from sub-committee meetings was shared and evaluated as a group to identify opportunities for the Board to address in the plan.

II. Student Input

In March 2023, the Climate Action Committee met with the GECDSB Student Senate to gain a better understanding of student behaviour across the system and understand the challenge in schools related to waste minimization. As Student Senate is primarily comprised of grade 11 and 12 students, this feedback was specific to secondary schools. Throughout the discussion the following themes emerged:

- Lack of Knowledge - Students are unaware of where items should be placed. The act of defaulting to the waste stream over recycling or choosing the incorrect recycling stream is not deliberate.
- Lack of Access - There are very few source separation stations provided that include the full set up of garbage and both recycling streams. Most classrooms have all three, but that is not where most waste is generated by students.

In addition to the conversation around waste minimization, students expressed a lot of interest in the ability to participate in school greening projects as an opportunity towards their 40 hours of community service. There was a request for social media collaboration to increase awareness of ongoing initiatives in the student community as this is a primary mode of communication for the group the senate represents.

III. Parent Input

In February 2023, the Climate Action Committee met with GECPIC (Greater Essex County Parent Involvement Committee) to discuss ongoing environmental initiatives in schools and how the Board could go about gaining more meaningful input from its parent groups. In the meeting we discussed how to foster engagement within individual school communities and create regional priorities across all board owned sites. Consistently, parents expressed that they want to be more involved in their children's schools and play a more active role in emerging initiatives.

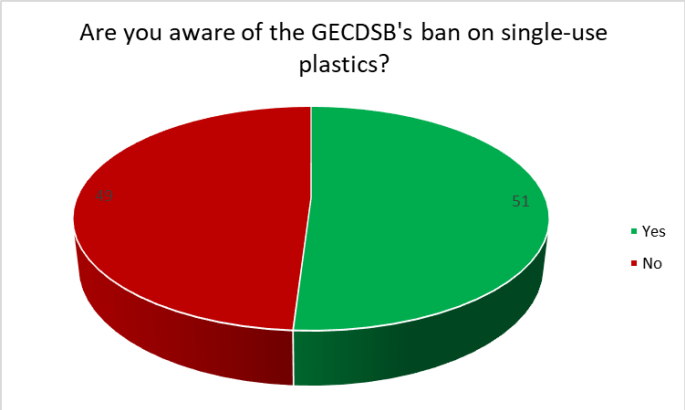
IV. Indigenous Inclusion

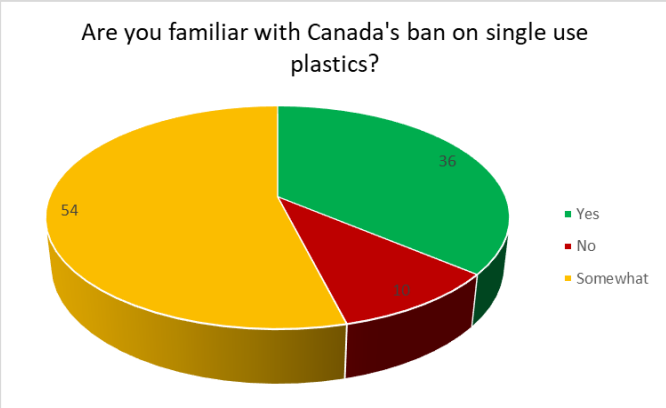
As a key member of the GECDSB community, Indigenous Peoples and their collective voice are a crucial part of the Climate Action Plan. In February 2023, the Climate Action Plan Committee met with IEAC (Indigenous Education Advisory Council) to collaborate on a mission/ vision statement that would reflect the values of their lived experiences and our collective duty to conserve and protect the environment and the productive capacity of lands, territories, and resources.

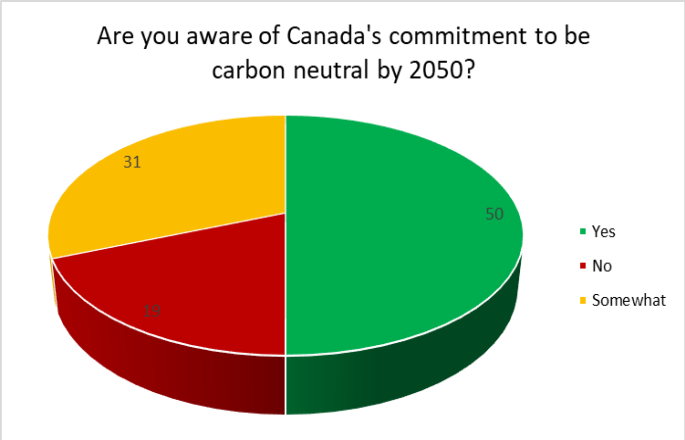
Through the dialogue there was an ongoing commitment to continue down the path of consultation and learning on the part of GECDSB as it relates to the implementation of this Climate Action Plan or future editions of the Climate Action Plan. Specifically, there was a call to encourage connection with the Caldwell First Nations youth group, “Point Pelee Guardians,” to learn more about what the group does and see if there are opportunities for collaboration.

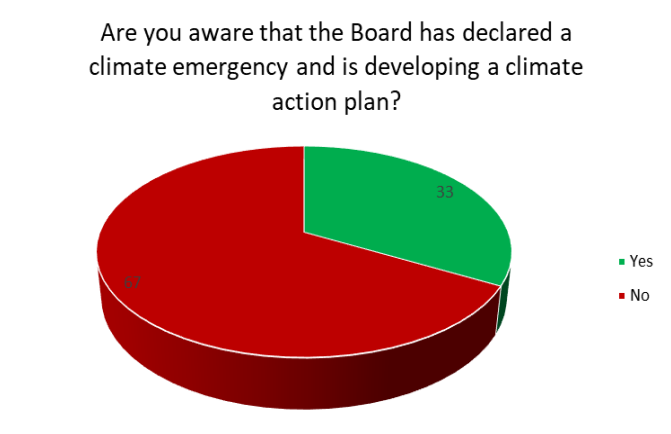
V. Other

In addition to the individual stakeholder meetings listed above, a board-wide survey was sent out to gauge the general awareness of climate action at the school level and the level of understanding related to federal initiatives. Available for a one-month period, approximately 900 responses were received.
General knowledge testing questions produced the following results:



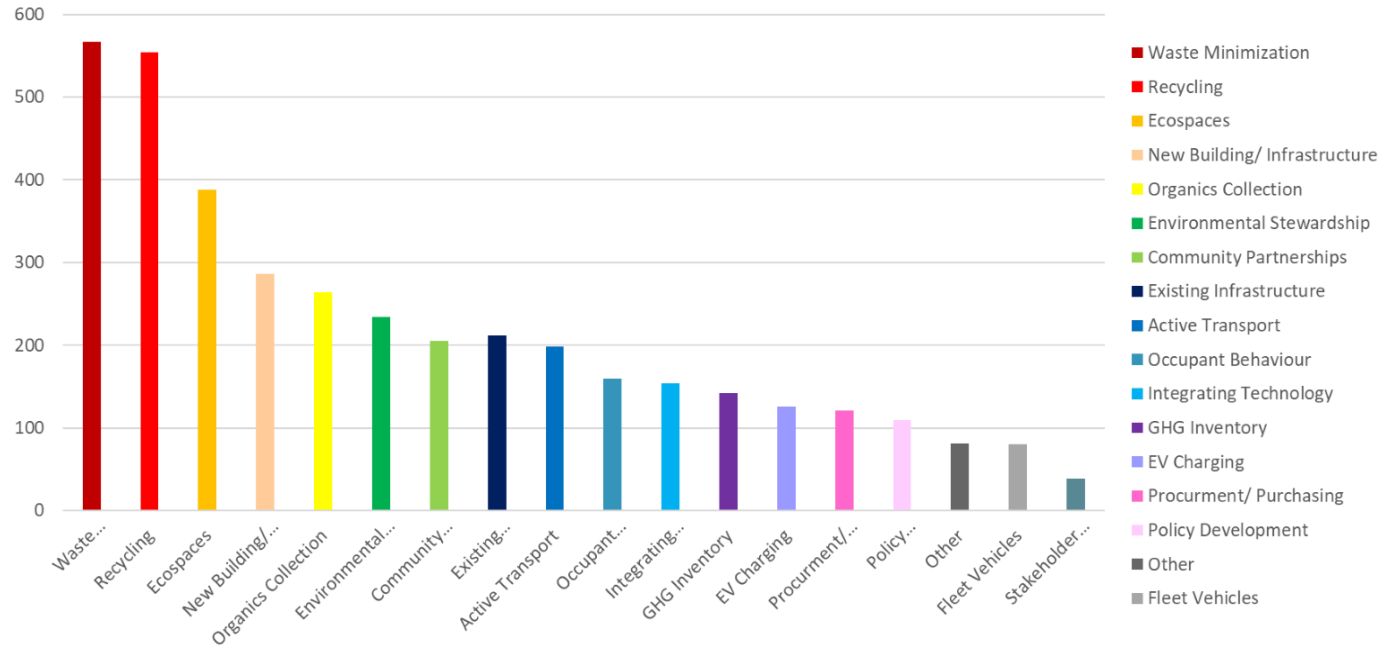






As was discovered in consultation with the student senate, the staff and parent community also have a knowledge gap, meaning that the Board is not effectively communicating its goals of environmental stewardship to its entire stakeholder group.

When asked which areas the focus of the proposed climate action plan should be, the following responses were received (note that each respondent could select up to 5 options):



From the responses received, three of the top five were tied to the waste the Board generates. The number one response was waste minimization, followed by recycling and organics collection landed in the top five. The feedback received from the survey was used to help formulate the action steps included later in the plan and supports the on-going waste diversion educational initiatives lead by the Program Department.

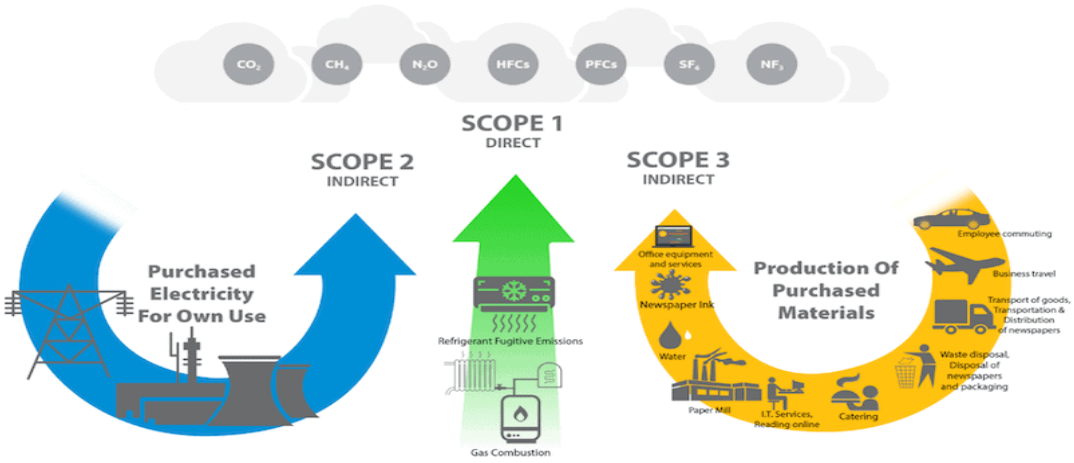
4. Greenhouse Gas Inventory

Greenhouse gas accounting is the inventory and tracking system used to understand the amount of human created emissions required to operate daily. In the case of the Board, three categories require further examination to increase our understanding of the Board's direct and indirect emissions:

- Scope 1 Emission (Direct) – Emissions from sources that are owned and controlled by the Board including all Board owned sites. Scope 1 Emissions include natural gas combustion for heating and ventilation, fugitive refrigerant emissions from air conditioning systems and gasoline combustion from board vehicles.
- Scope 2 Emission (Indirect) – Emissions that occur at sources owned or controlled by another entity. An example of this would be the production and transmission of electricity that we purchase and consume.
- Scope 3 Emissions (Indirect) – Emissions that are produced because of our activities. The most relevant example of this is organic waste that ends up in the land fill.

After review of all the Board's operations, it was determined that, for the initial calculation, the scope of the GHG inventory would be limited to the following:

- Buildings – GHG emissions can be calculated from data in the Utility Consumption Database maintained by the Ministry of Education. Similarly, the quantity of any refrigerant that had to be replaced from air conditioning service records can be calculated from this source as well. All Board owned buildings that operate as a school and the Board's Administration Building would be included in the calculation.
- Transportation – GHG emissions calculated from all Board owned vehicles using mileage and vehicle fuel efficiency.
- Waste – GHG emissions calculated from the results of the recent waste audits conducted in 9 schools and the Administration Building. The schools chosen for these audits this year represent various sizes of schools and programming offered. This will allow the information to be extrapolated to calculate the representative results from all Board buildings.



As an exercise in GHG accounting, past available data from 2021 was used to get a better understanding of what this inventory process would look like for the Board. Greenhouse gas (CO2 equivalent) emissions are calculated through the following equation:

$$Emissions_{GHG} = GHG\ Activity\ Data \times EF \times GWP$$

Where:

$Emissions_{GHG}$	= total emissions (CO_2e) calculated for a greenhouse gas
GHG Activity Data	= quantity of feedstock, such as fuel combusted, tonnes produced
EF	= emission factor (published or calculated)
GWP	= UNIPCC Global Warming Potential (IPCC AR6)

Scope	Activity Type	Tonnes CO_2e
Scope 1	Stationary Combustion - Facility Heating	10,658.27
	Mobile Combustion - Board Vehicles	259.05
	Fugitive Emissions - Refrigerants from Building A/C	TBD
	Scope 1 Total	**10,917.32**
Scope 2	Purchased Electricity	**605.67**
Scope 3	Organic Waste Generated in Operations	**285.74**
	Total tonnes CO2e	**11,808.74**

These emissions would be equivalent to…

GHG emissions from 2,544 gas powered cars driven for 1 year

CO2 emissions from 1,487 homes' energy use for 1 year

carbon sequestered by 13,974 acres of forest in one year

To complete the exercise, the following assumptions were used:

- Scope 1- Stationary Combustion - Facility emissions
  i. Facility natural gas consumption data obtained from the UCD for FY2021.
  ii. Emission factors obtained from National Inventory Report 1990-2019: Greenhouse Gas Sources and Sinks in Canada, Part 2, Annex 6 Table A-6, A6.1-3p211.
- Scope 1- Mobile Combustion
  i. Mileage data provided by Maintenance & Media Dept, for annual vehicle license renewal.
  ii. Readings taken in December, annual mileage calculated is the difference between annual readings, assuming the readings were taken on the same day.
  iii. Used driving tests website to look-up vehicle specifications using VIN.
  iv. 2019-2021 mileage pro-rated to compensate for the 2-month COVID shutdown in March of 2020 when vehicles were not in use.

v. Emission factors obtained from National Inventory Report 1990-2019: Greenhouse Gas Sources and Sinks in Canada, Part 2 Annex 6 Table A-6, A6.1-14 p217 Emission Factors for Energy Mobile Combustion Sources, Light Duty Tier.

- Scope 1- Fugitive Emissions (Refrigerants) – amount and types of refrigerants for GHG accounting baseline year which were unavailable at time of the calculation exercise
- Scope 2 – Electricity
    i. Facility electricity consumption data obtained from the UCD reports, FY2021.
    ii. Emission factors obtained from National Inventory Report 1990-2019: Greenhouse Gas Sources and Sinks in Canada, Part 3 Table A13-7.
- Scope 3- Food Waste
    i. Data obtained from FY 2022 waste audit results, from 10 school site audits and the remainder of schools' data extrapolated from the 10 audit results.
    ii. Used the US EPA Waste Reduction Model (WARM) to calculate high-level estimate of food waste GHGs.

To determine appropriate targets for GHG reduction, it has been determined that 2022/2023 will be the baseline year for all GHG accounting.

TARGET: **Complete GHG accounting for 2022/2023 year to establish baseline data for reduction targets.**

5. Action Steps

I. Policy

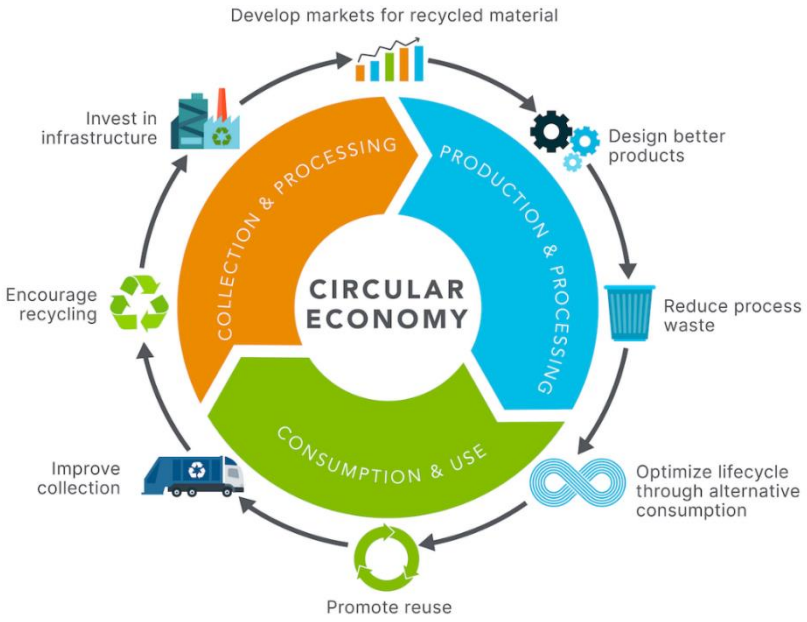
Introduction

The Board of Trustees are responsible for developing the policies and regulations of the Board. Policies and regulations guide decisions and support the achievement of the Board's strategic plan. One pillar of the Board's strategic priorities is to demonstrate the ethical use of resources through thoughtful and intentional use of financial, human, environmental and community resources.

13 CLIMATE ACTION

Policies are designed to align with the Board's mission, vision and strategic priorities, and share the Board's values. Policies create a framework and an environment which engages teachers, students, administrators, parents and the wider community to support the Board's overall vision. Embedding climate action into the Board's policies and regulations aligns with its strategic priorities, mission and vision, and provides a framework for stakeholders to adopt a climate action lens in all that they do.

Key to the development of climate action-oriented policies and regulations is the notion of the Circular Economy. The Circular Economy challenges the way in which the Board conducts its operations by acknowledging that nothing is wasted.



Resources are used wisely to retain and recover as much value as possible, through the 5 R's: reusing, repairing, refurbishing, repurposing and recycling products and materials. In adopting a climate lens, waste is considered a resource, rather than a cost, requiring creative ways of its use to improve the environment.

As the effects of climate change are evidenced throughout the world (e.g., warming temperatures, wildfires, depletion of snow and ice, droughts etc.), climate change will have long-lasting effects. To mitigate these impacts, identifying new opportunities and making deliberate changes through the Board's policy development is one way in which the Board can contribute to addressing this global concern, and align with Canada's commitment to climate change.

The Greater Essex County District School Board recognizes and embraces the rich diversity of its students, staff and communities. As a publicly funded institution, the Board is committed to ensuring its procurement practices reflect the Board's strategic priorities of engaging communities and ethical stewardship of its resources, and by ensuring social, environmental, and economic values are considered in its decisions and actions.

TARGET: **At each policy and regulation renewal, critically assess policies and regulations from a climate lens perspective (2023 – onwards).**

Climate Education for Trustees, Senior Administration and School Administrators

To create a greater awareness of environmental concerns, all staff were required to take a Brightspace module on Environmental Stewardship in May 2023. As identified in Section 2, there is a knowledge gap of the Board's single-use plastics reduction strategy, Canada's carbon neutral plan, and the Board's commitment to the environment through the declaration of a climate emergency. To effect meaningful change beyond amending existing polices and regulations, education is necessary to influence changes in behaviour. To be effective, setting the "tone from the top" must be actively modelled by senior leaders and Trustees.

TARGET: **Provide climate education and awareness communications and / or training to trustees, senior administration and school administration (Fall 2023 and onwards).**

School Staff and Student Commitment

To be successful, each school requires an Environmental Stewardship Champion who can act as the liaison between the school and Board Administration who are leading the climate action plan. The Champion may share initiatives with school principals and school staff, lead or coordinate school activities and bring back ideas and issues to Administration for consideration. Promoting green activities will be key to this role. Schools and individual classrooms will be encouraged to adopt a sustainability pledge at the beginning of each school year and to share their pledges and progress. Items to include in a sustainability pledge may include:

- Using both sides of paper.
- Using recycled paper wherever possible.
- Using scrap paper for art projects and practice work.
- Recycle (aluminum, glass, plastic, paper and cardboard).
- Don't use a single-use plastic water bottle.
- Pack litter less lunches.
- Turn off faucets tightly.
- Unplug electronic devices at the end of the day.
- Turn off lights when leaving an empty classroom.

TARGET: **Introduce sustainability pledges in all schools starting with the 2023 school year.**

TARGET: **Request each school to nominate an Environmental Champion for 2023-24.**

TARGET: **Grow Eco School participation by 2 schools in 2023-24.**

Energy Conservation and Demand Management Plan

Ontario Regulation 25/23 entitled "Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans" was enacted under the Electricity Act 1998 on February 23, 2023 and replaced the "Green Energy Act". Regulation 24/23 requires school boards to complete the following:

- Every school board shall prepare an energy conservation and demand management plan (ECDMP).
- The ECDMP shall be approved by the senior management of the school board before the board publishes the plan on their website and makes the plan available to the public in printed form at their head office.
- The ECDMP must include:
    i. A summary of annual greenhouse gas emissions for each school.
    ii. A description of the results of previous activities and measures to conserve energy consumed by the Board and to otherwise reduce the amount of energy consumed by the Board including by employing such energy conservation and demand management methods as may be prescribed.
    iii. The cost and saving estimates for the Board's current and proposed activities and measures.
    iv. A description of any renewable energy generation facility operated by the Board and the amount of energy produced on an annual basis by the Board.
    v. A description of:
        - The ground source energy utilized, if any, by ground source heat pump technology operated by the Board.
        - The solar energy utilized, if any, by thermal air technology or thermal water technology operated by the Board.
        - The proposed plan, if any, to operation heat pump technology, thermal air technology or thermal water technology in the future.
        - The estimated length of time the Board's current and proposed activities will be in place.
        - A confirmation that the ECDMP has been approved by the Board's senior management.
- On or before July 1, 2024 and on or before July 1 in every fifth year thereafter, the Board shall publish on its website, and make available to the public in printed form at its head office, the Board's ECDMP.
- The summary of annual energy consumption and the summary of annual greenhouse gas emissions shall be for the year that ends on December 31 immediately preceding the day the summary is required to be submitted.
- The summary for a year must include the following information for each of the Board's Facilities:
    i. The name and address of the building.
    ii. Total floor area of the building.
    iii. Type of building.

iv. A description of the days and hours in the year during which the building or facility is operated.
v. The total amount of each type of energy that was consumed in the year to operate the building and that was purchased by the Board.
vi. The total amount of greenhouse gas emissions that were emitted in the year with respect to each type of energy.
vii. Whether the school had classrooms in temporary accommodations and the number of such classrooms.
viii. Whether the school had an indoor swimming pool.

- Each year, the Board shall submit to the Ministry of Energy, through the use of Portfolio Manager, the summary referred to above and the summaries for a year ending December 31 shall be submitted on or before July 1 of the following year.

Facility Services is committed to creating an Energy Conservation and Demand Management Plan that conserves energy but first and foremost continues to ensure the health and safety of all students, staff and faculty that occupy our facilities. While the ECDMP is ambitious in its energy conservation targets, utmost care will be taken to ensure that occupant comfort standards is not compromised.

As required by the Green Energy Act at that time, the Board of Trustees have approved an ECDMP that was published in July of 2018 and is found in Appendix A of this document. This ECDMP must be updated and approved by the Board in June of 2024 and published prior to July 1, 2024.

TARGET: **The Board continues to comply with Ontario Regulation 24/23 and ensure energy conservation measures are captured in the ECDMP along with energy reduction targets.**

Energy Incentive Programs

The Government of Ontario, through the "Save on Energy Program", offers several conservation programs that are available to the Board.

- Strategic Energy Management Program – this program is designed to help organizations improve their energy performance by implementing an integrated system of organizational practices, policies and processes to achieve persistent energy savings. The SEM program provides an organization with knowledge, expertise and training in energy management that can help reduce energy costs, build organizational skills, and help achieve their carbon reduction and environmental goals.

- Retrofit Program – this program offers incentives to upgrade equipment, reduce energy bills, lower carbon footprint and enhance occupant comfort. The program offers financial incentives through two streams.
    i. Custom Stream – offers financial incentives to undertake larger, more complex retrofit projects that are more reflective of the participant's actual operating conditions. The custom stream is structured to accommodate a wide range of project types to help participants capture greater energy savings.
    ii. Prescriptive Stream – offers financial incentives for targeted retrofits, helping to participants to upgrade to more energy-efficient equipment. The prescriptive stream, which focuses on commonly used products and technology, is suitable for more typical upgrades of equipment. Organizations can receive incentives for a variety of energy-efficient measures available in three areas: Lighting, HVAC, Manufacturing, and other equipment. Examples of eligible projects include lighting retrofits, lighting controls, HVAC re-design, chiller replacement, variable-speed drive installations and custom equipment retrofits.

- Energy Performance Program – Awards organizations who are able to make behavioural and operational changes that support capital investment projects, enabling them to grow their energy savings over a number of years

- Existing Building Commissioning Program (coming soon) – this program is designed provide incentives to help owners, operators, and managers of buildings in Ontario improve their energy management, implementing building management best practices that will help reduce energy waste and enhance occupant comfort

TARGET: **Ensure the Board is maximizing all financial incentive opportunities.**

II. Existing Buildings

Introduction

The Facility Services Department, with the full support of the Board, has been engaged in energy conservation measures since the early 1990's through energy partners. The focus behind these energy initiatives was to achieve significant energy savings with a payback period ranging from 7 to 10 years. This allowed energy savings to offset the rising costs of utilities.

In 1999, with the amalgamation of school boards, a new funding formula was introduced to determine School Renewal Allocation. Following the implementation, the Board struggled to find and implement various strategies to manage the increasing building renewal backlog and, due to the aging facilities, increased maintenance and operating costs. With those funding levels, building renewal was only occurring on critical building systems that affected comfort or safety. This was demonstrated by the increasing number of unplanned failures of systems in schools that resulted in lost classroom time for students. No

significant impact could be made on any program-related renewal such as science labs. At the same time, the Board faced an unprecedented increase in electricity costs due to generation limits in the Province of Ontario.

In 2003, the Board approved the "Better Schools Initiative" which saw the Board engage with an energy partner to implement Phase III of the Energy Retrofit Program. This saw a mindset change when looking at energy retrofit programs. The strategic shift was away from solely energy savings to one addressing the Board's highest needs in school renewal. Several school boards had recognized these new opportunities and had adopted aggressive strategies to fund these initiatives with potential energy savings.

The emphasis had shifted from a fast payback with energy savings to a program that positioned the board to better utilize current funding for other board priorities that are critical to the future success of the students. It is a paradigm shift in which energy savings were no longer an end in and of themselves but were used to complement and fund renewal needs over a greater period.

The following chart highlights some of the retrofit work and the resulting energy savings:

Year	Project Cost	Annual Project Savings	Scope of Work	Energy Cost/Sq. Ft (2003)
1992				$1.56
1993/1994 *(Phase I of Energy Retrofit)*	$10,500,000	$1,200,000	Building Controls, Lighting, Water Conservation	$1.32
1999 *(Phase II of Energy Retrofit)*	$1,760,000	$220,000	Portable Controls, Water, Lighting, Steam Traps Retrofits	$1.28
2003 *(Phase III of Energy Retrofit) Partially completed*	$34,578,000	$1,000,000	Replacement of heating systems and terminal units, building controls, washroom fixtures, building envelope	$1.08 (projected)

In the early 2000's, the Ministry of Education started a physical assessment of every school in the Province of Ontario to identify and prioritize all renewal needs.

In 2005, the Ministry of Education announced the first stage of "Good Places to Learn Initiative" as the government's comprehensive plan to improve the environment in which students learn across the province.

Good Places to Learn funding (Phase 1 to 4) which partially funded high and urgent needs allowed the Board to pause the Phase III of the Energy Retrofit Program and funding school renewal through both the Good Places to Learn funding and the School Renewal Allocation.

The Ministry of Education continues to perform a physical assessment of every school in the province in a 5-year cycle (apart from the COVID-19 Pandemic) to update and prioritize all renewal needs.

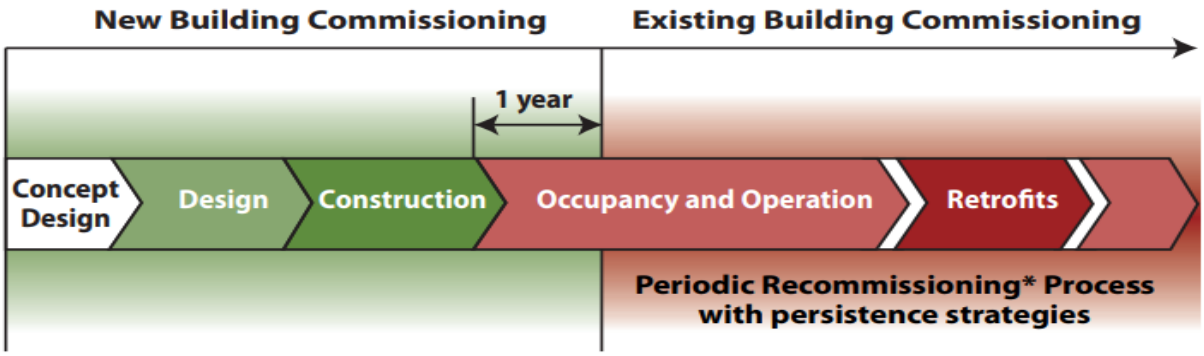
Since 2011, the Ministry has continued to partially fund high and urgent needs through the School Condition Improvement Allocation, in addition to the annual School Renewal Allocation. With the influx of capital funding, the Board moved forward with critical building renewal needs and incorporating energy conservation as part of the work.

Building Recommissioning Program

Changing occupant needs, space reprogramming, building renovations and obsolete systems can wreak havoc on the efficiency of a building's energy-using systems. But these problems can be avoided through recommissioning. Recommissioning (RCx) is a re-optimization process that ensures that existing equipment and systems operate optimally. It provides a rigorous investigative approach to identifying problems and systems integration issues.

Typical measures found during the recommissioning process include fixing ventilation dampers, adjusting chiller operations, aligning zone temperature set-points, eliminating simultaneous heating and cooling, and using persistence strategies such as training, monitoring energy bills, energy management information systems and automatic diagnostics.

Rather than viewing commissioning as a one-time event, it should be viewed as a process that is integrated throughout the building's life cycle. Optimum building performance is maintained by commissioning new buildings or recommissioning existing buildings and then using ongoing commissioning to ensure the persistence of benefits – from initial concept to occupancy. Regardless of the building's phase in its life cycle, it is never too late to start.



* 3 to 5 years, depending on ongoing commissioning rigour and changes in building use.

In anticipation of this work and for new school construction, the Board has pre-qualified commissioning agents and can perform this work on both existing and new buildings.

TARGET: **Continue to implement and optimize the Building Re-commissioning program through all Board buildings on a regular basis.**

Energy Conservation Measures as Part of Building Renovations

Facility Services is committed to energy efficiency, if feasible, when considering renovations and retrofits. Some examples include:

- Air handling replacements incorporating Energy Recovery Technology.
- LED lighting upgrade throughout all schools.
- Heating system replacements with a conversion from steam to hot water.
- Building Envelope upgrades including windows, doors and roofing including increasing roofing insulation values.
- Implementation of Air Source Heat Pumps in HVAC upgrades, where feasible.
- Upgrades to Variable Frequency Drives where feasible.
- Implementation of automated digital controls on Heating, Ventilation and Air Conditioning equipment allowing the Board to schedule their operation based on time of day and switches off the equipment overnight and during weekends and holidays.
- Convert direct gas systems in existing buildings to rely more heavily on electricity or other fuel sources where there is a business case.

TARGET: Consider energy efficiency in all renovations and retrofits

Improved Operations and Maintenance

When energy efficiency is integrated into a facility's operation and maintenance (O&M) program, the Board can reduce energy use without significant capital investment. In addition, efficient O&M strategies:

- Reduce operating costs.
- Reduce the risk of early equipment failure and unscheduled down time.
- Reduce a facility's operating costs.
- Maintain comfort, leading to fewer "hot and cold" complaints.

Some strategies include the following:

- Building equipment and systems should be appropriately calibrated and tuned to run as efficiently as possible, scheduled to run only as needed, and periodically checked to prevent performance drift.
    i. A rigorous O&M re-calibration requires performing a thorough assessment of the current operation and maintenance practices. It systematically looks at all aspects of the current O&M program, and may include spot testing equipment and controls, checking pressures, temperatures, power, flows, and lighting use over time, and reviewing schedules and control strategies to determine whether the building is being operated optimally. For the assessment to be successful, Maintenance staff need to view the process as a means of enhancing and supporting their work and not as a fault-finding activity.
    ii. Once the recommendations for improvements are selected and prioritized, many of them may be implemented very quickly and inexpensively. For example, control strategy or schedule improvements, where the greatest savings often occur, may only take a few hours to implement.

- It is also critical to document the sequence of operation and energy-efficient control strategies for the energy-using systems to understand building control. The control documentation is critical for maintaining energy-efficient operation and effectively troubleshooting operational problems. Once accurate building documentation is obtained, it must be updated to maintain continuity. For example, sensor set-point changes, sensor location changes, and control strategy changes should be documented whenever they occur. If the changes remain in the heads of only one or two staff members, when they leave the organization, the information is lost. Relying on memory can lead to mistakes that cost time and energy.

- Another strategy to ensure energy efficiency is to operate equipment only when needed. The number one way to waste energy is to leave equipment and lights on when they could be off. The payback for improved scheduling is almost immediate. Although individual pieces of equipment may be well maintained and perform efficiently, unless the control strategies and occupant needs are periodically reviewed, equipment may be operating more than necessary. Because many people often have access to lighting and HVAC controls, parameters and schedules may be changed to meet a special need or unusual condition and never get changed back to their original setting unless preventive maintenance procedures for addressing operational issues are in place.

- Although schools have a computerized, energy management system (EMS) in place, they may not take full advantage of the system's capabilities. Staff often use these systems only to turn equipment on and off. These systems can be programmed to accomplish control strategies such as optimal start/stop, air- and water-side economizing, chilled and heating water resets, night setback and setup, night purge, morning warm-up, hot and cold deck optimization, and lighting sweeps. These strategies can save energy dollars beyond ordinary time-of-day control. Newer HVAC equipment may also have sophisticated integral controls that can be programmed to accomplish energy-efficient strategies such as chilled water reset. These integral controls should be programmed and adjusted to take full advantage of energy-efficient strategies.
    i. Equipment may operate very efficiently, but if it's "on" when "nobody's home," the only thing happening is energy waste.

- Typically, the primary goal of the preventive maintenance (PM) plan is reliability and increased equipment life. Buildings often have extensive PM plans, which are rigorously carried out by maintenance staff. However, even if a piece of equipment or a system is meticulously maintained, if it is poorly operated using inadequate control strategies or improper scheduling, vast amounts of energy waste can occur. Also, poor equipment operation can lead to premature equipment failure (for example, short-cycling) and an increase in maintenance requirements. Rather than focusing on component-by-component care, O&M plans should be balanced to address the operation part of O&M as equal in importance to maintenance.

- Redefine preventive maintenance to include activities critical to energy-efficient building operation:
    ii. Perform periodic reviews. As part of preventive O&M planning, perform periodic reviews of HVAC and lighting schedules, temperature set points, and occupant/tenant use requirements to ensure that equipment runs only when needed. Develop procedures to periodically review and monitor EMS time-of-day schedules, optimum start/stop strategies, temperature setups and setback, lock-outs, freeze protection, and other strategies and parameters that stage or turn equipment on and off. Also review and monitor any other on/off controls such as programmable and mechanical time clock settings, integral equipment controls, lighting photocells, sweeps, and occupancy sensors for proper operation.
    iii. Schedule after-hours walk-throughs. A quick walk through the building after hours can be quite revealing. For buildings where equipment should be OFF after hours, managers can detect stray equipment operation by simply entering the building during unoccupied hours and listening for unexpected noise. Building staff should perform an after-hours walk-through once every six months to observe the behavior of heating and cooling equipment,

lighting, and office equipment such as copiers, printers, and computers. Alternatively, staff can use portable dataloggers at the electric panels to track whether equipment is ON when it should not be.

iv. Seasonally adjust control strategies. Just as certain maintenance tasks are performed to prepare equipment for heating or cooling season, control strategies should also be reviewed and adjusted. A good control strategy for cooling season is not necessarily optimal for "swing" season or heating season.

v. Track performance over time. Develop O&M procedures and forms for tracking actual equipment performance against expected performance. Forms may include the task description, checking method and frequency for each piece of equipment, reporting formats, procedures for addressing non-conformance issues and how to resolve performance deficiencies. In many cases the data gathering procedures on equipment performance dovetail nicely with other PM work adding very little staff time for accomplishing the task

At first glance, this list may appear to increase the workload of O&M staff. However, performing these tasks on a regular, proactive basis should actually save staff time in the long run, because preventive maintenance helps to reduce equipment malfunction and occupant complaints. Staff who spend more time on preventive operations generally spend less time "fighting fires" and troubleshooting operational problems.

By redefining the preventive maintenance program to include operational activities that are critical to energy-efficient building operation, staff can help ensure that this efficient performance will continue over time.

TARGET: **Continue to improve operation and maintenance processes to reduce energy usage through strategies such as building and control system assessment and optimizing the preventative maintenance program.**

TARGET: **Research and implement an Operations and Maintenance checklist of common energy saving measures that can be used to optimize**

Monitoring and Metering

A rigorous monitoring and metering program are required for the Board to:

- ensure compliance with the initiatives outlined in the plans and to measure progress and forecast future trends.
- benchmark facilities for performance evaluation and identifying areas of improvement.

- engage the school community in energy conservation and sustainability.
- generate energy incentives from outside funding sources.

The Board's Facility Services is primarily responsible for monitoring progress with regards to the Energy Conservation and Demand Management Plan.

A real-time monitoring and metering system automatically gather energy data from utility meters and reports it in an easy to use format, allowing for energy tracking and identification of top / worst performing facilities.

Ongoing monitoring and metering include the implementation of an Energy Dashboard online and available to schools. This will provide a web-based energy consumption dashboard and benchmarking system that allows schools to see their energy usage in real-time and provides abilities to compare similar school buildings. This can encourage the community to conserve energy and support the development of a culture of conservation.

TARGET: **Implement Real-Time Monitoring and Metering with an energy dashboard.**

III. New Buildings

New Technology

The Board has a long history of constructing energy efficient schools since the early 1990's. Most new schools constructed since that time have appropriate ventilation and air conditioning and they are some of the most energy efficient buildings that the Board operates.

The Board also constructed the Dr. David Suzuki Public School which was given a LEED Platinum Status. LEED stands for Leadership in Energy and Environmental Design. Dr. David Suzuki Public School was the first LEED Platinum School in Canada and continues to lead in energy efficiency through the use of innovative ideas and technologies.

Technologies used at Dr. David Suzuki Public School informed the future of new school construction for the Board in terms of technologies that were effective along with technologies that were not suited or maintainable by a school board. Technologies implemented at Dr. David Suzuki Public School include:

- Daylight harvesting which uses a separate sensor to monitor light levels and turn off interior lighting when daylight can meet the lighting needs of a classroom.

- Sun-pipes are pipes with highly reflective interiors that are intended to bring natural light down into a building interior space. These replace the use of electric lighting during daylight hours. The ability

to bring natural light into the interior of a school not only reduces electrical consumption but provides a brighter more appealing space.

- Sun Tracker is like a sun pipe, but it tracks the sun across the sky maximizing the amount of sunlight in the space.

- Energy Recovery which extracts the energy from the building's exhaust and transfers that energy to the outdoor air being drawn in to ventilate the building. 60% of the cost of heating a school can be attributed to the heating of ventilation air when energy recovery is not in place. Similarly, 33% of the costs of air conditioning a school can be attributed to the costs of cooling ventilation air. Reducing the amount of energy required to condition the outdoor air results in smaller heating and cooling loads, smaller equipment, and lower energy consumption.

- A Green Roof which is a roof of a building that is partially or completely covered with vegetation and soil, or a growing medium, planted over a waterproofing membrane. The Green Roof reduces heating (by adding mass and thermal resistance value) and cooling (by evaporative cooling) loads on a building. It also increases the roof life space as it is not exposed to the elements. It reduces stormwater run-off as it is required to water the vegetation. It filters pollutants and other contaminants out of the rain water as it passes through the growing medium.

- Combating the urban heat island effect is another reason for creating a green roof. Traditional building materials soak up the sun's radiation and reflect it back as heat, making cities at least 7 degrees hotter than surrounding areas. On Chicago's City Hall, by contrast, which features a green roof, temperatures on a hot day are typically 25–80 degrees Fahrenheit (14–44 degrees Celsius) cooler than they are on traditionally roofed buildings nearby.

- A Living Wall (or Plant Wall) which is an interior wall where plants have been rooted from top to bottom, tucked into blocks of a synthetic rooting medium mounted on a metal support frame. From a pool at the base of the wall filled with lava rock, water is pumped upward to percolate back down through the material and carry nutrients to the plant roots. Using plants' natural respiratory properties, the living wall is intended to cool the building air in summer and work like a humidifier in winter.

- Solar Wall that preheats air for use in ventilation unit.

- Earth Tubes preheat the air for use in a ventilation unit. Used in the Gymnasium.

- Daylight from two sources in 75 % of the occupied spaces. Glass sizes are predetermined to meet credits required for daylighting and vision. Glass is almost floor to ceiling in all classrooms and at a higher level in the gym.

- Storm water retention on site through a bio-swale system. Part of landscaping. Most of the storm water will be held on site and allowed to percolate back into the ground. Only excess water in a 5-year rain will be allowed to flow into the city storm sewer.

- Wind generator. Two horizontal axis wind turbines that generates 2.4 kw of renewable energy for use at the school.

- Highly Reflective Surfaces. Highly reflective concrete is used in the front of the school and the parking lot. Playground hard surface will be asphalt. Highly reflective white roof will be used over entire roof surface except the green roof area.

- Naturalized Landscaping uses only indigenous plants.

Ontario Building Code

Within the Ontario Building code (OBC), there are requirements for how energy efficient a building must be. These requirements include specifications for the required thickness of insulation, maximum number and size of windows, and how efficient new mechanical systems must be.

Depending on the location of the building project, the engineer must determine what type of heating system they plan to use, electric, or fossil fuel. Requirements for how much insulation is required and what type of windows that can be used are based on the heating system and its efficiency.

The Ontario Building Code also mandates a window to wall ratio (WWR) for the project. This common metric is used to identify how much of the “wall” surface is window and how much is the wall. If the WWR is less than 17% WWR the next steps are relatively simple.

Once the mechanical system, location, and WWR are determined, the Ontario Building Code delineates the project's energy efficiency requirements using a prescriptive compliance package.

Some of the building methods, materials and equipment used in the current construction of schools include:

- Better building envelope construction – this includes much more energy efficient windows, insulation and wall construction that minimizes any heating or cooling losses.

- LED lighting – this has now become a standard for all new construction which the most energy efficient product that can be purchased at this time. Also, costs for these fixtures have made them viable as a standardized product in all new schools. The added benefit is the heat generated by these types of lights is minimal and therefore less energy is used to cool the space.

- Energy efficiency HVAC systems including:
    i. Where possible, the separation of heating, cooling and ventilation. In typical construction, HVAC systems can provide all three elements in one system. Unfortunately, this ensures that more energy is used because the volume of air required to heat or cool a space is much larger than the ventilation needs. This results in increased energy consumption to heat or cool that volume of air. The Board continues to look for opportunities to, at a minimum, ensure the heating system is separate from any cooling or ventilation system. This is important because during the winter, heating may be required during off-hours and it is more energy efficient to provide that heating without turning on larger pieces of equipment.
    ii. The inclusion of Energy Recovery in all new HVAC units. This allows the unit to remove energy from the exhaust air and transfer it to the incoming outdoor air which will pre-heat or pre-cool the air.
    iii. The implementation of energy efficient motors and pumps with variable frequency drives. A variable frequency drive controls the speed of a motor by varying the frequency supplied to the motor. This ensure that only the required energy is used by the motor. This impacts motors on all HVAC systems.
    iv. Ensuring the HVAC systems in the school are sized to match the required load for heating and cooling. Minimizing redundancy in these systems allows them to work more efficiently without continual cycling of equipment.

- Occupancy sensors for lighting in the school. This ensures that lights are off when the rooms or spaces are not occupied. This also allows for the control of the ventilation system based on the occupancy of the space.

- The specification of hot water boilers for heating that can be over 95% energy efficient.

- Load reduction controls which turn off electrical plugs at the end of the day as required by the building code.
- Consideration of a highly reflective roofing material which minimizes the amount of that the building absorbs.

TARGET: **Develop building construction standards that identify measures to reduce energy use, GHG emissions and total cost of building ownership through the operational life of buildings.**

TARGET: Work with and support building design teams to achieve the best possible performance and provide direction on the Board's future

IV. Energy Supply

Ontario Energy Market

The Ontario energy market is deregulated for both natural gas and electricity. Deregulation indicates the Board must procure electricity and natural gas on a commodities exchange and be exposed to the pricing of the commodity at the time of purchase. This is further complicated by the fact that the commodity itself is one of several energy costs incurred by the Board in procuring energy.

In the early 2000's, with deregulation on the horizon, the Catholic School Board Services Association, lead an initiative to unite school boards in the procurement of electricity to increase the buying power of the group. Over 60 school boards joined the consortium and a third-party energy consulting firm was hired to advise the group and complete any transaction for the procurement of electricity.

In 2005, due to the inadequacy and age of electricity generation in the province, the government began offering long-term, fixed-price contracts at above-market rates for incentivize new generation.

To cover the difference between electricity's market rate and the rates being paid to new generators, the government introduced the Global Adjustment. The Global Adjustment charge works inversely to the market rates for electricity. If the Board procures electricity at a lower rate, the Global Adjustment rate must go up to compensate. Therefore, since that time, it has not been feasible to enter into any fixed contracts for the procurement of electricity as the Board would pay more over time.

Natural Gas has been deregulated since 1985 and the Board has been part of a consortium since that time. The consortium works with a third party energy consulting firm to advise the group and complete any

transactions for the procurement of natural gas. independent consultants to determine optimal utility price.

With the abundance of natural gas from shale ground formations, the price of natural gas has seen some extremely low numbers since the mid-2000's. This has prompted the Board to continue to procure gas on the commodity market. Unfortunately, the past several years has seen significant world events impact the natural gas markets including global warming and the war between Russian and Ukraine. However, pricing in the 6 months seems to be stabilizing.

TARGET: **Continue to work with the Board's third-party energy consulting firm to minimize the impact of market pricing on the Board's utility costs.**

TARGET: Continue with the action items as outlined in the Energy Conservation and Demand Management Plan (see Appendix)

V. Waste Management

Waste Audits and Waste Reduction Work Plans

To better comply with Ontario Regulation 102/94: Waste Audits and Waste Reduction Work Plans and Ontario Regulation 103/94 Industrial, Commercial and Institutional Source Separation Programs under the Ontario Environmental Protection Act R.S.O. 1990, c. E.19, the GECDSB will conduct annual waste audits at 10 of our facilities each fall. Though the regulation states that buildings with less than 350 students are not required to complete an audit, the board believes it is important to include these buildings to have better proportional representation of its school community.

In 2021, Facility Services began working to better understand the volume and types of waste created by working with an outside agency to complete these audits. This is a lengthy process wherein waste and recycling are collected building-wide for a period of 24 hours and pooled based on the functional area it came from (ex. classroom, office, etc.). Once all waste is collected, it is sorted, weighed, and subdivided to get a full picture of daily activity in a building.

In examining the 2022/2023 school year waste audits, the Board is producing an average of 78.26 kg's (172.5lbs) of waste per school, per day. The chart below details the composition of waste at each individual school during the most recent audit along with the averaged total.

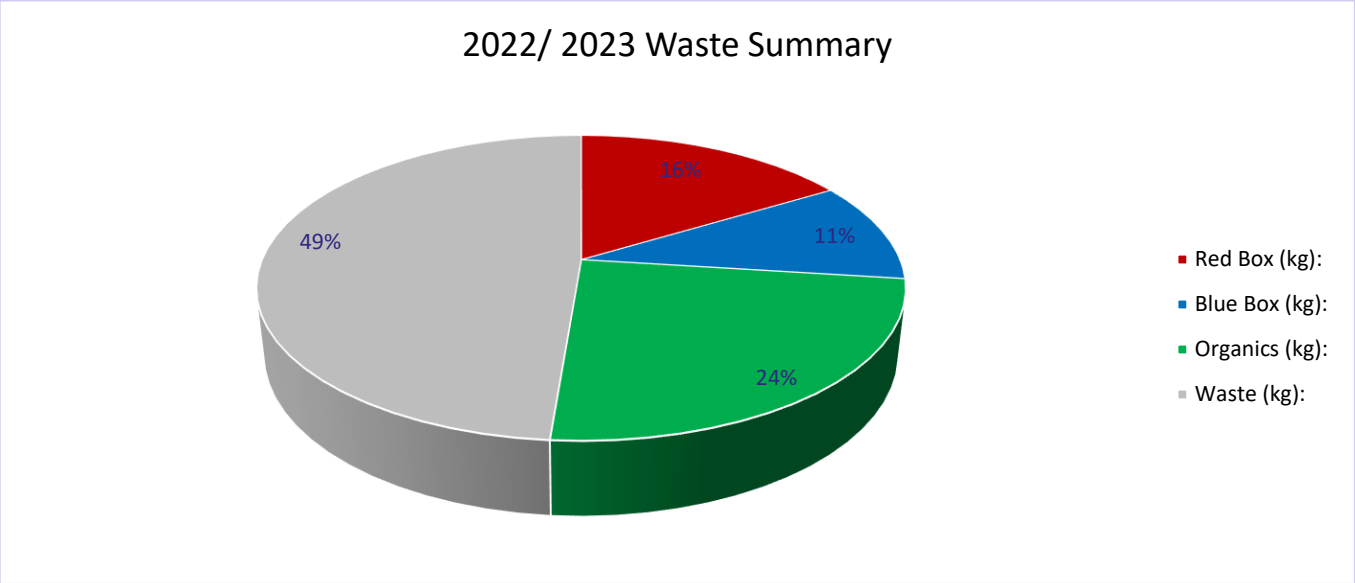
School:	Red Box (kg):	Blue Box (kg):	Organics (kg):	Waste (kg):	Total Weight (kg):	Diversion Rate:
Elementary School 1	2.96	1.11	7.01	15.84	26.92	15.12%
Elementary School 2	14.1	10.33	28.93	30.38	83.74	29.17%
Elementary School 3	19.04	9.85	21.34	33.43	83.66	34.53%
Elementary School 4	14.86	8.33	12.15	40.59	75.93	30.54%
Elementary School 5	2.94	10.03	26.9	27.48	67.35	19.26%
Elementary School 6	23.92	9.5	23.51	40.38	97.31	34.34%
Elementary School 7	10.39	0	31.56	22.9	64.85	16.02%
Secondary School 1	19.45	22	12.24	97.7	151.39	27.38%
Secondary School 2	7.68	3.74	7.31	34.46	53.19	21.47%
Total	115.34	74.89	170.95	343.16	704.34	NA
Average	**16%**	**11%**	**24%**	**49%**	78.26	**27%**

In addition to understanding the volume of waste generated, the waste diversion rate is a critical component of a waste audit as it is the primary metric employed to determine performance of the overall diversion program. It is the percentage of the total waste stream diverted from landfill. The Ministry of Environment, Conservation and Parks (MECP) has determined the calculation rate to be as follows:

Waste Diversion Rate = Total Waste Diverted ÷ Total Waste Generated * 100.

At this time, for our area, waste diverted refers to the red box and blue box as organic collection is not currently provided. As seen in the chart above, we are actively diverting just over 27% from landfill, falling short of the provincial waste diversion target of 60%.

Looking at GECDSB waste as an average of all our sites, it is understood that 73% of our consumables are destined for landfill, of which, 24% is food waste. The remaining 27% of consumables are diverted from landfill into either the red box or blue box for recycling.



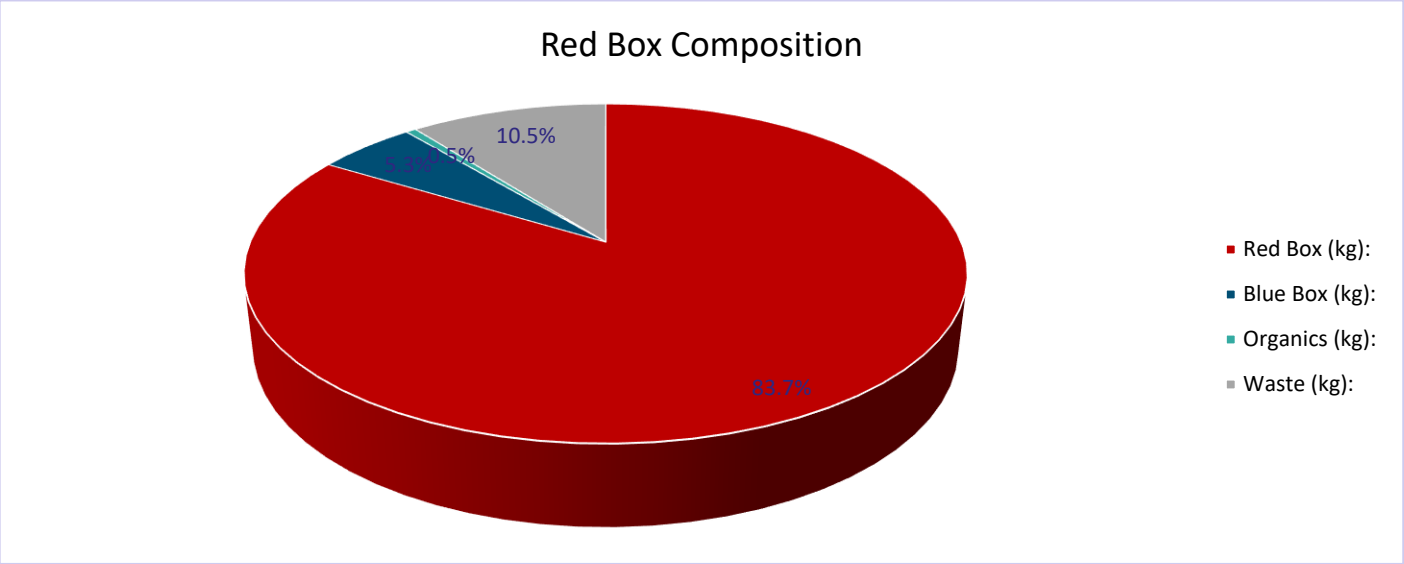
TARGET: **Increase waste diversion rate from an average of 27% to an average of 35% (2024)**

Contamination of the waste streams is another area of improvement to focus on. We calculate contamination of a waste stream by adding the total weight of categories that should not be present and dividing it by the total weight of that waste stream. For example:

Red box contamination = (Blue Box + Organics + Waste) ÷ Total Weight of Red Box * 100

The charts below detail the composition of the red box waste.

School:	Red Box (kg):	Blue Box (kg):	Organics (kg):	Waste (kg):	Total Weight (kg):	Contamination
Elementary School 1	2.6	0.1	0	0.26	2.96	12%
Elementary School 2	12.56	1.02	0	0.52	14.1	11%
Elementary School 3	16.36	1.66	0.07	0.95	19.04	14%
Elementary School 4	12.37	0.69	0.2	1.6	14.86	17%
Elementary School 5	2.73	0.05	0	0.16	2.94	7%
Elementary School 6	17.05	0.64	0.26	5.97	23.92	29%
Elementary School 7	9.69	0.03	0	0.67	10.39	7%
Secondary School 1	9	1.3	0.05	0.6	10.95	18%
Secondary School 2	7.01	0.13	0	0.51	7.65	8%
Total	89.37	5.62	0.58	11.24	106.81	NA
Average	**83.7%**	**5.3%**	**.5%**	**10.5%**	**11.87**	**16.3%**



Looking at the information detailed above, it is understood that across board owned sites, on average, 14 % of the red box stream is contaminated with materials that should have ended up in an alternative waste stream. This contamination is comprised of roughly 5.3% blue box, .5% organics, and 10.5 % waste.

TARGET: **Reduce red box contamination from an average of 14% to an average of 5% (2024)**

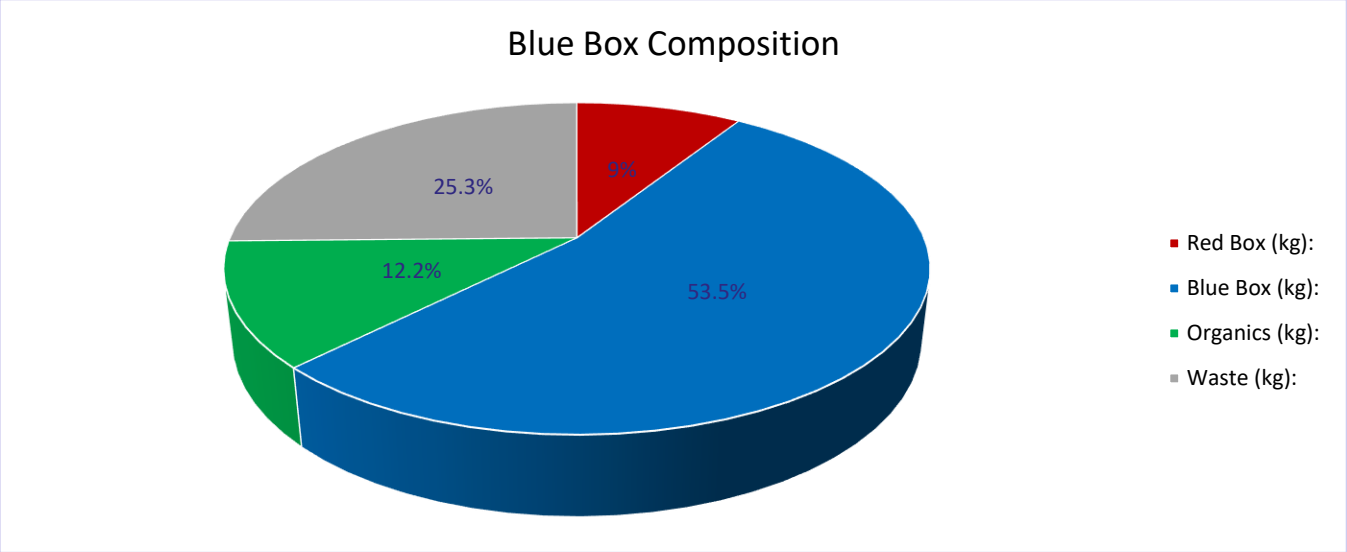
Like the red box, Facility Services calculated contamination of the blue box stream by adding the total weight of categories that should not be present and dividing it by the total weight of the waste stream. For example:

Blue box contamination = (Red Box + Organics + Waste) ÷ Total Weight of Blue Box * 100

The charts below detail the composition of our blue box waste.

School:	Red Box (kg):	Blue Box (kg):	Organics (kg):	Waste (kg):	Total Weight (kg):	Contamination
Elementary School 1	0.01	0.86	0.01	0.23	1.11	23%
Elementary School 2	0.95	5.83	0.45	3.1	10.33	44%
Elementary School 3	0.7	4.1	2.73	2.32	9.85	58%
Elementary School 4	0.74	3.99	1.7	1.9	8.33	52%
Elementary School 5	0.21	5.14	1.43	3.25	10.03	49%
Elementary School 6	1.15	5.2	1.35	1.8	9.5	45%

Elementary School 7	0	0	0	0	0	No recycling present
Secondary School 1	2.76	11.75	1.25	6.24	22	47%
Secondary School 2	0.26	3.18	0.19	0.11	3.74	15%
Total	6.78	40.05	9.11	18.95	74.89	NA
Average	**9%**	**53.5%**	**12.2%**	**25.3%**	**8.32**	**46.5%**



Looking at the information detailed above, it is understood that across board owned sites, on average, 46.5% of the blue box stream is also contaminated with materials that should have ended up in an alternative waste stream. This contamination is comprised of 9% red box, 12.2% organics, and 25.3% waste.

TARGET: **Reduce blue box contamination from an average of 46.5% to an average of 20% (2024)**

Downstream once the materials are taken by the municipal service, if there is too much contamination, the recycled material cannot be bundled, and broken down for re-use. If there is too much contamination, the recycling is rejected and will end up going to landfill. This is why choosing the correct bin is so important.

TARGET: **Complete 10 waste audits per school year in October**
TARGET: **Encourage individual schools to complete their own waste audits by leveraging the EcoSchools program.**
TARGET: Ensure all schools are posting their waste audit publicly beginning in September 2023
TARGET: Provide opportunities for schools involved in the waste audit with benchmarking opportunity- December 2023

Single Use Plastics

In 2018 the Board decided to act as it related to our over-use of single use plastics as a school board. The Board was aware that there would be changes coming Canada-wide and wanted to proactively begin reducing or eliminating unnecessary plastic form our internal supply chain. In October 2020, Prime Minister Trudeau announced a federal ban of single-use plastic products. A discussion paper was released outlining the proposed plan to eliminate 6 categories of single-use plastic products, with a regulation to be finalized by the end of 2021. The six items being eliminated were shopping bags, stir sticks, six pack rings, plastic cutlery, straws, and food packaging made from hard-to-recycle plastics. All items identified in the federal ban were included in our strategy along with plastic water bottles.

Once all items were identified for elimination from the GECDSB supply chain, target dates for removal were assigned.

Item	Included in Federal Legislation	Target Elimination Date
Styrofoam	Yes	January 1, 2021
Straws	Yes	September 1, 2021
Stir Sticks	Yes	September 1, 2021
Shopping Bags	Yes	September 1, 2021
Water bottle beverages	No	September 1, 2021
Plastic Cutlery	Yes	January 1, 2022
Take-out Containers	Yes	January 1, 2022

To achieve all elimination dates there was a single-use plastics committee formed, that included a cross-functional representing programming, facilities, procurement, and business teams along with support at the Superintendent level.

Area	Action	Completion Date
Program	Infographic on curriculum connections	January 2021
Program / Facilities Services	Staff survey	January 2021
Program / Facilities Services	Student Survey	January 2021
Purchasing	RFI for alternative products	March 2021
Program	Assessment of all program kits	Spring 2021
Business	Removal of bottled water from vending machines	Spring 2021
Facilities Services	Conduct waste audit	August 2021
Purchasing	Collaborate with food service providers	September 2022
Purchasing	Remove identified items from Webstock	September 2021
Program	Update all program kits for alternative products	September 2021
Facilities Services	Installation of additional bottle filling stations	December 2021
Business	Develop Policy, Regulation and Administrative Procedure	June 2023

By the end of 2021, the Board produced a list of action items to support the transition to a plastic-free supply chain. To gain buy-in and foster awareness within our community, an infographic was circulated to all education staff to share curriculum connections. Additionally, a survey was sent to staff and students to gauge awareness of the use of single-use plastics which received almost 2000 responses, a 50/50 split between the two groups.

Purchasing has sourced alternative products where plastic was strictly used in the past, such as biodegradable cutlery, paper straws and re-useable ice packs. The internal ordering system, Webstock, has been updated to reflect the changes and the previously available items can no longer be ordered. A new contract for cafeteria services has been implemented, which contains green requirements from the service provider.

The Program Department has assessed all school program kits and removed single use plastics and successfully added alternative resources. These kits are continually updated with environmentally sustainable products.

Other updates include the installation of over 278 bottle fill stations that was paid for through funding received from the federal government's Resiliency Infrastructure Program, and an assessment of vending machines has begun for the removal of bottled drinking water from machines, given that all school sites now have water bottle refilling stations.

TARGET: **Post results of first-round single-use-plastics reduction**
TARGET: **Evaluate opportunity for second round or single-use-plastic reduction (November 2023)**
TARGET: **Complete a second round of single-use-plastic reduction in 2023/2024 school year.**

Organic and Food Waste

According to the Food and Organic Waste Framework put forward by the Government of Ontario, the Industrial, Commercial and Institutional sectors present some of the best opportunity to increase resource recovery and help foster a circular economy. This is due to two components- recovery costs in this sector being lower than that of the residential sector and scalability.

As the province prepares to amend the 3R's Regulations to include food and organic waste, and as our local Essex Windsor Solid Waste Authority prepares for municipal collection in 2025, we need to begin understanding what this will look like for our buildings, and how to appropriately set up on-site collection. This should include:

- A detailed analysis of collection costs, including required equipment (e.g., carts and minibins or new outdoor storage),
- Benchmarking the programs of other school boards where municipal collection is already in place,
- An understanding of the workload and division of responsibilities in an individual school, and
- Evaluation of opportunities for the parent community to get involved.

Though often used interchangeably, food waste refers to the edible parts of plants and animals produced or harvested but not consumed, while organic waste refers to the inedible parts of plants and animals, as well as other organic material that may be processed alongside food waste. According to the National Zero Waste Council, in 2022, 63% of the food thrown away by Canadians could have been eaten. This means that for the average Canadian household, 140kg (308lbs) of food is wasted per year. In our schools, as identified by the annual waste audits, 24% of our waste each day is food waste. Without an organic and food waste diversion program, the Board is unlikely to ever achieve the provincial target of 60% waste diversion from landfill.

TARGET: **Continue open and transparent conversation with the Essex Windsor Solid Waste Authority and local municipalities to understand what organics collection will mean for our schools**

TARGET: **Benchmark with other schools in the province where organics collection is already in place (Fall 2023)**

TARGET: **Run an organic collection pilot with two elementary schools and one secondary school in (Spring 2024)**

Construction Opportunities

GECDSB is continually working with our vendors to investigate alternative approaches to necessary construction and maintenance on our properties. Currently, we are considering the following:

- BAE Removal/ Replacement:
    i. Specialized milling machine shreds the existing track in place while strengthening/conditioning the shredded remains with concrete paste, wetting and packing it to give it as strong a base as you would achieve following the standard approach.
    ii. The base can be prepared in about 1 to 1.5 days.
- Roof restoration:
    i. The process of restoring a roof allows the existing membrane/ assembly to remain in service, eliminating landfill waste.

ii. The materials are treated and re-sealed adding longevity to the materials.
iii. The process can be completed up to 3x total.

TARGET: **Explore opportunities to implement waste reduction during construction and maintenance activities.**

VI. Behaviour Change

Implementation of Engagement Program

Occupant behaviour is another area the Board will strive to improve. To further educate staff and students on waste management the Board will focus on:

1. Improving and measuring schools' participation in the Environmental Stewardship Program.
2. Inspire and motivate participation in the Environmental Stewardship Program, and
3. Develop an Eco recognition program for schools.

Specifically looking at the 2022/2023 school year, two Environmental Stewardship Teachers, with the support of a Teacher Consultant, ran a pilot in two families of schools- Belle River (Belle River PS, Lakeshore Discovery, Centennial Central) and Walkerville (Walkerville Collegiate, King Edward, Prince Edward, Begley, Hugh Beaton). These pilot programs ran Monday through Thursday and included safe, rich, engaging workshops, assemblies, audit presentations, monitors/Eco club training and wildlife visits aimed to heighten interest, confidence, understanding of concepts, and excitement for Environmental Stewardship and Outdoor Education (K-12).

Climate in the Curriculum and Promoting Outdoor Learning

GECDSB continues to develop hands-on presentations for schools and classrooms regarding Wildlife, Invasive Species and Habitat Conservation. Where possible, climate related educational resources and learning tools were provided for teachers. The goal is to integrate a minimum of one climate-related activity in every course for example, examining nature motifs in literature in a language course or, assessing the impact of information and communication technology on personal health and the environment in a business course. Through partnerships with local conservation authorities (ERCA), we provide experiential outdoor learning starting in kindergarten and extending through grade 12.

Since 2004, each fall and spring, The Environmental Stewardship Program runs the Fighting Island Outdoor Education Program which is funded by the Ontario Outdoor Education Grant and Eco-Schools budget. BASF, with the Greater Essex County District School Board, turned the island into an outdoor classroom, providing a hands-on learning environment that has hosted over 30,000 local students. Each educational program

relates to one of the island's habitats and encourages students to use problem solving and critical thinking skills. The Fighting Island program has cross-curricular connections with mathematics, physical education, geography, and art. The visits are open to K-12 students that explore comparison studies where students take on the role of researchers. Experiential hands-on learning is practical and allows students to make contributions to the island through their studies. Students explore the natural habitat, make observations, and collect data that is helpful for wildlife habitat certification. The students leave the island with so much gratitude for this unique outdoor education experience.

With the vision to continue this one-of-a-kind opportunity, our elementary and secondary students benefit from a STEM learning experience. Educational activities are structured around a practical experiment-based approach using the island's habitats as the basis for cultivating problem-solving and critical thinking skills. BASF's work on Fighting Island has added value to the community while preserving and enriching the environment for wildlife. BASF believes stewardship and sustainability practices play a key role in protecting habitats and fostering biodiversity. BASF's support of our outdoor educational program builds environmentally and socially responsible students which aligns with our board mission.

The fieldtrips to Fighting Island contribute to the Wildlife Habitat Council certification. Our students conduct research in the form of Species Inventories: Part of a good Wildlife Management Plan where students track the diversity and abundance of species that are on the island. This will allow students to identify how the wildlife projects have impacted the biodiversity on the island over time.

Promote Environmental Student Leadership

To achieve our goal of becoming an environmental stewardship leader in our community, each school is expected to assemble a staff supported, student-led environmental group, sustainability committee or eco-team. These teams must have at least two Eco Champions comprised of 1 student minister, 1 staff climate action representative to assist in the student driven initiatives of the eco-team.

The responsibilities of the Eco Team include, but are not limited to these aspects of the EcoSchools program:

- Setting a minimum of one SMART goal from each of the ten phases of the Climate Change Action Plan. This will be documented in an annual Student Action Plan.
- Documenting the progress of the goals outlined in Student Action Plans.
- Communicating the progress of the goals outlined in the Student Action Plan.
- Contributing to their school's annual report about their school's climate action that will be shared on the school's website.

These reports include all details of the school's initiatives (resources, communication of activities and promotion) and state the ongoing eco-challenges for staff and student. It is recommended that this information is presented at a school assembly in September and announcements and informational posters are displayed throughout the year detailing progress towards completion.

Engagement

To engage with those who are part of our school communities, mini workshops have been held with parent council to educate the school community about energy conservation, waste minimization and reducing the carbon footprint. Families, community organizations and local climate action advocacy groups are invited to participate in our school campaigns and provide feedback.

For educators, the Program Department hosts ongoing professional development about climate change and environmental education. At a minimum, there is one climate-based professional development workshop on a Professional Activity Day every year. To broaden the way environmental topics are approached by educators, the Program Department ensures that these development sessions include feedback and development from an interdisciplinary team. To date, GECDSB has covered topics such as Indigenous connections to the environment (Indigenous Inclusion), climate change and mental health (Connecting Climate Change to Mental Health), and outdoor and experiential learning (Promoting Outdoor Learning) through both in person professional activity training and online modules.

TARGET: **Improve the recycling habits and reduce contamination in recycling streams.**

TARGET: **Select two new families of schools for pilot.**

VII. Fleet

Canada has mandated at least 20 per cent of car sales to be electric vehicles by 2026, however, questions if the goal is realistic given supply levels and charging infrastructure.

The federal government has said that there will be penalties for manufacturers and importers that do not meet the 20 per cent sales target. After 2026, the government is aiming for 60 per cent of sales to be EVs by 2030, with all sales being electric by 2035.

The Board currently owns 52 gas-powered vehicles as the infrastructure to support electrical vehicles is not available at any Board site at this time.

TARGET: **Increase the efficiency of the Board's fleet through procurement of right sized, high efficiency, and electric vehicles and motorized equipment wherever possible.**
TARGET: **Explore opportunities for Electric Vehicle Charging stations at each school.**

VIII. Procurement

Sustainable Procurement

It is the policy of the Greater Essex County District School Board ("Board") to procure goods, services, and construction necessary for the operation of schools and other offices in an environmentally responsible, efficient, and cost-effective manner.

Sustainable procurement incorporates an additional layer in the acquisition of goods and services in which environmental factors, such as the avoidance of depleting natural resources and support of climate change, are considered in procurement decisions. Specifically, sustainable procurement supports partnering with suppliers who value and actively model CO2 reductions, alternative energy selections, protection of eco-systems, pollution reduction and waste management.

Examples in which the Board might practice sustainable procurement includes:

- Purchasing renewable energy;
- Selecting local suppliers to cut down on transport emissions;
- Selecting products using post-consumer recyclable materials (e.g., paper) or less packaging;
- Use suppliers who actively value environmental protection and social responsibility (including Indigenous suppliers)

The concept of sustainable procurement supports the Board's mission, vision and strategic priorities by focusing on the future by building tomorrow together with our students, staff, community partners and suppliers, as well as actively demonstrating ethical stewardship through thoughtful and intentional use of financial, human, environmental and community resources. The declaration of a climate emergency is only the first step in the process of making meaningful change.

Implementing sustainable procurement in the Board's procurement policy, regulation and practices may lead to several benefits:

- Enhanced public perception of the Board, highlighting its commitment to fighting climate change;
- Differentiation of the Board from the coterminous boards;
- Measurable reductions in waste and carbon footprint;
- Opportunities to develop new partnerships with existing and new suppliers as well as use new products and / or services;
- Model social responsibility by considering local suppliers, including Indigenous suppliers.

TARGET: **Review the Board's procurement activity to identify potential suppliers and services to be considered for sustainable procurement (2023-24).**

TARGET: **Develop Key Performance Indicators to measure environmental and sustainability factors of suppliers (2023-24).**

TARGET: **Revise the Procurement Policy and Regulation (BA-01) to incorporate sustainable procurement (2024-25).**

TARGET: **Phase-in sustainable procurement (2024 onwards).**

TARGET: **Develop regular reporting to the Board of Trustees and stakeholders on the impact of sustainable procurement. (2024 onwards)**

Implementation of sustainable procurement will not come without challenges. Participation of suppliers who value the environment and sustainable procurement will be critical. Developing key performance indicators / measures on what constitutes sustainable procurement performance will also need to be established to ensure both transparency and fairness in the procurement process. Compliance with all trade agreements and Broader Public Sector Procurement directives will also need to be followed.

Repurposing Furniture and Equipment

In conjunction with the development of the annual budget, a minor amount of funding is available to schools for the replacement of furniture and equipment. The age and condition of the furniture and equipment is considered in the determination of the allocation of funds.

As new schools are constructed, construction budgets have typically allocated an amount for new furniture and equipment to outfit the new school. As existing schools are closed, furniture and equipment are assessed for damage, and wear and tear, and items designated for re-use are stored at a board facility for eventual reuse in the system.

Consistent with the Board's strategic priority for ethical and responsible use of its resources, replacement of furniture and equipment will be initially contemplated through the reuse of existing items. This was introduced with the 2023 Furniture Replacement Program announced to the system in April 2023. Going forward, new furniture and equipment will be procured if the item(s) required cannot be fulfilled through existing stock. In doing so, the Board is reducing the amount of potential waste generated from the surplus stock of furniture and equipment and may reduce expenditures, resulting in funding that can be redeployed elsewhere in the system.

TARGET: **In new school construction and building additions, utilize surplus furniture and equipment, where available and in good condition (2023-24).**
TARGET: **Repurpose surplus furniture and equipment as part of the annual Furniture Replacement Program, where available and in good condition (2023-24).**

IX. Complimentary Opportunities

Active Transport

The Active Transportation Committee began approximately 2 years ago as an initiative with local agencies/ organizations including the Windsor Police, the Windsor Essex Health Unit

and County Wide Active Transport System (CWATS). Initially involving a pilot of 5 schools (Northwood, Dr. David Suzuki, MD Bennie, King Edward and Talbot Trail), the program has now doubled to 10 sites (LaSalle, McWilliam, West Gate, Southwood and James L Dunn). As part of this initiative, a Green Canada Grant of $75,000 was received and put towards the purchase of bicycle racks, survey completion, and painting crosswalks to encourage participation. To determine where the funds would be used most effectively, bike-ability and walkability assessments were completed for each individual school community.

TARGET: **Continue to support active transportation opportunities at our schools.**

Renewable Energy

The Board currently owns 4 roof-top solar panel systems (TVA, SSS, Suzuki, Ford City). TVA, SSS and Suzuki are under contract with the Government of Ontario through a Feed-In Tariff program that was available at the time the systems were constructed. These systems generate electricity for which the Board receives compensation. The Board also licenses roof top space to a third-party vendor who operates solar panel systems on 26 schools for which the Board receives approximately $200,000 annually again through the Feed-In Tariff program. The term of these contracts expires in 10 years.

TARGET: **Continue to explore renewable energy opportunities at schools.**

6. Targets and Timelines

GHG Inventory:

#	Target	Timeline
1.	Complete GHG accounting for 2022/2023 year to establish baseline data for reduction targets.	Fall 2023

Policy:

#	Target	Timeline
1.	At each policy and regulation renewal, critically assess policies and regulations from a climate lens perspective.	Fall 2023 On-going
2.	Provide climate education and awareness communications and / or training to trustees, senior administration and school administration.	Fall 2023
3.	Introduce sustainability pledges in all schools.	Fall 2023
4.	Request each school to nominate an Environmental Champion.	Fall 2023
5.	Grow Eco School participation by 2 schools.	2023/ 2024
6.	The Board continues to comply with Ontario Regulation 24/23 and ensure energy conservation measures are captured in the ECDMP along with energy reduction targets.	On-going
7.	Ensure the Board is maximizing all financial incentive opportunities.	On-going

Existing Buildings:

#	Target	Timeline
1.	Continue to implement and optimize the Building Re-commissioning program through all Board buildings on a regular basis.	Start summer of 2024 with 5-year implementation goal
2.	Consider energy efficiency in all renovations and retrofits	Implemented and ongoing
3.	Improve operation and maintenance processes to reduce energy usage through strategies such as building and control system assessment and optimizing the preventative maintenance program	Start September 2024 with 1 year implementation plan
4.	Research and implement an Operations and Maintenance checklist of common energy saving measures that can be used to optimize energy opportunities	Spring 2024
5.	Implement Real-Time Monitoring and Metering with an energy dashboard	2024/ 2025

New Buildings:

#	Target	Timeline
1.	Develop building construction standards that identify measures to reduce energy use, GHG emissions and total cost of building ownership through the operational life of buildings.	2024/2025
2.	Work with and support building design teams to achieve the best possible performance and provide direction on the Board's future performance targets	Existing proces On-going

Energy Supply:

#	Target	Timeline
1.	Continue to work with the Board's third-party energy consulting firm to minimize the impact of market pricing on the Board's utility costs	Existing process On-going
2.	Continue with the action items as outlined in the Energy Conservation and Demand Management Plan (see Appendix)	Next release Spring 2024

Waste Management:

#	Target	Timeline
1.	Increase waste diversion rate from an average of 27% to an average of 35%	2024
2.	Reduce red box contamination from an average of 14% to an average of 5%	2024
3.	Reduce blue box contamination from an average of 46.5% to an average of 20%	2024
4.	Complete 10 waste audits per school year	October 2023
5.	Encourage individual schools to complete their own waste audits by leveraging the EcoSchools program	Fall 2023
6.	Ensure all schools are posting their waste audit publicly on individual websites	Fall 2023
7.	Provide opportunities for schools involved in the waste audit with benchmarking opportunity- December 2023	December 2023
8.	Post results of first-round single-use-plastics reduction	Fall 2023
9.	Evaluate opportunity for second round or single-use-plastic reduction	November 2023
10.	Complete a second round of single-use-plastic reduction	Spring 2024
11.	Continue open and transparent conversation with the Essex Windsor Solid Waste Authority and local municipalities to understand what organics collection will mean for our schools	Ongoing
12.	Benchmark with other schools in the province where organics collection is already in place	Fall 2023

13.	Run an organic collection pilot with two elementary schools and one secondary school	Spring 2024
14.	Explore opportunities to implement waste reduction during construction and maintenance activities.	Fall 2024

Behaviour Change:

#	Target	Timeline
1.	Improve the recycling habits and reduce contamination in recycling streams.	2023/2024
2.	Select two new families of schools for pilot.	Fall 2023

Fleet:

#	Target	Timeline
1.	Increase the efficiency of the Board's fleet through procurement of right sized, high efficiency, and electric vehicles and motorized equipment wherever possible.	2025/2026
2.	Explore opportunities for Electric Vehicle Charging stations at each school.	Spring 2024

Procurement:

#	Target	Timeline
1.	Review the Board's procurement activity to identify potential suppliers and services to be considered for sustainable procurement	2023/2024
2.	Develop Key Performance Indicators to measure environmental and sustainability factors of suppliers	2023/2024
3.	Revise the Procurement Policy and Regulation (BA-01) to incorporate sustainable procurement	2024/2025
4.	Phase-in sustainable procurement	2024 Onwards
5.	Develop regular reporting to the Board of Trustees and stakeholders on the impact of sustainable procurement	2024 Onwards
6.	In new school construction and building additions, utilize surplus furniture and equipment, where available and in good condition	2023/ 2024
7.	Repurpose surplus furniture and equipment as part of the annual Furniture Replacement Program, where available and in good condition	2023/2024

Complimentary Opportunities:

#	Target	Timeline
1.	Continue to support active transportation opportunities at our schools.	Ongoing
2.	Continue to explore Renewable Energy Opportunities at schools	Ongoing

7. Communication

Pre-promotion/Education

In early 2022, the GECDSB announced the climate emergency declaration on our website, social media platforms and EDSBY.

Distribution of Completed Plan

In order to achieve the expected outcomes, staff, students, parents/guardians and the community need to be informed as the work is being completed and educated on how they can contribute to the success of the plan. The GECDSB has access to several forms of communication that will help us achieve these goals:

Lobby Screens

Most GECDSB schools now have a lobby screen that can be used to share information with their school communities. In addition, the GECDSB can push news items and information down from the Board office so it appears in all school lobbies.

EDSBY

The EDSBY River of News is available to the Communications Officer, Administrative Assistants and Senior Administration to share information and announcements board-wide.

Website

A section of the website will be built to store the Climate Action Plan and provide updates on its progress.

Social Media

Twitter, Facebook, Instagram and YouTube are available to share information with the community-at-large.

News Release

News releases can be distributed when noteworthy aspects of the Climate Action Plan are put into place or completed. Designated members of the Climate Action Committee can be available to speak to the media about the work.
Other communication tactics such as videos, interviews and infographics will be used to introduce and update students, staff, parents/guardians and the community on the Climate Action Plan.
The GECDSB Communications Office will also design a logo and branding for the Climate Action Plan.

Communication Updates

An annual report will be provided to the Trustees each June, providing an update on climate action plan progress. Going forward, the Board's Operational Plan will be updated to reflect the short-term targets from the plan.

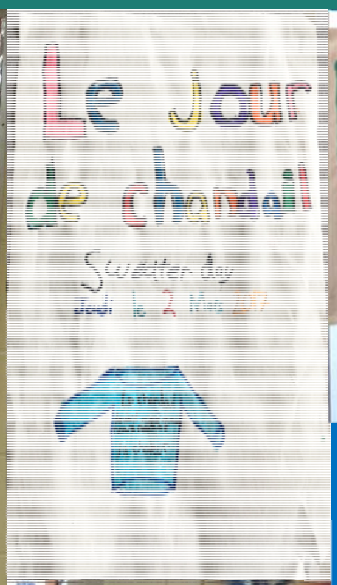
8. Commitment to Future Action

The GECDSB commits to an annual status update to the Board of Trustees regarding progress on and changes to the Climate Action Plan. The Board commits to updating the Climate Action Plan once every 5 years to align with the Energy Conservation and Demand Management Plan as included in the appendices of this report.

We at the Greater Essex County District School Board strive to become an environmental stewardship leader in our community and are dedicated to the Federal timeline of net zero by 2050.

9. Appendix – Energy Conservation and Demand Management Plan

Energy Conservation & Demand Management Plan 2019 - 2023



GREATER ESSEX COUNTY District School Board

July 1, 2019

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Executive Summary

In the Energy Conservation and Demand Management Plan 2019 - 2023, performance of energy conservation strategies implemented in the fiscal years of 2014 to 2018 is reported. Energy consumption and associated greenhouse gas (GHG) emissions are discussed with results measured against goals.

There has been a demonstrated positive impact in some areas, however, there is a recognition that more work is needed on a range of fronts.

New energy reduction targets are set for the next five years and strategies are identified to achieve these goals.

With Senior Management approval of the Energy Conservation and Demand Management Plan 2019-2023, the Board supports the energy reduction targets and renews its commitment to energy conservation through the continued implementation of conservation strategies to achieve energy reduction goals over the next five years.

Senior Management Approval

Greater Essex County District School Board approves the Energy Conservation and Demand Management Plan 2019 - 2023.

Signature: Erin Kelly

Full Name: Erin Kelly

Job Title: Director of Education

Date: June 24/19

INTRODUCTION

The Greater Essex County District School Board (GECDSB) considers energy conservation and associated greenhouse gas emission reductions a necessity to demonstrating responsible leadership and being a good local and global citizen. Compelling evidence strongly indicates that human activity is changing the environment and the Board must demonstrate its leadership by aiming higher and aggressively targeting to reduce its impact on the Earth. As an educational institution, there is a responsibility to deliver a clear message to students of the importance of conserving energy and reducing their footprint on the planet.

Since the early 1990's, the GECDSB has strongly pursued energy conservation opportunities. In 2014, the Board solidified its commitment to energy conservation with its first formal 5-Year Energy Conservation Demand Management Plan (ECDMP).

The ECDMP 2019 – 2023 reviews progress made toward goals in the previous five years and sets the Board's goals for the next five years.

The ECDMP 2019 – 2023 demonstrates the Board's commitment to ensuring the success of this plan through resource allocation, annual reporting and regular updates as required.

EDUCATION SECTOR BACKGROUND

Legislated Requirement for Energy Reporting

The Province of Ontario adopted the Green Energy Act as "a mechanism to expand renewable energy generation, encourage energy conservation and promote the creation of clean energy jobs" (Ministry of Energy, 2012).

The Green Energy Act was repealed in 2018 and various provisions of this Act placed under The Electricity Act, O.Reg.507/18, Broader Public Sector: Energy Reporting and Conservation and Demand Management Plan and O.Reg.506/18, Reporting of Energy Consumption and Water Use. These provisions require public agencies, including school boards, to:

a. Report annually to the Ministry of Energy on energy use and GHG emissions and ensure this information is available to the public; and,
b. Develop a five-year energy conservation and demand management plan (ECDMP) starting July 1, 2014, and ensure the plan is available to the public. The plan is required to be reviewed and updated every five years.

The ECDMP 2019 - 2023 is the first update of the original ECDMP, issued in 2014, and complies with the requirements of the Ministry of Energy's mandate.

Funding and Energy Management Planning

All school boards receive 100% of their funding from the Ministry of Education. The Ministry announces each Board's funding allocation annually for the next fiscal year which runs from September 1st to August 31st. The Ministry only allocates funding to School Boards on a year-by-year basis.

As a result, while a Board may have a five-year energy management strategy, the Board's ability to implement their strategy is dependent on the funding they receive in each of the five years covered by their energy management plan.

Asset Portfolios and Energy Management Planning

The education sector is unique in that a board's asset portfolio can experience important changes that impact a board's energy consumption over a five-year period. The following is a list of some of the more common variables that may impact consumption at a site. These variables are considered in the Board's assessment of energy usage and priorities for energy management initiatives.

Facility Variables:

- Changes to Building Area
    a. Major additions
    b. Sites sold/closed/demolished/leased
    c. Portables – installed or removed

- Equipment/Systems
    a. Replacements and Upgrades with newer technology
    b. Increased use of air conditioning due to program and scheduling changes.
- Shared Use Sites (e.g. common areas shared with a partner, libraries, lighted sports fields etc.)

Other Variables:

- Programs
    - Day Care including Before/After School Programs
    - Summer School and Summer Programs
    - Community Use
- Occupancy
    - Significant Increase or decrease in number of students
    - New programs being added to or removed from a site

Typical School Energy Use

In order to better manage energy consumption, it is also critical to gain an understanding of how the energy is being used in a facility. The following chart outlines a typical breakdown of energy consumption at a school. This has assisted the Board in prioritizing energy conservation strategies.

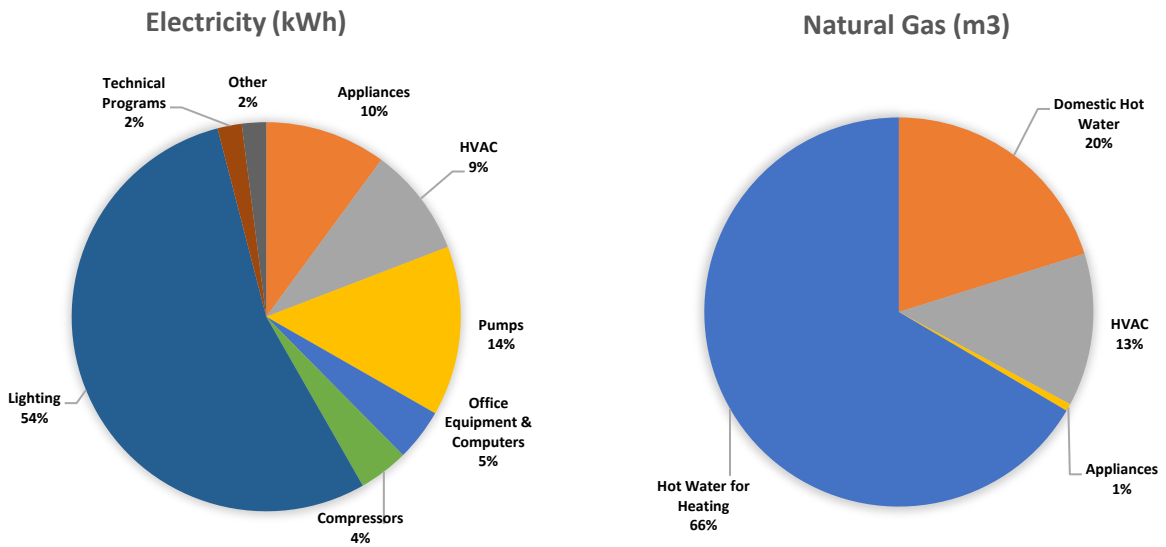

Figure 1 – Typical breakdown of school energy consumption

ENERGY CONSERVATION at GECDSB

Overview

The Board's infrastructure dates from the early 1900's to present day, with a wide variety of architectural designs and construction techniques. The geographical size, varying ages of buildings, and the multi-use of some facilities present a challenge to the Board in managing energy use.

Prior to implementing its first 5-year plan in 2014, the Board had participated in energy conservation initiatives since the early 1990's, resulting in significant reductions in energy use. Prior to the implementation of the first ECDMP, the initiatives included the conversion of lighting to energy efficient T8 lighting, the implementation of building automation controls for all major pieces of Heating, Ventilation and Air-Conditioning (HVAC) equipment and HVAC retrofits.

The Board continues to adopt construction standards that ensure energy efficiency in new schools, additions and renovations. New changes in the Ontario Building Code now mandate energy efficiency measures in all new construction and major renovations, including low flow plumbing fixtures, high efficiency LED lighting, lighting controls, energy efficient mechanical systems and electrical metering of all main systems in a building.

Since 2011, the Board has employed a full-time Energy & Environmental Officer, who is responsible for the development and maintenance of the Board's ECDMP. This includes the measurement and analysis of utility consumption, the management of all utility budgets, identification of energy saving opportunities, development of business cases for the implementation of these opportunities, the application for energy grants/rebates, the development of energy conservation training programs for Board employees and students, and participation on the Board EcoSchools Steering Committee.

To further enhance its energy management program, the Board has recently added an HVAC/Controls specialist (contract position) to its Facility Services staff. This key role focuses on the optimization of existing equipment and controls to improve efficiency. This position also establishes and implements mechanical, electrical and controls standards on all new construction and renovations, resulting in significant construction and energy savings for the Board.

The Board also supports a system-wide Environmental Stewardship Program, modelled on the "Ontario EcoSchools" program. which aligns with the Board's Policy, Regulation A/R-PR-09 and Administrative Procedure AP-PR-13 "Environmental Education and Stewardship". All schools participate in the program with a significant number of schools reaching EcoSchools certification annually. The Board supports this program with training opportunities for school staff and "EcoTeams" and incentive programs based on energy savings.

The Board also supported community energy conservation efforts and participated in Community Task Force Meetings where area stakeholders helped shape and develop the City of Windsor's Community Energy Plan. This plan aims to improve the City's energy efficiency,

reduce its energy consumption and associated greenhouse gas emissions, as well as support local economic development and ultimately, improving the quality of life for its residents.

The Board was fortunate to open Canada's first LEED Platinum certified school, Dr. David Suzuki Public School in 2011, as a demonstration site to showcase energy conservation measures for other public and private sector entities. The school contains a 36kW solar system, two wind turbines, displacement ventilation, daylight and storm water harvesting systems and geothermal heating and cooling and continues to aggressively surpass all energy performance criteria of other schools in the province. Construction, curriculum connections and energy performance data is published on the www.suzukipublicschool.ca website.

Presently, four Local Distribution Companies (LDCs) provide electricity to the board's sites, Enwin Utilities, Essex Energy, ELK and Hydro One. The Board relies mainly on natural gas, provided by Enbridge, formerly Union Gas, for its heating and domestic hot water heating, with the exception of one school located on Pelee Island. As natural gas services are not available on the island, the school must use oil for heating.

Energy Conservation Measures

Energy initiatives are managed through the Board's Facility Services Department. A focus for Facility Services is to ensure energy efficiency is considered in all departments including Operations, Maintenance and Engineering. Key members of the Facility Services team meet on a quarterly basis to discuss energy saving opportunities.

The Board's energy management goal is to reduce energy consumption and, in turn, mitigate greenhouse gas emissions. This is accomplished through the implementation of various energy management strategies that are funded through a portion of the annual capital renewal and operating grants or specific Ministry funding (Energy Efficiency, Green House Gas Reduction). These funding streams support energy saving strategies in four key categories:

1. Design/Construction/Retrofit
2. Operations and Maintenance
3. Occupant Behaviour
4. Policy and Planning

NOTE: It takes a minimum of one full year after an energy management strategy has been implemented before an evaluation can determine if project related energy savings were achieved.

1. Design/Construction/Retrofit

Design/construction/retrofit encompasses how a building and its systems perform through the integration of disciplines such as architecture and engineering. This category highlights infrastructure standards and changes that can result in higher energy efficiencies. The various strategies used in design/construction/retrofit include the following:

A. Lighting

In recent years, significant improvements in LED lighting technology has made these fixtures more affordable and these technologies continue to evolve rapidly. Energy savings can be achieved by replacing older incandescent, metal halide, high pressure sodium lamps and fluorescent lighting with LED (light-emitting diode) lamps. Savings, which are dependent on the lamp type, wattage and ballast used, can range from 30-70%.

Lighting occupancy and daylight harvesting sensors can be used to turn lights off during periods of inactivity or when there is enough sunlight to light the space. Typical energy savings from installing these systems are approximately 40%.

By the end of the 2018-2019 school year, 75% of our schools will be fully LED as well as the Administration Building.

B. Heating, Ventilation and Air Conditioning (HVAC) Systems

HVAC systems modulate the indoor air temperature, humidity and air quality for people and equipment in our facilities. Their primary function is to provide a comfortable and safe learning/working environment. They also account for a large portion of a building's energy use.

Due to the varying age of school buildings, various types of HVAC systems can be found across the GECDSB. Cooling is typically provided by chillers, window air conditioning units, single room internal air conditioning systems and internal/external HVAC units. The Board's heating systems include steam or hot water provided by natural gas fired boilers, rooftop or internal HVAC units with ducted distribution and electrical heating.

HVAC system improvements may include:

- Replacement of old Boilers, HVAC units and Chillers with more efficient models, with consideration to right sizing existing systems heating and/or cooling requirements.
- Include energy recovery, when feasible, for all new HVAC units.
- Replace or install constant volume systems with variable air volume systems (VAV) that produce fan energy consumption savings.
- Install Variable Frequency Drives (VFDs) for motors on pumps and HVAC units.
- Whole school air balancing of existing and new systems.

Standard boilers operate at an efficiency of approximately 80%. Newer condensing boilers can operate at efficiencies of up to 95%, and typical energy savings when upgrading to a condensing boiler are approximately 10%.

In HVAC and boiler systems, VFDs can be installed to promote higher efficiencies on motors. Energy savings vary depending on the specific system characteristics but, in certain cases, can be 50% or higher.

Energy Recovery Ventilation (ERV) can be added to new ventilation systems, where the energy in building exhaust air is used to pre-condition the incoming outdoor ventilation air. During the warmer seasons, an ERV will pre-cool and dehumidify incoming air while, in cooler seasons, it will humidify and pre-heat. The benefit of using energy recovery is the ability to meet ventilation & energy standards, while improving indoor air quality and reducing total HVAC equipment capacity and energy use.

Testing, Adjusting, and Balancing (TAB), also known as air balancing, reviews air and water flows through HVAC and Boiler systems to ensure optimum flow to meet proper spatial requirements for ventilation, cooling and heating. Air balancing optimizes performance of the system thus achieving energy savings. Another added benefit is mitigation of over or under pressurizing a building which reduces the heating or cooling requirements for the building.

Through the SCIA funding the past 3 years, the Board was able to renew over $11,000,000 in HVAC infrastructure while implementing greater energy efficiencies.

C. Building Automation System (BAS)

A BAS system offers one of the best returns on investment. Energy savings are achieved by the greater control of various HVAC and Lighting systems, allowing the Board to optimize their operation. Additional benefits include improved indoor comfort and greater visibility into building systems reducing response time for service calls. Typical energy savings achieved through the implementation of a BAS are 5-15%.

Opportunities for BAS improvements, include efficient equipment scheduling to reflect building occupancy, set-point standardization and equipment programming to ensure operational efficiencies.

With expenditures of $1,750,000 over the past 5 years, the Board was able to implement/upgrade controls systems to mitigate un-necessary usage.

D. Building Envelope Upgrades

Building Envelope upgrades include roofing, windows, exterior cladding, caulking and exterior door upgrades. The addition of new insulation to the roof increases the "R-Value" associated with the building envelope, thereby reducing the amount of energy lost to the environment. By implementing this measure, studies have shown that heating loads may be reduced by 37% and cooling loads by 10%.

Other building envelope opportunities include caulking of windows and doors to prevent infiltration and the upgrade of external doors to ensure appropriate weather seals. A higher cost initiative is the replacement of original single sash windows with more energy efficient ones.

In the past two years, Board spent $20,000,000 to replace glazing and roofing making the classroom more comfortable while saving energy.

E. Energy Efficient Incentives

The Board regularly applies for various incentive programs offered by utility companies to support the implementation of projects which produce energy savings.

Since 2014, the Board has received over $920,000 in incentive payments to offset operating costs.

The Board also consults with the education sector's Incentive Program Advisor and has used his services to apply for incentives on behalf of the board.

2. Operations and Maintenance

Various operations and maintenance strategies are used by the Board to ensure that the existing buildings and equipment perform at peak efficiency. These include:

A. Energy Audits

During the first year of the Ministry's Energy Efficiency Funding (2009), the Board conducted independent 3rd party energy audits of all its facilities. These audits not only provided an inventory of equipment but also identified energy opportunities in each building. The 3rd party consultant was also able to consolidate like projects for implementation.

Facility Services has relied on these reports and the energy savings opportunities identified to prioritize energy efficiency work that was funded by the Ministry of Education Energy Efficiency Funding received in 2010, 2011 and 2012. Projects completed included boiler upgrades, steam

trap retrofits, lighting retrofits, building envelope and controls upgrades and water conservation measures.

These Energy Audit Reports continue to provide prioritized energy efficiency initiatives that can be implemented as additional funding becomes available.

The Ministry of Education is currently supporting its Condition Assessment Initiative which continue to provide detailed infrastructure assessments of all schools in the Province of Ontario. These assessments identify renewal needs in each school with an assigned priority. These renewal needs are captured in the Ministry supported VFA software system which can extract identified energy saving renewal opportunities in a report format. This will be another valuable tool available to the Board to identify renewal needs which will also impact energy consumption.

The HVAC/Controls Project Administrator portfolio includes building audits to identify energy waste and opportunities for improvements in areas of maintenance, operations and renewal. Opportunities that have been identified during audits this school year include installing VFD's on heating pumps and fan motors, improving existing or adding new controls to increase efficiencies while improving occupant comfort, capital needs such as HVAC replacements and highlighting maintenance and operational practices that waste energy.

The HVAC/Controls Administrator has completed 18 audits this school year identifying many opportunities to save energy.

B. Temperature Set Points and Equipment Scheduling

Building temperature settings and equipment schedules revolve around comfort and building occupancy. In the early 1990's, during the Board's first energy retrofit program, the Board standardized and upgraded each school's building automation system (BAS) which controlled key pieces of equipment including HVAC and Boilers. These controls allowed the Board to establish temperature set points along with schedules for occupancy. The schedule and temperatures for both heating and cooling seasons are standardized and implemented across the Board's infrastructure. This has produced significant energy savings by shutting down equipment and lowering temperatures when buildings are un-occupied.

For several years, all outside lighting that is controlled by the BAS has been scheduled to turn off from 2 a.m. to 5 a.m. at its City of Windsor sites and from 12 a.m. to 6 a.m. at all other schools. This practice has proven very successful in reducing nighttime electricity demand for the Board.

C. Monitoring of Utility Consumption and Demand

Presently, the Board does not have access to current, real-time energy consumption data in most of its school buildings. This poses a challenge in the timely measurement of the

performance of energy efficiency projects implemented and initiatives taken by schools or Facility Services Department. Newer meters (available in a small portion of the Board's portfolio) allow for electronic access to daily and monthly data either through static data on a website or a dynamic dashboard provided by the LDC. This data is usually aged 24 hours.

Presently, only monthly consumption of natural gas is available through Enbridge.

The lack of real time energy data can also make it difficult to quantify energy savings realized directly through operational changes, especially when there has been a concurrent building system improvement.

In order to facilitate the completion of legislated reporting requirements, The Ministry of Education has contracted the services of a third-party provider to compile utility data the all LDC's and populate the information in the Utility Consumption Database (UCD) for all Ontario school boards. The UCD also provides the ability for a sector wide peer comparison.

By reviewing both utility and UCD data, anomalies in consumption and demand can be detected and corrected, through repairs or equipment scheduling, which typically results in a decrease in electricity or water usage.

3. Occupant Behaviour

A. EcoSchools and Energy Challenge

The Board recognizes that 1/3 of all energy savings realized in a building can be achieved by modifying specific occupant behaviours to reduce energy consumption. With this in mind, the Board adopted the Ontario EcoSchools environmental stewardship program which contains a component focused on energy conservation.

Facility Services developed and continues to support an "Energy Conservation Challenge" within the Board's EcoSchools program. The basis of the challenge is to increase energy and water conservation awareness by encouraging school occupants to change their behaviour and reduce energy and water usage through conservation strategies. As a reward for their efforts, participating schools receive a portion of the savings realized within the six-month challenge period.

Strategies adopted by schools have included the formation of a dedicated energy "watchdog" team, performing energy audits, participating in sweater days, shutting lights and equipment off when not in use, taking advantage of natural light in classrooms, removing old and unused small

appliances, using window treatments to optimize indoor building temperature and, most importantly, having a good communication strategy with the entire school community.

The table below highlights the energy and water savings through the Energy Challenge.

Table 1 - Energy Challenge Results 2012 to 2018

Year	# of sites participating	Electricity (kWh)	Water (L)
2012	7	258,551	1,744,000
2013	8	150,478	2,359,000
2014	35	477,504	15,733,000
2015	50	844,310	20,130,000
2016	42	430,473	15,049,000
2017	50	698,816	13,120,000
2018	38	285,523	6,599,000
Total		**1,730,843**	**39,966,000**

In addition to utility savings, the current year's Energy Challenge also aims to reward participating schools for each implemented conservation initiative.

Since its inception 8 years ago, schools have saved enough electricity to charge 153,289,000 smart phones and enough water to fill 530 average pools through the Energy Conservation Challenge

A. Training and Education

Successful energy management programs depend on staff and student support. Increasing knowledge about energy use motivates the school community to integrate effective actions to reduce energy waste in their day-to-day activities. As a result, staff and students play an important and ongoing role in ensuring that the Board meets its energy reduction goals and promoting the growth of an energy conscious culture.

The Board has created a training video "Reduce Your Use" to provide awareness training to school staff and newly hired custodians, and there are plans to further expand the scope of training to other staff.

Reduce Your Use Video

The Board has provided for EcoSchools Training in various formats for all school EcoTeams, including administrators, teachers, students and custodians.

Though very successful and well-received, off site training events have had limited attendance due to venue size. Plans are currently underway to develop training presentations to be brought to schools and delivered to the entire student body, thus gaining a larger audience to spread energy conservation awareness.

4. Policy and Planning

A. Energy Management Policy & Procedure

The Board approves and supports the ECDMP 2019 – 2023 which acts as a framework for our energy conservation programs.

The Board should consider adopting a policy which demonstrates the Board's commitment to energy conservation and management and supports this plan.

B. Energy Savings through School Closures

The GECDSB faces the same challenges as other Board in the Province in terms of under-utilized facilities. The Board's Superintendent of Accommodations assists in developing the Board's strategies to "right-size" our facilities. The process for school closures follows the Board's Program Accommodation Review Process (PARC).

The Board has closed several schools in the past five years and recognizes that there continues to be a need to ensure efficiencies on how space is utilized and programs delivered.

School consolidations that result in new buildings allows for the closure of older, inefficient buildings and supports the construction of buildings that meet a higher standard of energy efficiency. In most cases, a new school will be more energy efficient even with the introduction of air conditioning.

For detailed information on the Board's future goals in terms of accommodations, refer to the Annual Board's Accommodation Report found on the Board's website.

Facility Services also has developed a standard operating procedure which ensures closed buildings are operated in an energy efficient manner.

C. Energy Procurement

As utility costs will continue to rise in the coming years, the Board, in an effort to optimize its energy expenditures, continues to participate in consortia arrangements for the purchase of both electricity and natural gas. The Board uses the services of the Education Sector's OECM

Strategic Electricity Management and Advisory Services for the purchase of electricity and Shell Energy for the purchase of gas.

The challenges facing all school boards in Ontario is the continued unpredictability of electricity prices and the impact of weather on natural gas prices. The 2013/2014 school year saw School Boards dealing with major changes with the introduction of the Global Adjustment Factor (GAF) cost which doubled, if not tripled, the cost of electricity. As the GAF reacts inversely to electricity prices, the Board would experience higher overall electricity pricing should an attempt be made to mitigate the pricing fluctuations by entering into fixed pricing contracts. This would exacerbate the impact of the GAF. Also, during this same period, Ontario experienced the coldest winter in several decades, as a result of the "Polar Vortex" phenomenon, and all Boards were exposed to the subsequent escalation of natural gas prices from previous record lows.

For the past 5 years, procurement of both electricity and natural gas has been through open market purchases due to low cost of natural gas and the introduction of the Global Adjustment Factor which performs inversely to electricity prices. The Board continues to procure transportation contracts for natural gas on a multi-year basis. Facility Services monitors energy costs against budgets.

D. Renewable Energy

Dr. David Suzuki Public School

The Board has supported renewable energy installations consisting of both solar photovoltaic (PV) systems and wind turbines. Presently, the Board owns three solar PV systems, located at Tecumseh Vista Academy (100 kW), Dr. David Suzuki Public School (38 kW) and Sandwich Secondary School (10 kW). Power generation for all three solar PV systems is under contract with the Independent Electricity System Operator (IESO) through the Feed-In-Tariff (FIT) and MicroFit programs to supply electricity to the grid for compensation which offsets electricity costs for the building.

In 2016/2017, the Board leased school rooftops to a 3rd party partner for the installation of PV systems at 25 of its schools, for a 20 year FIT program term and supplying an estimated total 6,246,000 kWh of clean energy per year to the electricity grid. The Board receives approximately $350,000 annually under this lease arrangement.

The Board has also recently completed upgrades to the rooftop PV systems located at Dr. David Suzuki Public School and Tecumseh Vista Academy to increase their efficiencies. It is estimated that they will now generate and supply an average of 30 to 40% more clean energy to the grid.

The Board's two wind turbines are located at Dr. David Suzuki Public School. They consist of one 5kW vertical axis and one 2.4 kW horizontal axis turbines. Both wind turbines offset the schools' electricity consumption.

Table 2 - GECDSB's Current Renewable Energy Sites

Renewable Energy	Define	Number of systems in asset portfolio	Total size (kW)	Average Estimated Annual Generation (ekWh)
Solar photovoltaic	Board owned	3	148	171,015
	3rd party owned, rooftop leased	25	4,727	6,246,175
Wind Turbine	Dr.David Suzuki PS	2	7.4	unknown

PROGRESS AGAINST GOALS - A Review of the Past 5 Years

Changes to the Board's Asset Portfolio from the Baseline Year

The following table outlines changes in the Board's asset portfolio that changed from the baseline Fiscal Year 2012 to 2013 to the end of the five-year reporting period Fiscal Year 2017 to 2018.

Table 3 - Board's Asset Portfolio

Key Metrics	(Baseline Year) Fiscal Year 2012 to 2013	Fiscal Year 2017 to 2018	Variance
Total Number of Buildings	81	77	- 4
Total Number of Portables/Portapaks	58	70	+12
Total Floor Area (ft^2)	5,310,378	5,112,712	-197,666
Average Daily Enrolment	32,998	36,496	+ 3,498
Community Use of Schools: • Community Rental Hours • # of School Based Childcare Programs	31,118 39	34,972 48	+ 3,854 + 9

Although the number of the Board's buildings has decreased, all other metrics have increased and therefore creating an additional challenge for the board to achieve its energy saving goals.

Implementation of Projects

The following chart shows planned vs actual spending in the energy conservation strategy category of Design/Construction/Retrofits, which includes lighting, HVAC and controls retrofit projects, as well as building envelope improvements. A complete list of the Board's investment

in these strategies for the 2013 to 2018 fiscal year period can be found in *Appendix A - Design/Construction/Retrofit Strategy Investments from FY2014 to FY2018.*

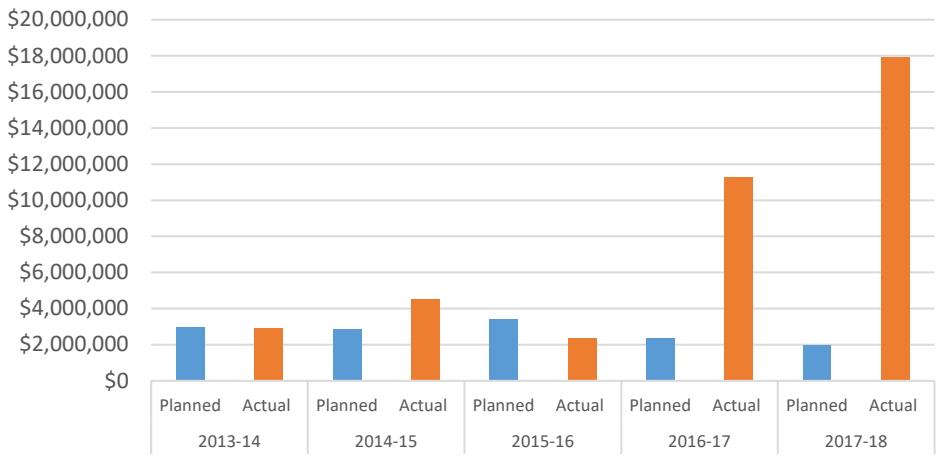

Figure 2 – Investments in Design/Construction/Retrofit Projects FY2014 to FY2018

The Board invested close to $39,000,000 in renewal strategies that impacted energy savings over the past 5 years.

In addition to Ministry of Education Greenhouse Gas Reduction Funding initiative in 2017 & 2018, the Board was able to invest more monies through the School Condition Improvement Allocation (SCIA) funding to support the replacement, renewal and installation of energy efficient equipment and building infrastructure.

Energy Use

All energy consumption data used to monitor and measure performance against goals was obtained from the Ministry of Education UCD. A summary of source UCD data used for this report may be found in *Appendix B - UCD Report EOR02 5 Year Energy Consumption and Demand Management Plan Data*.

The following table compares the "metered" consumption data of the baseline year (2012-2013) and the most recently compiled data for fiscal year 2017-2018. Natural gas and heating oil are converted to a common unit of Equivalent Kilowatt Hours (ekWh) for comparison purposes.

Table 4 - Metered Energy Usage

Utility	Fiscal Year 2012 to 2013 (Baseline year)	Fiscal Year 2017 to 2018
Total Electricity (kWh)	27,447,270	25,159,790

Utility	Fiscal Year 2012 to 2013 (Baseline year)	Fiscal Year 2017 to 2018
Total Natural Gas (ekWh)	71,126,050	55,145,230
Total Heating Fuel (Type 1) for Pelee Island (ekWh)	56,707 (2013/2014)	55,039

Metered, also known as “raw” consumption data, does not take into consideration the impact of weather on energy usage and as a result it does not allow an accurate analysis of energy performance from one year to the next.

Impact of Weather

In Ontario, 25% to 35% of energy consumption for a facility is affected by variations in weather during heating and cooling seasons.

The following table shows the annual Heating Degree Days (HDD)[1] and Cooling Degree Days (CDD)[2] for the six most common Environment Canada weather stations in the Ontario education sector for the last six years.

Table 5 - Ontario Degree-days

Ontario Degree Days	Fiscal Year 2012 to 2013	Fiscal Year 2013 to 2014	Fiscal Year 2014 to 2015	Fiscal Year 2015 to 2016	Fiscal Year 2016 to 2017	Fiscal Year 2017 to 2018
HDD	3698	4285	4091	3355	3583	3989
CDD	289	217	271	462	303	432

From the data above, it is clear that weather is not consistent from year to year. Therefore, the best way to compare energy usage from one year to another is to factor in the impact of weather on energy performance which allows for an equitable comparison of consumption across multiple years. This is called “weather-normalized” data.

However, a straight comparison of Total Energy (weather-normalized or not) between one or more years does not take into consideration variations in a board’s asset portfolio, such as square footage, enrolment, programs and building features, which will also impact energy consumption.

[1] Heating Degree Day (HDD) is a measure used to quantify the impact of cold weather on energy use. In the data above, HDD are the number of degrees that a day's average temperature is below 18C (the balance point), the temperature at which most buildings need to be heated.
[2] Cooling Degree Day (CDD) is a measure used to quantify the impact of hot weather on energy use. In the data above, CDD are the number of degrees that a day’s average temperature is above 18C, the temperature at which most buildings need to be cooled. It should be noted that not all buildings have air conditioning and some building have partial air conditioning. The UCD only applies CDD to meters that demonstrate an increase in consumption due to air conditioning.

A more accurate measure of performance is to compare Energy Intensity between various school years. Energy Intensity is value derived by calculating the building's energy use per square foot, reported as *equivalent kilowatt hours per square foot* (ekWh/ft^2). It allows for year over year comparisons of a building's energy efficiency which takes into account changes in square footage, building upgrades, programs and enrolment. The table below shows the combined electricity, natural gas and fuel oil consumption in eKWh for the Board and the Board's average energy intensity for the baseline year and the last reporting year.

Table 6 - Weather Normalized Energy Consumption

Weather Normalized Values	Fiscal Year 2012 to 2013 (Baseline Year)	Fiscal Year 2017 to 2018
Total Energy Consumed (ekWh)	95,550,770	74,999,880
Energy Intensity (eKWh/ft^2)	17.37	13.46

Despite the increases in school areas, number of portables and in school use, a trend of decreasing energy consumption for both electricity and gas has occurred over the last five years, with metered **electricity use reduced by over 4 million kWh** and **gas use reduced by 27 million m^3**.

Energy reductions over the past 4 years equals the GHG emissions saved by taking 3,248 cars off the road for one year.

Energy Conservation Results Measured Against Goals

In 2014, the Board set annual energy conservation goals for five fiscal years, FY2013 to FY2018. The following table compares the Energy Intensity Conservation Target with the Actual Energy Intensity Reduced for each year.

Table 7 - Comparison of Weather Normalized Energy Intensity Conservation Goals and Actual Energy Intensity Achieved

Fiscal Year	Energy Intensity Goal ekWh/ft2	Conservation Goal % Reduction	Actual Energy Intensity ekWh/ft2	Actual % Difference
2012 to 2013	Baseline Year	--------	17.37	--------
2013 to 2014	17.02	- 2	17.29	+ 1.6

Fiscal Year	Energy Intensity Goal ekWh/ft2	Conservation Goal % Reduction	Actual Energy Intensity ekWh/ft2	Actual % Difference
2014 to 2015	16.94	**- 2**	15.74	**- 7.1**
2015 to 2016	15.43	**- 2**	16.12	**+ 4.5**
2016 to 2017	15.79	**- 2**	14.91	**- 5.6**
2017 to 2018	14.66	**- 2**	13.46	**- 8.1**
Cumulative Goal 2014 - 2018	--------	**- 8 %**	--------	**- 14.7 %**

Note: Weather normalized data used

The Board has significantly surpassed its energy conservation goals for 2014-2018

Individual school energy intensity can be found in *Appendix C – School Energy Intensity 2017-2018 (Weather Normalized).*

Utility Costs for 2014-2018

The cost of utilities over time must also be considered when reviewing the Board's energy performance over the last five years. The table below showing our energy expenditure compared to the total energy consumed highlights the fact that, even with the application of millions of dollars in energy conservation strategies, the Board has only been successful in minimally mitigating the impact of higher energy prices.

Table 8 – Utility Consumption vs. Cost

Weather Normalized Values	Fiscal Year 2012 to 2013 (Baseline Year)	Fiscal Year 2017 to 2018	Reduction
Total Energy Consumed (ekWh)	95,550,770	74,999,880	21.5%
Total Cost of Energy	$5,839,282	$5,506,788	5.7%

Consumption was reduced by 21.5% but costs were only reduced 5.7%.

Greenhouse Gas (GHG) Emissions

In conjunction with energy savings, the Board also reduced its impact on the environment. The chart below shows our carbon emissions from energy usage, as calculated by the UCD from our raw energy data, have steadily decreased since FY2014.

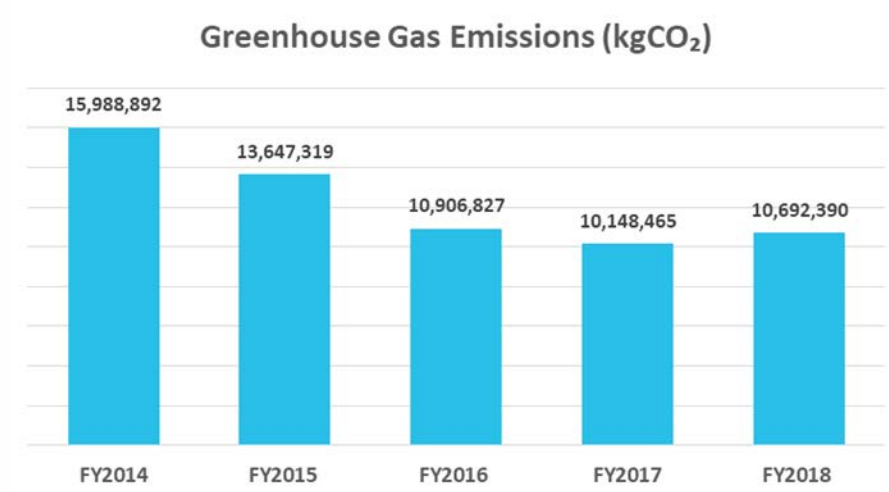

Figure 3 - Total GECDSB GHG emissions FY2014 to FY2018

The Board mitigated over 15 thousand tonnes of GHG emissions during 2014-2018

Equivalent to the GHG/CO_2 emissions from…

1,832

homes' energy use for one year

and carbon sequestered by…

252,977

tree seedlings grown for 10 years

Source: U.S. EPA Greenhouse Gas Equivalencies Calculator

LOOKING AHEAD – ENERGY PLANNING FOR THE NEXT 5 YEARS

The GECDSB will continue to implement energy management strategies, in key areas as described previously, for 2019 to 2023, to reduce energy consumption and associated GHGs emissions. For a comprehensive listing of the Board's planned investments in energy conservation over the next five years, please refer to *Appendix D – Energy Conservation Investment Goals for FY2019 to FY2023.*

Energy Conservation Goals FY2019 to FY2023

The Board commits to the following energy intensity reduction conservation goals for the next five fiscal years.

Table 9 – Annual Energy Intensity Conservation Goals

Annual Energy Intensity Conservation Goal	Fiscal Year 2018 to 2019	Fiscal Year 2019 to 2020	Fiscal Year 2020 to 2021	Fiscal Year 2021 to 2022	Fiscal Year 2022 to 2023	Cumulative Goal
ekW/ft^2*	13.19	12.93	12.68	12.43	12.19	63.42
Percentage decrease from previous year	2	2	2	2	2	10

* Based on achieving the annual percentage decrease target and using 2017/2018 actual weather normalized intensity as baseline

Other Energy Goals

The Board will explore the introduction of an Energy Conservation Policy to support the Energy Conservation and Demand Management Plan 2019-2023.

The Board will explore increasing the level of real-time metering in order to provide more immediate feedback on energy conservation measures.

Barriers to Achieving the 2019 – 2023 Energy Intensity Reduction Goals

Several factors may influence the Board's ability to meet its energy conservation goals. A few of these factors include, but are not limited to:

1. Enrolment Increases or Decreases
2. Changes to School Board Funding Models
3. Building Changes – additions, portables, renovations
4. Severe weather trends
5. Changes in Occupant Behaviour
6. Increasing use of buildings through changes in programs
7. Increasing use of buildings through community partners such as child care

CONCLUSION

Despite facing some future challenges to achieving its goals, the Board continues to invest in energy conservation because, as a responsible organization, it is a necessity. The Board recognizes that energy and resource conservation must be ingrained in students in order to have long-lasting impact on the environment.

The Greater Essex County District School Board also realizes that the strength and success of its energy conservation program is dependent on everyone working together towards its goals and plans, not only in investing in building changes over the next five years, but also in continuing to educate its employees, occupants and school communities about the importance and need to conserve in this world of limited resources.

APPENDIX A - Design/Construction/Retrofit Strategy Investments from FY2014 to FY2018

	2013-14		2014-15		2015-16		2016-17		2017-18	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
New School Design	$0	$35,000	$840,000	$550,000	$1,471,310	$250,000	$579,607	$550,000	$0	$0
Lighting Retrofits	$250,000	$200,000	$250,000	$50,000	$250,000	$92,801	$250,000	$2,092,353	$250,000	$6,298,907
HVAC - Boilers	$250,000	$200,000	$0	$0	$250,000	$444,023	$0	$210,550	$250,000	$0
HVAC Systems	$200,000	$300,000	$200,000	$0	$200,000	$372,862	$200,000	$3,667,680	$200,000	$6,226,739
Controls - New	$200,000	$250,000	$200,000	$200,000	$200,000	$400,000	$200,000	$500,000	$200,000	$400,000
Controls - Upgrades	$50,000	$100,000	$50,000	$50,000	$50,000	$70,276	$50,000	$39,281	$50,000	$63,181
Glazing	$0	$0	$0	$0	$0	$0	$0	$1,022,057	$0	$338,139
New Roof	$2,000,000	$1,800,000	$1,295,000	$3,645,641	$995,000	$715,891	$1,060,000	$3,162,974	$1,040,000	$4,581,695
TOTAL	**$2,950,000**	**$2,885,000**	**$2,835,000**	**$4,495,641**	**$3,416,310**	**$2,345,853**	**$2,339,607**	**$11,244,895**	**$1,990,000**	**$17,908,661**

Appendix B - UCD Report EOR02 5 Year Energy Consumption and Demand Mangement Plan Data

UCD Data Fields for Completing the 5-year Energy Conservation and Demand Management Plan	FY2013 / AF2013 (baseline fiscal year)	FY2014 / AF2014	FY2015 / AF2015	FY2016 / AF2016	FY2017 / AF2017	FY2018 / AF2018	Variance between FY2013 and FY2018
Average Daily Enrolment (ADE)	32,997.68	32,369.50	33,939.00	34,351.65	35,249.41	36,496.00	3,498.32
Total Electricity (kWh) - raw	27,447,270.00	28,430,670.00	26,080,920.00	26,407,420.00	24,978,360.00	25,159,790.00	
Total Natural Gas (ekWh) - raw	71,126,050.00	82,165,500.00	70,871,220.00	55,701,730.00	51,970,220.00	55,145,230.00	
Total Heating Fuel (Type 1) (ekWh) - raw	no data	56,706.61	58,577.25	46,730.95	52,290.61	55,039.12	
Total Energy Consumed (eKWh) - raw	98,573,320.00	110,652,900.00	97,010,710.00	82,155,870.00	76,743,550.00	80,305,020.00	
Energy Intensity (ekWh/ft2) - raw	17.92	20.20	17.71	15.10	13.90	14.43	
Total Electricity (kWh) - weather normalized	25,095,520.00	26,327,410.00	25,127,160.00	26,457,000.00	24,938,720.00	24,833,180.00	-262,340.00
Total Natural Gas (ekWh) - weather normalized	70,455,250.00	68,322,380.00	61,025,280.00	61,189,640.00	57,307,190.00	50,121,410.00	-20,333,840.00
Total Heating Fuel (Type 1) (ekWh) -weather normalized	no data	44,609.31	48,439.25	50,197.17	38,909.08	45,291.81	
Total Energy Consumed (eKWh) - weather normalized	95,550,770.00	94,694,400.00	86,200,880.00	87,696,840.00	82,284,820.00	74,999,880.00	-20,550,890.00
Energy Intensity (ekWh/ft2) - weather normalized	17.37	17.29	15.74	16.12	14.91	13.46	-3.91

APPENDIX C - School Energy Intensity 2017-2018 (weather normalized)

School Name	Energy Intensity (ekWh/ft²)
A V Graham PS	16.37
Administration Building	15.34
Amherstburg Public School	17.65
Anderdon Central Public School	21.44
Belle River District High School	14.44
Belle River Public School	19.95
Bellewood Public School	10.82
Centennial Central Public School	18.32
Central Public School	12.59
Colchester North Public School	17.31
Coronation Public School	13.24
D M Eagle PS	14.71
David Maxwell Public School	24.50
Dougall Avenue Public School	13.96
Dr. David Suzuki Public School	7.67
East Mersea Public School	15.69
Eastwood Public School	11.78
Essex District High School	19.68
Essex Public School	10.35
Facility Services	9.54
Ford City Public School (formerly Percy P McCallum PS)	12.12
Forest Glade Public School	15.53
Forest Glade Public School Primary Learning Centre (Former H. B. McManus)	20.12
Frank W Begley Public School	8.83
General Amherst District High School	18.65
General Brock Public School	13.05
Giles Campus French Immersion (formerly W D Lowe Secondary School) *	16.79
Glenwood Public School	14.15
Gore Hill Public School	15.24
Gosfield North Central Public School	19.77
Harrow District High School - Closed	0.97
Harrow Public School	12.71
Hon W C Kennedy Secondary School	17.00
Hugh Beaton Public School	17.69
J A McWilliam Public School	15.36
Jack Miner Public School	13.55
John Campbell Public School	11.62
King Edward Public School	12.45
Kingsville District High School	23.73
Kingsville Public School	17.93
Lakeshore Discovery	11.53
LaSalle Public School	16.29

Leamington District Secondary School	22.44
Leamington District Secondary School - CLOSED	0.40
M S Hetherington Public School	14.63
Malden Central Public School	18.56
Margaret D Bennie Public School	10.73
Marlborough Public School	18.56
Mill Street Public School - CLOSED	0.42
Mount Carmel-Blytheswood Public School	17.73
Northwood Public School	14.38
Parkview Public School	11.04
PASS (formerly Alicia Mason)	18.62
Pelee Island Public School	12.26
Prince Andrew Public School	26.39
Prince Edward Public School	16.66
Princess Elizabeth Public School	11.20
Queen Elizabeth Public School	13.13
Queen Victoria Public School (Windsor)	14.20
Riverside Secondary School	14.92
Roseland Public School	10.71
Roseville Public School	14.01
Sandwich Secondary School	15.01
Sandwich West Public School	18.86
Southwood Public School	11.22
Sun Parlor Jr Public School	35.15
Talbot Trail	10.71
Tecumseh Vista Elementary & Secondary	13.16
Vincent Massey Secondary School	13.54
W F Herman Academy K-12 (formerly Secondary School)	13.29
Walkerville Collegiate Institute & Centre for the Creative Arts	13.87
West Gate Public School	9.52
Western Secondary School	22.80
Westview Freedom Academy (formerly Century Secondary School)	19.07
William G Davis Public School	13.40

* Estimated (2017-2018 data not available due to gas meter issues)

Appendix D - GECDSB Energy Conservation Investment Goals for FY 2019 to FY 2023

	2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023
	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)2	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)3	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)4	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
Design, Construction and Retrofit Strategies	**$ 11,150,000**	**4,121,377**	**$ 3,713,000**	**2,959,517**	**$ 6,113,000**	**3,291,278**	**$ 2,575,000**	**2,063,321**	**$ 5,375,000**	**3,195,980**	**49,641,407**
High Efficiency Lighting Systems, indoor and outdoor lighting	$		$ 300,000		$ 300,000		$ 300,000		$ 300,000		
High-efficiency Boilers (condensing)	$ 500,000		$ 500,000	589,246.26	$ 250,000	589,246.26	$ 250,000	589,246.26	$ 500,000		17,376,798.50
Energy Efficient HVAC systems	$ 300,000 1,500,000		$ 250,000		$ 250,000		$ 250,000		$ 250,000	589,246.26	8,838,693.84 4309,436.12
Energy Efficient Rooftop Units	$ -	1,390,143.88 196,415.42	$ 250,000	1,390,143.88	$ 250,000	695,071.94	$ 250,000	695,071.94	$		
Efficient Chillers and Controls	$ 675,000		$ -	32,735.90	$ 500,000	32,735.90	$	32,735.90	$ 250,000	1,390,143.88 28,571.43	818,397.58
High-efficiency Motors	$ 100,000		$ 100,000		$ 100,000		$ 100,000		$ 100,000	32,735.90	
VFD	$ 100,000	38,571.43 57,142.86	$ 100,000	81,839.76 57,142.86	$	81,839.76 57,142.86	$ - 100,000	81,839.76 57,142.86	$ 100,000	81,839.76 144,495.62	
Demand Ventilation	$ 25,000		$ 25,000		$ 25,000	28,571.43	$ 25,000		$ 500,000 25,000	57,142.86	307,142.86
Building Automation Systems - New	$ -	- 49,103.85	$ 200,000	49,103.85	$ 100,000	49,103.85	$		$ -		857,142.86 2,167,434.30
Building Automation Systems - Upgrade	$	144,495.62	$ 400,000	144,495.62	$	144,495.62	$	144,495.62 49,103.85 -	$		
Real-time energy data for operators to identify and diagnose building issues	$ -		$ -		$ 400,000 200,000	654,718.06	$ 400,000 200,000	654,718.06	$ 300,000 200,000	49,103.85	736,557.82 2,553,400.44
New Roof	$ 3,500,000	302,140.88	$ 1,000,000	130,943.61 -	$ 1,000,000	86,325.97	$ - 1,000,000	86,325.97	$ 1,000,000	654,718.06 86,325.97	523,774.45
New Windows	$ 3,000,000	647,444.75	$ -	261,887.22	$ 2,000,000	261,887.22	$ -	261,887.22	$ 2,000,000	196,415.42	3,928,308.37 4,963,743.09
Shading Devices	$ 250,000	- 71,428.57	$ -		$ 150,000	431,629.83	$ -		$	150,000	2,373,964.09
Operations and Maintenance Strategies	**$ 415,000**	**808,216**	**$ 440,000**	86,325.97 **832,768**	**$ 440,000**	**832,768**	**$ 440,000**	**832,768**	**$ 440,000**	**832,768**	528,571.43 **12,368,755**
New School Design/Construction Guidelines and Specifications	$		$	-	$	42,857.14	$	-	$	431,629.83	
Day and Night Temperature Guidelines for all Schools	$		$ 300,000		$		$		$	42,857.14	
Nighttime Blackout of Sites - Exterior	$ 300,000 10,000	10,000	$ 10,000	10,000	$ 300,000 10,000		$ 300,000 10,000	-	$ 300,000		8,838,693.84
Procures Only Energy Star Certified Appliances	$	589,246.26	$ 25,000	589,246.26	$ 10,000	589,246.26	$ 10,000	589,246.26	$ 10,000	589,246.26	517,955.80
HVAC Optimization (coil cleaning, re-calibration of equipment)	$ 30,000	25,000 34,530.39	$	34,530.39	$ 25,000	34,530.39	$ 25,000	34,530.39	$ 25,000	34,530.39 147,311.56	122,448.98
Commissioning (retro and re)	$ -	8,163.27	$ 25,000	8,163.27	$ 25,000	8,163.27 24,551.93	$ 25,000	8,163.27 24,551.93	$ 25,000	8,163.27	428,571.43
Walk Through Audit	$ 40,000	28,571.43 147,311.56	$ 30,000 40,000	28,571.43	$ 30,000 40,000	28,571.43 147,311.56	$ 30,000 40,000	28,571.43	$ 40,000	28,571.43 24,551.93	2,209,673.46 5,892.46
Occupant Behaviour Strategies Total	**$ 100,000**	**93,537** 682.83	**$ 115,000**	**222,336** 392.83	**$ 115,000**	**222,336**	**$**	147,311.56 **93,537**	**$ 100,000**	**93,537**	**2,304,646** 245,519.27
Building Automation Training (site specific)	$ -		$ 15,000	24,551.93	$ 15,000	392.83 128,799.59	$ -		$		901,597.11
Ongoing Training and Awareness Programs for Energy Conservation	$ 50,000	-	$		$	31,178.87	$ 50,000	100,000 392.83 31,178.87 -	$ 50,000	392.83 31,178.87	
Participation in EcoSchools	$ 50,000		$ 50,000	128,799.59	$ 50,000		$ 50,000		$ 50,000		935,366.20
TOTAL	**$ 22,030,000**	**8,728,232** 31,178.87 62,357.75	**$ 7,833,000**	**7,671,253** 50,000 31,178.87 62,357.75	**$** 50,000 **12,633,000**	**8,334,775** 62,357.75	**$ 6,430,000**	**6,474,961** 62,357.75	**$ 12,030,000**	**8,740,278** 62,357.75	467,493.19 **123,966,929**