



Superior-Greystone District School Board

5-Year Energy Conservation and Demand Management Plan

July 2019

Prepared in co-operation with:



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Our Commitment to Energy Conservation



Small Schools Make a Difference

June 6, 2019

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In the spirit of reducing the impact of rising energy costs, and in response to current regulatory requirements, Superior-Greenstone District School Board has developed a new 5-Year Energy Conservation and Demand Management (ECDM) Plan. This Plan outlines our progress against our original 2014 Plan as well as our planned conservation actions forward to 2024. This new plan and its related strategies and initiatives is supported by Board senior management.

This new Energy Conservation and Demand Energy Management Plan (ECDM Plan) has been updated in response to Ontario Regulation 507/18 made under the Conservation and Energy Efficiency section of the Electricity Act, 1998, requiring all public agencies to prepare, publish and implement an ECDM Plan. Our ECDM Plan fulfils the reporting requirements of the above regulations and provides the Board with a framework to support continued energy and sustainability initiatives within the built environment, operations and programs. The Plan further identifies opportunities for continued energy conservation measures and sustainability initiatives to build on our existing plans and conservation efforts. Implementation of all initiatives is subject to future funding availability and budget approvals.

Our ECDM Management Plan has also been developed to address the fiscal, societal, and environmental costs and risks associated with energy consumption. Appropriate energy management will permit the Board to display leadership, improve the delivery of services, and enhance the overall quality of life within our Board.

Warmest Regards,

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Introduction – Executive Summary

Background

The Superior-Greenstone District School Board's Energy Conservation and Demand Management (ECDM) Plan was developed in response to Ontario Regulation 507/18 which requires all public sector organizations to complete an update to their original 2014 ECDM Plan by July 1, 2019. This comprehensive Plan is an effective method of identifying energy conservation opportunities, selectively implementing the best projects and then measuring their effectiveness. The Plan has been developed to protect the interests of our school community and ensure that the Superior-Greenstone District School Board obtains the best possible value from our operating budgets. In addition to meeting our regulatory obligations, the Board believes that a strong commitment to energy conservation and a reduction of energy use is demonstrated evidence of our belief in becoming a more sustainable community while operating in a cost-effective manner.

Previous Results and Purpose of the Plan

The 5-Year Energy Conservation and Demand Management Plan is designed to guide Superior-Greenstone District School Board towards a more energy-efficient future. The policies, practices and energy conservation measures identified illustrate the importance the Board places on acting responsibly towards energy consumption through the wise use of resources in Board operations.

To enhance our understanding of energy use and return on investment through conservation, this document contains a thorough review of the measures implemented since the creation of the original Plan, issued on July 1, 2014. Since then, the Board has initiated several substantial energy projects, yielding significant savings results, including:

- LED lighting retrofits
- Building Automation Systems (BAS) and controls upgrades
- Building envelope and roofing improvements
- HVAC upgrades and boiler retrofits

The wise and efficient use of energy are two of the best options for meeting energy demands. They also provide many other environmental, economic and social benefits, including reducing greenhouse gas (GHG) emissions, cost avoidance and savings. Along with the primary benefits, the responsible use of energy also promotes local economic development opportunities, energy system reliability, improved energy supply security and reduced-price volatility.

Following the path of our previous ECDM Plan, this document is a continuation of a process involving the:

- Integration of establishing and evaluating a baseline for performance to be measured against;
- Reviewing the effectiveness of previous conservation efforts while setting future performance goals and objectives;
- Continuous improvement through identification of energy conservation potential;
- Strategic alignment of improvement measure implementation and fiscal constraints; and,
- Evaluation, measurement and communication of results achieved.

The following report summarizes the significant efforts applied by the Superior-Greenstone District School Board's Energy Conservation Team to create a Plan that can be implemented responsibly, over time, to create lasting results. The Plan takes advantage of internal expertise as well as all available external financial incentives and rebates currently being offered to support the implementation of energy savings ideas. The current energy picture for Superior-Greenstone District School Board and our future Vision, Goals and Objectives as shown in the Board's Energy Conservation and Management Policy, are outlined. Our strategic focus areas are discussed in detail and our 5-year Action Plan is also laid out.

1.0 Historic Energy Performance

Historical Energy Usage

Effectively managing energy requires the creation of a robust energy monitoring strategy and establishing an accurate energy baseline is an essential first step in this process. This baseline assists with energy conservation and greenhouse gas reduction target setting, energy procurement and budgeting, bill verification, energy awareness, and the selection and assessment of potential energy projects. Superior-Greenstone District School Board, similar to many other boards, relies on utility bills to establish this energy baseline.

To evaluate the effectiveness of the Board's previous energy conservation measures, fiscal year 2013/2014 was chosen as the base year for measurement; this aligns with the Ministry of Energy's Regulation 507/18 requirements for reporting. Overall, the Board's consumption in 2013 was 6.7 million kWh of electricity and 472,000 m³ of natural gas.

For comparative purposes, the raw energy consumption breakdowns by month since the original baseline for the Board are as follows:

Figure 1-1 – Electricity Use (2013 – 2018)

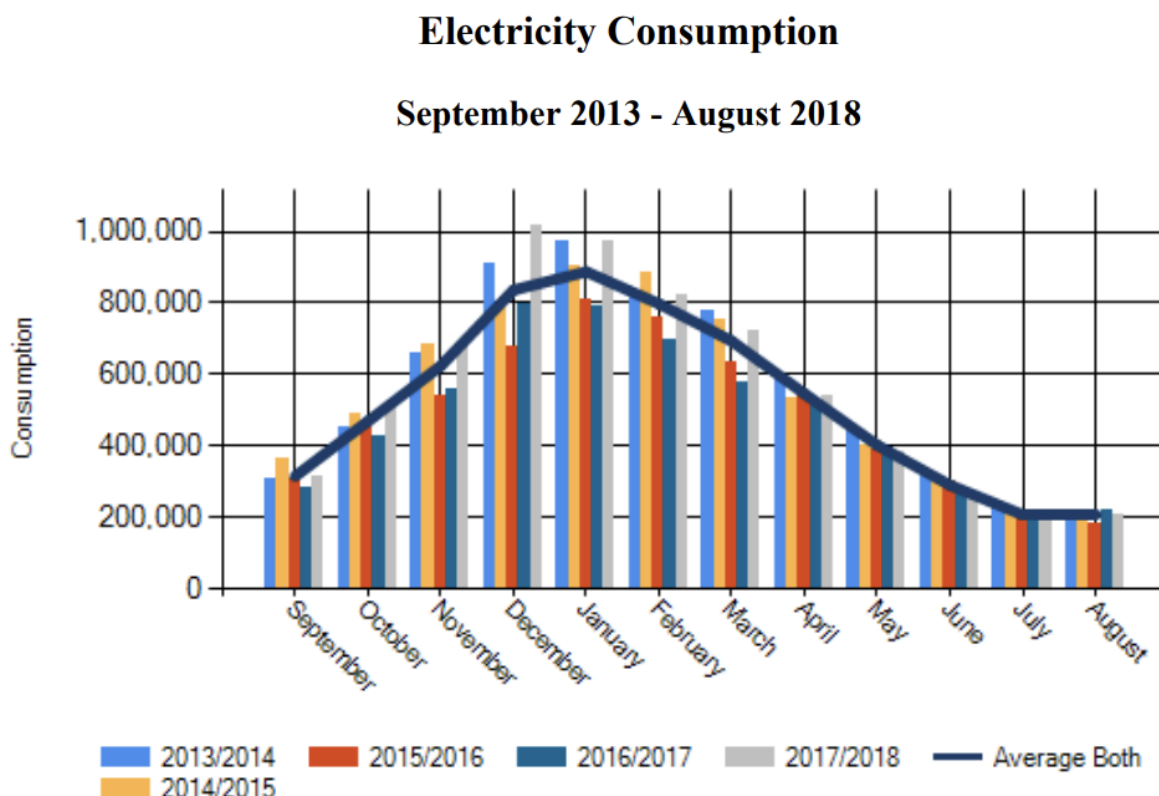
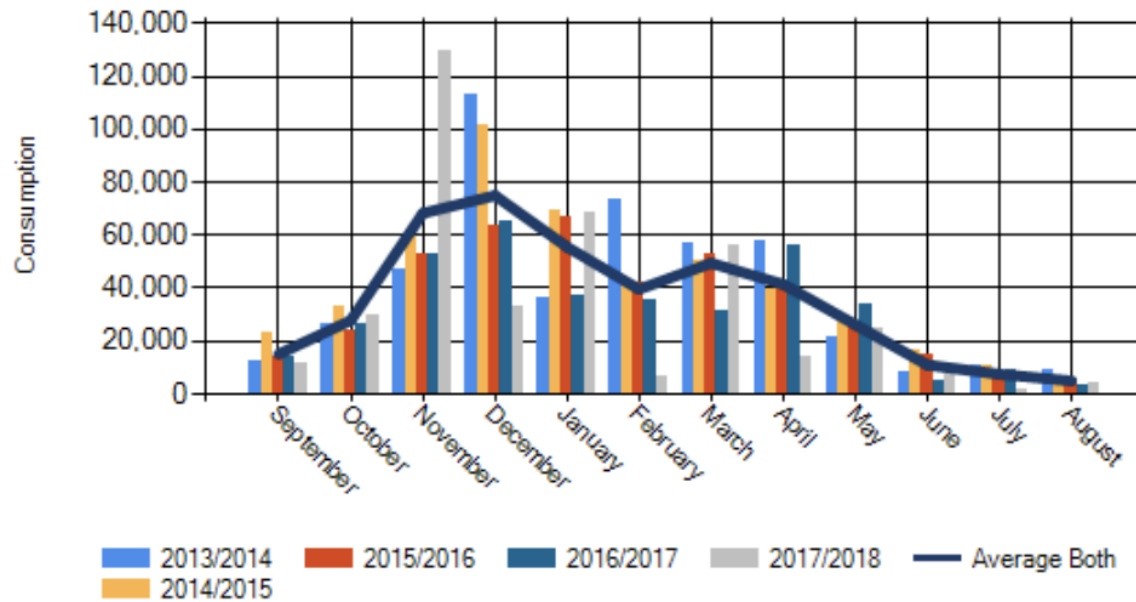


Figure 1-2 – Natural Gas Use (2013 – 2018)

Natural Gas Consumption

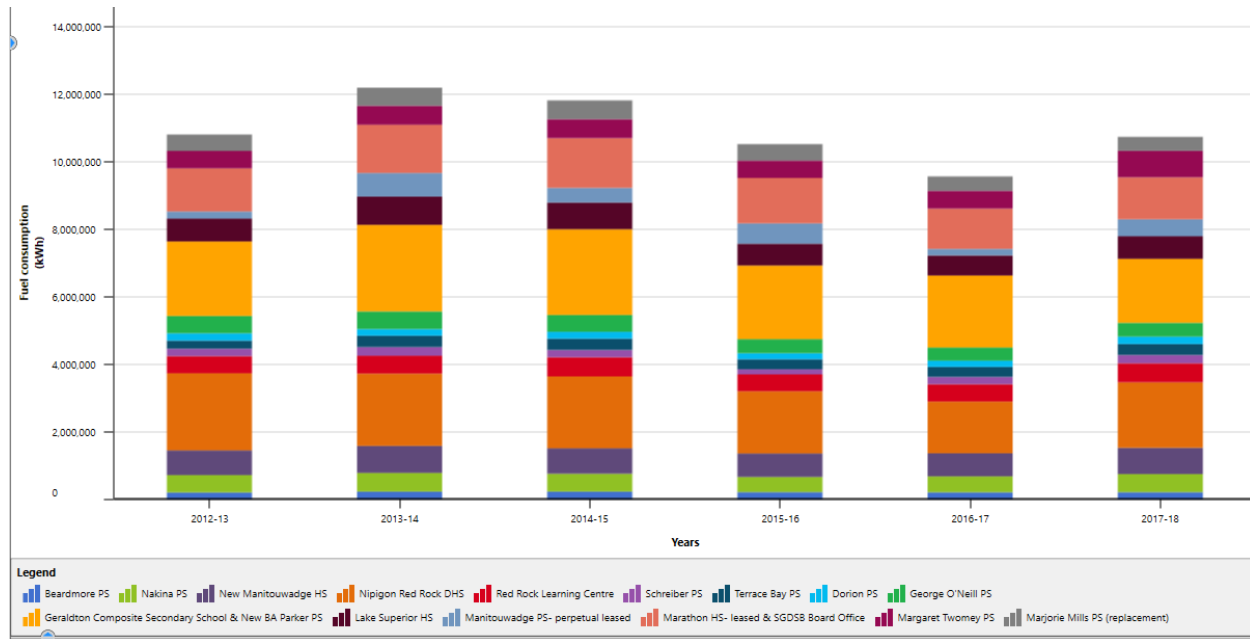
September 2013 - August 2018



Superior-Greenstone District School Board Energy Baseline Analysis

For comparative purposes, the following equivalent kilowatt hours (ekWh) report was created using RETScreen's Portfolio manager reporting system. Using ekWh's allows for a comparison of total energy used (electricity and natural gas) giving an analysis of total energy usage for the Board:

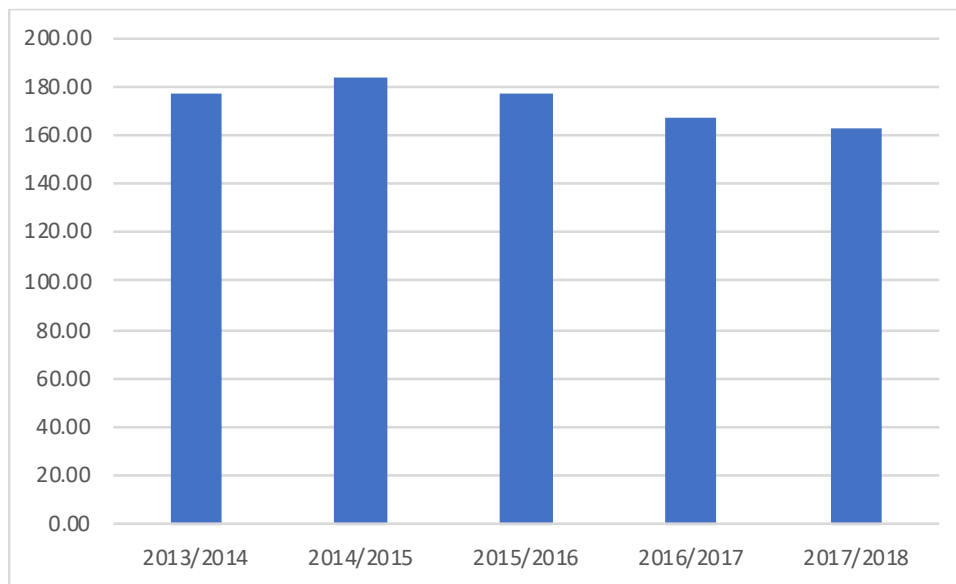
Figure 1-3 – ekWh Comparison (Fiscal 2013/2014 – 2017/2018)



This chart reveals that the Board decreased their ekWh consumption by 12% between the base year of 2013/2014 (812,800 ekWh) and 2017/2018 (715,624 ekWh).

Changes in total m2 of facility floor area can influence overall energy usage for the Board. For example, building a new school or removing an old one from the building fleet can have a significant effect on Board-wide energy consumption. Similarly, weather and temperature are major variables affecting energy consumption.

Figure 1-4 Weather-Normalized Energy Intensity (ekWh/m²)



After an initial increase in the first year, the Board's Weather-Normalized Energy Intensity (ekWh/m²) has reduced by almost 12% (183.78 in fiscal 2014/2015 and 162.08 in fiscal 2017/2018). This means that the Board's conservation activities are having a strong effect on energy consumption. This measure follows a similar pattern to the raw data analysis.

Energy Conservation Project Successes

Since the creation of the last 5-Year ECDM Plan, the Board has initiated significant investments in energy efficiency and energy-cost reduction. These projects include:

- LED lighting retrofits
- Audits and retro-commissioning assessments
- HVAC and controls upgrades
- Boiler retrofits and replacements

The above projects have resulted in both utility incentives and annualized energy savings. Details of our previous conservation investments can be found in Appendix B.

2.0 Energy Conservation and Management Policy

Our Commitment

Superior-Greenstone District School Board is committed to allocating the resources to develop and implement a strategic Energy Conservation and Demand Management (ECDM) Plan that will reduce energy consumption and its related environmental impact. As an organization, we value the notion of efficient operations and creating a more sustainable community.

We are committed to managing energy responsibly and will use energy efficiency practices throughout our facilities, operations and equipment wherever it is cost effective and we are able to secure funding to do so.

Our Vision

Superior-Greenstone District School Board endeavours to minimize energy consumption, related costs, and carbon emissions by continuously improving its energy management practices without compromising the level of service delivery to the school community.

Our Goals and Objectives

As part of our 2019 ECDM Plan, the Board created several strategic avenues to achieve specific goals and targets with regards to energy management. We have re-examined our past objectives and are re-committing to this updated version.

1. Reduce energy intensity in Board facilities by 5% by 2024. This is in addition reduction achieved between 2013 and 2018.
2. Enhance our culture of conservation through training and outreach to staff, students and facility users. Through this training staff will have the appropriate knowledge and training to be empowered to reduce energy consumption.
3. Expand upon our comprehensive energy management policy and practices by enhancing key existing business practices to include energy efficiency standards and energy management best practices.
4. Expand our monitoring and tracking program for energy use by providing access to our energy management system to make energy consumption visible to everyone in the Board and support facility/management decision-making.
5. Deliver energy cost savings through the identification and implementation of processes, programs and projects that will reduce energy consumption.
 - Re-assess and benchmark the top energy consuming facilities in the Board. (2019)

- Review previously identified energy savings opportunities through review of past energy audits and plan to renew energy audits and analysis of the capital asset renewal program. (Ongoing)
- Review and/or enhance standard operating and maintenance procedures to include energy conservation best practices. (Ongoing)
- Seek funding for energy-related projects from various sources to enhance the payback and reduce implementation costs. (Ongoing)

Strategic Action Plan

To achieve our new ECDM Plan, the Board will employ the following strategies designed to ensure a positive outcome over the next 5 years. These key strategies support the delivery of our Goals and Objectives.

Strategy 1. Policies and Practices

Develop policies and practices that support the energy conservation effort and show leadership and commitment within the Board and community.

- Energy Management Team: Roles, Responsibilities and Accountability
- Energy and Resource Conservation Policy

Strategy 2. Education, Awareness & Outreach

Provide the guidance, leadership and framework necessary to empower staff and develop a culture of conservation.

- Energy Skills Training Program
- Energy Awareness Training
- Outreach, Engagement and Recognition Programs
- Feedback System for Suggestions
- Brainstorming Sessions

Strategy 3. Energy Conservation Action Plan and Energy Information Management

Continually identify and deliver energy conservation processes, programs and projects in all areas of the Board (facilities, equipment, etc.). Demonstrate sound operating and maintenance practices to complement the energy efficiencies implemented through the capital asset renewal program. Employ a robust Energy Information Management System to ensure that all conservation activities are measured and verified to ensure the Board receives and maintains specified energy reductions and savings.

Energy Conservation Action Plan

- Key facility energy audits
- Asset renewal plan and energy conservation project delivery
- Standard facility operations procedure review

Energy Information Management

- Maintenance of the online energy monitoring and reporting system (electricity, natural gas and fuels)

- Regular Energy Use Review presentations for the community, council, accountable staff and energy users
- Energy bill verification and rate optimization
- Reporting requirements for Regulation 507/18 (formerly 397/11)
- Consistent updates and review of key performance indicators (KPIs)/benchmarking
- Standardize and implement project measurement and verification

3.0 STRATEGY 1: Energy Management Practices

Superior-Greenstone District School Board has implemented essential practices, including key personnel deployment, to ensure a strong focus on energy management and savings. These efforts remain a key component of our renewed ECDM Plan.

The Energy Management Team: Roles and Responsibilities

Energy Leader: Manager of Plant Operations, Transportation and Health & Safety

The Energy Leader is ultimately responsible for creating budgets, securing spending authority and resources for the program. This role is responsible for setting and/or legitimizing the program's high-level goals and objectives, keeping track of major project activities and approving resources and funding for the team and its approved projects.

The Energy Leader has direct knowledge of the Board's major energy-using systems and is responsible for developing and maintaining the focus for the Energy Management Team. The role coordinates meetings, sets agendas, and delegates and manages tasks related to the Energy Management Team. The Energy Leader helps create the vision for the program and will help the program maintain momentum, particularly when barriers arise. The Energy Leader is also responsible for ensuring that the monitoring and tracking systems for energy are accurate, up-to-date and available for use by Board staff.

Board Energy Management Team

Our Energy Management Team functions on a strategic level to set expectations for each of the Board facilities, develops metrics for tracking overall energy improvement, and builds accountability for energy management activities. In addition, this cross-functional team has direct responsibility for the consumption of energy within their respective departments. As a group, the team supports and monitors the energy management initiatives (processes, programs, and projects) at the various facilities and across the Board.

Actions: Continue to seek cross-departmental membership and support for the Energy Management Team. Continue to discuss the Energy Management Program to ensure implementation of new savings ideas as well as maintain the positive momentum built over the past 5 years.

Energy and Resource Conservation Policy

The Board has developed a comprehensive Energy and Resource Conservation policy. This policy advises the Board's decision-making regarding various aspects of energy and resource use and conservation. A copy is attached in Appendix C.

4.0 STRATEGY 2: Education, Awareness and Outreach

The Board's Education, Awareness and Outreach program will be utilized to assist with the maintenance of the Board's culture of conservation. This will be achieved by raising the level of awareness, understanding and general knowledge amongst staff regarding energy spending, usage and conservation. The Board will utilize a successful combination of program engagement, direct awareness marketing and hands-on training to enhance our energy reduction efforts to support the achievement of our energy conservation goals and objectives. As well, energy will be a regular agenda item at staff meetings to solicit new ideas for reduction of energy use, promote continued awareness of the cost of energy and ensure that energy conservation remains a key consideration for all Board staff.

The Education, Awareness and Outreach program provides guidance, leadership and the framework to empower staff and foster our culture of conservation. The program informs the organization of current energy use, operational practices as well as improvement opportunities, while ensuring that all staff have an opportunity to remain informed of the Board's energy reduction efforts. This continued practice will foster the greatest possible impact of education and awareness.

The program is comprised of the following focus areas:

Energy Skills Training Program

The Energy Skills Training Program is a vehicle for staff to continue to develop a general awareness and understanding of current energy use within the Board as well as skills to identify opportunities for improvement. The Training Program combines both general knowledge training and hands-on experience to gain maximum benefit.

Brainstorming Sessions are an important part of the Energy Skills Training Program and are encouraged during the Energy Team meetings as a way of generating new ideas for energy conservation. As regular users and managers of Board facilities, our staff are one of our most valuable resources to both generate and implement our energy conservation strategies.

Outreach, Engagement, Recognition and Energy Awareness Training Program

The Superior-Greenstone District School Board will continue to engage all users of Board facilities (staff, students and general public) and recognizes that this is essential to the continued success of the energy management program. Our energy program will continue to employ a comprehensive approach to both engaging staff and recognizing the efforts of staff who provide important support and ideas.

The Energy Awareness Training Program has been developed to provide consistent energy conservation messaging throughout all departments using Community-Based Social Marketing (CBSM) techniques to engage all users of Board facilities. Specific methods used to date include conservation tips, eye-catching posters and other relevant marketing tools. It is the intention of this program to expand our

ability and focus to enable the Board to become a 'clearinghouse' of information for staff, students and facility users to discover ideas and incentives to improve their own energy usage practices.

Feedback System for Suggestions

The Superior-Greenstone District School Board will create a feedback system to encourage staff, students and others to provide input and ideas. The suggestions submitted will be forwarded to the Energy Management Team to ensure a prompt response. The Energy Management Team can engage relevant staff to ensure that all ideas are captured and explored.

Actions: Review available energy training opportunities both generally (i.e. all staff) and for specific departments. Establish and maintain at least annual Outreach and Engagement efforts to keep energy conservation 'top-of-mind' for staff, students and stakeholders.

5.0 STRATEGY 3: Energy Conservation Activities and Information Management

Energy Conservation Action Plan

The Ministry of Energy 2019 Energy Conservation and Demand Management Plan Template (Appendix A) forms the blueprint for implementing energy conservation and cost saving measures. The Board has created a list of potential projects based on previous facility energy audits. The attached action plans have been created to guide this process based on a prioritized implementation schedule. All available incentives and funding sources will be explored to minimize the implementation cost of each measure. In addition to the measures shown, the Board anticipates that further energy audits, completed over the next 5 years, will augment the list of available energy conservation measures.

Appendix B contains a year-by-year implementation strategy. In all, the measures will include:

- Building envelope improvements
- HVAC and controls upgrades
- Boiler replacements
- LED lighting retrofits
- Geothermal upgrades

Additional measures will be added as funding becomes available on an annual basis. In general terms, our actions are expected to yield the following results:

- Education, Awareness and Outreach: 1-2% annual energy savings
- On-going regular reviews of consumption and baselines: 0.5 to 1% annual energy savings
- Re/retro Commissioning: 2-7% annual energy savings within the facilities where it is implemented (estimated to be 1% overall potential total annual savings)

Actions: Maintain a schedule of energy consumption reviews, audit renewals and re/retro-commissioning studies to ensure that our list of measures is up-to-date and that previous measures are still functional and providing savings. Perform periodic reviews of available incentives and stay up-to-date on potential sources of funding to offset the implementation costs of the proposed future measures. Review the list of measures at least annually and update as funding becomes available.

Energy Information Management

Online Energy Monitoring and Reporting System

The Superior-Greenstone District School Board utilizes the Ministry of Education's Utility Consumption Database (UCD) portal and has implemented a system for managing and reporting on its energy consumption (electricity, natural gas, fuels) and water. The motivation for this effort is the notion that "you can't manage what you are not aware of". By making our energy usage visual, and keeping the

information up-to-date, all personnel can benefit from understanding the nature of energy use in their facilities, as well as the impact their actions or inactions have on the Board's overall energy cost and budgeting. This information is also key in evaluating the potential of new conservation projects as well as measuring the effectiveness of initiatives already taken.

Actions: Continue to gather and upload energy data into the Energy Information Management System regularly and analyze the data for patterns and savings opportunities.

Energy Management Presentations for the Staff, Students and Energy Users

To gain traction for the initiatives within this Plan and ensure that the Board reaches its stated reduction targets, it is imperative that information regarding energy usage and cost, as well as the Board's energy conservation plans and projects, are well understood and top of mind of everyone from front-line staff to senior management. This broad awareness will lead to additional buy-in and support for the Board's continued efforts to reduce its energy usage and spending.

Actions: Make energy a key topic at staff and senior management meetings as well as provide an update on energy use and conservation to senior management, at least annually.

Key Performance Indicators (KPI's) and Monitoring and Verification

To ensure momentum continues, and the Board receives value-for-money with regards to its energy conservation efforts, a rigorous program of establishing KPI's and then monitoring and verifying ongoing savings is an essential element of this Plan. By establishing agreed upon KPI's and then performing regular and frequent monitoring, not only will Board personnel be able to verify that savings expected from various projects is achieved, but that the savings continue for the duration of the project or retrofit's useful life. This practice will protect the Board's investments as well as provide transparency and support for successful savings initiatives.

Actions: Review all conservation initiatives to understand the most appropriate monitoring and verification process. Review the project savings at pre-defined regular intervals and report outcomes to senior management.

Bill Verification and Rate Optimization

A consistent, periodic review of the Board's energy invoices is important to ensure that rates and recorded consumption values on energy bills is accurate. This ensures that the invoices presented by utilities are correct and are providing appropriate and relevant data to the Board's Energy Management Platforms.

Actions: Perform a rationalization check on monthly invoices and conduct at least annual detailed billing reviews to ensure accuracy.

Ongoing Ontario Regulation 507/18 Reporting

In addition to completing this Plan, the Superior-Greenstone District School Board is required to submit annual energy consumption and greenhouse gas emissions templates to the appropriate Ministry of Energy portal. Gathering and recording monthly energy invoices are necessary to complete these reports.

Actions: Complete all required regulatory reporting by July 1 of each year.

APPENDIX A: Ministry of Energy 2019 Energy Conservation and Demand Management Plan Template



Energy Conservation and Demand Management Plan

The plan is due by July 1, 2019.

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Education Sector Background

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 assignment in March for the next school board Fiscal Year (September 1st to August 31st). The Ministry gives funding only on a year-by-year basis.

While a board may have a five-year energy management strategy, the ability to implement their strategy depends on the funding that's received for each of the five years covered by their plan.

Asset Portfolios and Energy Management Planning

The education sector is unique in that a board's asset portfolio can experience important changes that crucially impact a board's energy consumption over a five-year period.

The following is a list of some of the most common variables and metrics that change in the education sector.

Facility Variables:

- Construction
 - Year built
 - Number of floors
 - Orientation of the building
- Building Area
 - Major additions
 - Sites sold/closed/demolished/leased
 - Portables
 - Installed
 - Removed
 - Areas under construction
- Equipment/Systems
 - Age
 - Type of technology
 - Lifecycle
 - Percentage of air-conditioned space

- Site Use
 - Elementary school
 - Secondary school
 - Administrative building
 - Maintenance/warehouse facility
 - Community Hubs
- Shared Site Use (For example: two or more boards share common areas and/or partnered with a municipality)
 - Swimming pools
 - Libraries
 - Lighted sports fields
 - Sports domes

Other Variables:

- Programs
 - Child care
 - Before/After School Programs
 - Summer School
 - Community Use
 - Outdoor ice rinks
- Occupancy
 - Significant increase or decrease in number of students
 - Significant increase in the hours of operation
 - New programs being added to a site
- Air Conditioning
 - Significant increase in air-conditioned space
 - Portables

PART I: A REVIEW OF PROGRESS & ACHIEVEMENTS in the PAST FIVE YEARS

A. The Board's Asset Portfolio

The following table outlines the energy-related variables and metrics 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 1: Board's Asset Portfolio

Key Metrics	(Baseline Year) Fiscal Year 2012 to 2013	Fiscal Year 2017 to 2018	Variance
Total Number of Buildings	23.00	23.00	0.00
Total Number of Portables/Portapaks	2.00	2.00	0.00
Total Floor Area (ft ²)	626,883.13	658,433.44	31,550.31
Average Operating Hours	46.00	46.00	0.00
Average Daily Enrolment	1,266.38	1,145.00	-121.38
Other Relevant Changes in the Operation of Assets:			

B. Energy Usage Data for the Board

The following table lists the “metered”¹ consumption values in the common unit of Equivalent Kilowatt Hours (ekWh) and Kilowatt Hours (kWh).

Table 2: Metered Usage Values

Utility	Fiscal Year 2012 to 2013 (Baseline year)	Fiscal Year 2017 to 2018
Total Electricity (kWh)	3,746,012.00	6,353,818.00
Total Natural Gas (ekWh)	4,755,163.00	3,899,728.00
Total Heating Fuel (Type 1 and 2) (ekWh)	17,943.99	0.00
Total Heating Fuel (Type 4 and 6) (ekWh)	0.00	0.00
Total Propane (ekWh)	0.00	0.00
Total Wood (ekWh)	0.00	0.00
Total District Heat (ekWh)	0.00	0.00
Total District Cool (ekWh)	0.00	0.00

C. Weather Normalized Energy Consumption Values

In Ontario, 25% to 35% of energy consumption for a facility is affected by weather.

To demonstrate the effect of weather, the following table shows the Weighted Average Heating Degree Days (HDD)² and Cooling Degree Days (CDD)³ for the six most common Environment Canada weather stations in the Ontario education sector.

¹ Metered consumption is the quantity of energy used and does not include a loss adjustment value (the quantity of energy lost in transmission).

² 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.

³ 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.

Table 3: 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

The best way to compare energy usage values from one year to another is to use weather normalized values as they take into consideration the impact of weather on energy performance and allows an “apple-to-apple” comparison of consumption across multiple years.

However, a straight comparison of Total Energy Consumed between one or more years does not take into consideration changes in a board’s asset portfolio, such as changes in buildings’ features (refer to the Facility Variables listed on pages 5 and 6), and newly implemented programs (refer to the Note to Readers on pages 10-12) which will greatly impact energy consumption.

As a result, weather normalized Energy Intensity⁴ is the most accurate measurement that allows the evaluation of a board’s energy use from one year to another as it cancels out any change in floor area. The unit of measurement used is either equivalent kilowatt hours per square foot (ekWh/ft²) or equivalent kilowatt hours per square metre (ekWh/m²).

Table 4: Weather Normalized Values

Weather Normalized Values	Fiscal Year 2012 to 2013 (Baseline Year)	Fiscal Year 2017 to 2018 (Most Recent Data Available)
Total Energy Consumed (ekWh)	8,117,656.00	9,914,384.00
Energy Intensity (ekWh/ft ²)	12.95	15.06
Energy Intensity (ekWh/m ²)	139.38	162.08

⁴ Energy Intensity (known as EI) is the quantity of total energy consumed divided by the total floor area. EI is typically expressed as equivalent kilowatt hours per square foot (ekWh/ft²), gigajoule per square metre (GJ /m²), etc., depending on the user’s preference.

D. Review of Previous Energy Conservation Goals and Achievements

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

Table 5: Comparison of Energy Intensity Conservation Goal and Actual Energy Intensity Reduced

Fiscal Year	Conservation Goal ekWh/ft2	Conservation Goal ekWh/m2	Conservation Goal Percentage	Actual Energy Savings ekWh/ft2	Actual Energy Savings ekWh/m2	Actual Energy Percentage
2013 to 2014			No Specific Target Set	-3.48	-37.44	-26.86
2014 to 2015			No Specific Target Set	-0.65	-6.96	-3.94
2015 to 2016			No Specific Target Set	0.67	7.17	3.90
2016 to 2017			No Specific Target Set	0.88	9.44	5.35
2017 to 2018			No Specific Target Set	0.47	5.09	3.05

NOTE TO READERS:

The Conservation Goals were forecasted in Spring 2014. Since then several factors, which impact energy use, have been introduced to the education sector that may either raise or limit a board's ability to make the forecasted Conservation Goals.

Some of these factors include:

Full Day Kindergarten (also known as FDK)

The introduction of FDK created many new spaces through new additions or major renovations of existing facilities. The result was more floor area and sometimes more energy-intensive designs due to factors such as:

- Higher ventilation requirements,
- Use of air conditioning, etc.

These factors increase the energy intensity of a building. Under FDK, spaces for more than 470,000 new students were added to the education sector.

Before and After School Programs

These programs were implemented to help the introduction of FDK spaces. However, Before-School and After-School Programs need a facility's Heating, Conditioning, and Air Conditioning (also known as HVAC) system to operate for an extended period of time on a daily basis, which will increase the overall energy intensity.

Community Use of Schools

The Ministry of Education introduced funding to all school boards, so they can make school space more affordable for use after hours. Both indoor and outdoor school space is available to not-for-profit community groups at reduced rates, outside of regular school hours. The use of spaces in schools, typically gymnasiums and libraries, increased to maximum usage. The use of these spaces during non-school hours requires a facility's HVAC system to operate for an extended period of time on a daily basis, which will increase the overall energy intensity.

Community Hubs

In 2016, the Ministry of Education introduced funding for boards to carry out Community Hubs within their asset portfolios. As a result, many schools now offer a greater range of:

- events (cultural),
- programs (arts, recreation, childcare), and
- services (health, family resource centres).

The dramatic increase in community use means that many schools now run from 6:00 a.m. until 11:00 p.m. during weekdays and are open many times on weekends. The use of these spaces during non-school hours requires a facility's HVAC system to operate for an extended period of time on a daily basis, which will increase the overall energy intensity.

Air Conditioning

Historically, schools have not had air conditioning, or it has been a minimal space in the facility. However, with changing weather patterns, "shoulder seasons" such as May, June and September are experiencing higher than normal temperatures. Parents are demanding that schools have air conditioning. Air conditioning significantly increases a facility's energy use.

Compliance with current Ontario Building Code (also known as OBC)

When renovations or an addition is built onto an existing school, in-place equipment such as HVAC systems, lighting etc., may be required to meet up-to-date OBC standards which may result in increased energy use.

For example under the OBC, buildings built today have increased ventilation requirements, meaning more outside air is brought into a facility. As a result, HVAC systems need to work longer to heat or cool the outdoor air to bring it to the same temperature as the standard indoor temperature for the building.

E. Cumulative Energy Conservation Goal

The following table compares the 2014 Forecasted Cumulative Energy Intensity Conservation Goal with the Actual Cumulative Energy Intensity Reduced Savings.

Table 6: Cumulative Energy Intensity Goal from Fiscal Year 2013 to 2014 through Fiscal Year 2017 to 2018

Cumulative Energy Intensity	(ekWh/ft ²)	(ekWh/m ²)	Variance
Forecasted. Cumulative Energy Intensity Conservation Goal of Fiscal Year 2013 to 2014 through Fiscal Year 2017 to 2018	No Specific Target Set	No Specific Target Set	Do not write in this cell
Forecasted Cumulative Energy Intensity Conservation Goal as a Percentage	Do not write in this cell	Do not write in this cell	No Specific Target Set
Actual Cumulative Energy Intensity Reduced or Increased from Fiscal Year 2013 to 2014 through Fiscal Year 2017 to 2018 – Weather Normalized	2.11	22.69	Do not write in this cell
Variance between 2014 Forecast Cumulative Conservation Goal and Actual Cumulative Energy Intensity– Weather Normalized	No Specific Target Set	No Specific Target Set	Do not write in this cell
% of Cumulative Energy Intensity Conservation Goal Achieved - Weather Normalized	Do not write in this cell	Do not write in this cell	No Specific Target Set

F. Measures Implemented from Fiscal Year 2012 to 2013 to Fiscal Year 2017 to 2018

A list of the measures implemented, the related costs, and the fiscal year that the measure was implemented within the Board are outlined in **Appendix: Investments in Energy Efficiency between Fiscal Year 2013 and Fiscal Year 2018**. Here is the list of sheets:

1. Design, Construction and Retrofit Investments
2. Operations and Maintenance Investments
3. Occupant Behaviour Investments
4. Renewable Energy Investments
5. Summary of All Investment Types

NOTE TO READERS:

Important Consideration - It takes a minimum of one full year after an energy management strategy has been implemented before an evaluation can figure out the related actual energy savings achieved.

PART II – ENERGY CONSERVATION and DEMAND MANAGEMENT PLAN for FISCAL YEAR 2018 to 2019 to FISCAL YEAR 2023 to 2024

Part II outlines the board's plan to reduce energy consumption through renewable energy and energy management strategies including:

1. Design, Construction and Retrofit;
2. Operations and Maintenance; and lastly
3. Occupant Behavior.

Background

1. To date the Board's energy management strategy has included the following:

(Prose box: Board to insert text – regarding philosophy)

2. The Board has an energy management position which includes the following options.

☒ In-house including:

- a. Shared job function

☒ Contracted third party, or

☐ None

3. Energy Management Strategies

Energy management strategies fall into four key categories:

1. Renewable Energy
2. Design/Construction/Retrofit
3. Operations and Maintenance
4. Occupant Behaviour

Renewal Energy

Definition

Renewal energy is a strategy to cut down a board's energy use from the province's electricity grid and includes:

- solar panels
- wind turbines, etc.

For a list of the Board's renewable energy projects, please refer to the **Calculating Energy Conservation Goals Fiscal Year 2019 to Fiscal Year 2023** explained in **Appendix A: Renewable Energy**.

Design/Construction/Retrofit

Definition

Design, construction, and retrofit includes the original and ongoing intent of how a building and its systems are to work through the combination of disciplines such as architecture and engineering.

For the Board's relevant projects over the next five years, please refer to **Calculating Energy Conservation Goals Fiscal Year 2019 to Fiscal Year 2023, Appendix B: Design, Construction, and Retrofit**.

Operations and Maintenance

Definition

Operations and maintenance include the strategies the Board uses to make sure that the existing buildings and equipment performs at maximum efficiency. For the Board's relevant projects over the next five years, please refer to **Calculating Energy Conservation Goals Fiscal Year 2019 to Fiscal Year 2023, Appendix C: Operations and Maintenance**.

Occupant Behaviour

Definition

Strategies that the Board uses to teach occupants, including staff, students and community users, with an emphasis on changing specific actions to reduce energy consumption. For the Board's relevant projects over the next five years, please refer to **Calculating Energy Conservation Goals Fiscal Year 2019 to Fiscal Year 2023, Appendix D: Occupant Behaviour**.

A. Future Energy Conservation Goals

The Board has set out the following energy intensity reduction conservation goals for the next five fiscal years.

Table 7: 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
ekW/ft2		0.67	1.20	1.15	1.09
ekW/m2		9.32	12.90	12.38	11.79
Percentage Decrease		5.75	7.96	7.64	7.27

The following table shows the Board's Cumulative Energy Intensity Conservation Goal for the next five fiscal years.

Table 8: Cumulative Conservation Goal

Cumulative Conservation Goal	Fiscal Year 2018 to 2019 through Fiscal Year 2022 to 2023
ekWh/ft2	4.31
ekWh/m2	46.38
Percentage Decrease	28.61

NOTE TO READERS:

There are many factors that influence a board's ability to meet energy conservation goals. A list of some of these factors include, but are not limited to, in the following changes:

1. Changes in Programming

For example:

- Introduction of Before and After School Programs to schools meant that the number of hours that a facility's HVAC system operates daily was expanded by four or more hours per weekday to reflect the longer occupancy hours.

2. Changes to the Ontario Building Code

For example:

- Regular changes/updates to the Ontario Building Code can impact energy use. For example, an increase in levels of ventilation in newly constructed buildings or other requirements. As a result, more fresh air is brought into a school to meet the ventilation requirements throughout the day requires heating and cooling of the air (dependent on the season) to meet standard classroom temperatures.

3. Changes to School Board Funding Models

- Forecasted Conservation Goals are based on current funding models being in place throughout the next five years.
- All boards' funding is determined on an annual basis. Any changes to the funding model will impact forecasted values.

4. Changes in Technology

- Forecasted Conservation Goals are based on current technologies and related energy savings. If new technologies become available, anticipated energy savings may increase.

B. Environmental Programs

In Fiscal Year 2018 to 2019, schools within the Board participated in environmental programs.

1. Eco Schools:
___ number of schools participate
2. Earth Care Schools:
___ number of schools participate
3. Enbridge: The School Energy Challenge
___ number of schools participate
4. Other: The School Energy Challenge
The name of the program is _____
___ Number of schools participate

C. Energy Efficiency Incentives

1. The Board applies to incentive programs to support the implementation of energy efficient projects on a regular basis.

☒ Yes ☐ No

If yes, between Fiscal Year 2013 to 2014 and Fiscal Year 2017 to 2018, the Board has applied for incentive funding from different agencies to support the implementation of energy efficient projects.

2. The Board uses the services of the sector's Incentive Programs Advisor (IPA).

☒ Yes ☐ No

D. Energy Procurement

1. The Board participates in a consortia arrangement to purchase electricity.

☐ Yes ☒ No

If yes,

☐ OECM's Strategic Electricity Management and Advisory Services

☐ Other:

Provide Name of Consortia: _____

2. The Board participates in a consortia arrangement to purchase natural gas.

☐ Yes ☒ No

If yes,

☐ Ontario Education Collaborative Marketplace's (also known as OECM) Natural Gas Management and Advisory Services

☐ Catholic School Board Services Association' (also known as CSBSA) Natural Gas Management and Advisory Services

☐ Other:

Provide Name of Consortia: _____

E. Demand Management

1. The Board uses the following method(s) to monitor electrical Demand:

☒ Invoices

☒ Real-time data

☐ Online data from the Local Distribution Company (LDC)

☐ Other:

2. The Board uses the following methodologies to cut down electrical Demand:

☒ Equipment scheduling

☒ Phased/staged use of equipment

☐ Demand-limit equipment

☐ Deferred start-up of large equipment (e.g. chiller start-up in spring)

☐ Other:

F. Senior Management Approval of this Energy Conservation and Demand Management Plan

I confirm that Superior-Greenstone District School Board senior management has reviewed and approved this Energy Conservation and Demand Management Plan.

Full Name: Nicole Morden-Cormier

Job Title: Director of Education

Date: June 6, 2019

APPENDIX B: Historic and Planned Energy Conservation Measures and Calculations

Investments in Energy Management Strategies

Press TAB to move to input area. Press UP or DOWN ARROW in column A to read through the document.

Design, Construction and Retrofit Strategies

	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Lighting	Investments in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies
High-efficiency Lighting Systems (T-8, T-5, CFL, LED ...)	\$ 24,675	\$ 96,481	\$ 237,859	\$ 430,446	\$ 10,709
Daylight Sensors	\$ -	\$ -	\$ -	\$ 50,616	\$ -
Outdoor Lighting	\$ -	\$ -	\$ -	\$ -	\$ -
Occupancy Sensors	\$ -	\$ -	\$ -	\$ -	\$ -
Daylight Harvesting	\$ -	\$ -	\$ -	\$ -	\$ -
Other (Describe)	\$ -	\$ -	\$ -	\$ -	\$ -

	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
HVAC	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies
Efficient Boilers (near condensing)	\$ 42,000	\$ 36,906	\$ 45,187	\$ 578,847	\$ -
High-efficiency Boilers (condensing)	\$ 11,199	\$ -	\$ 130,606	\$ 122,904	\$ -
High-efficiency Boiler Burners	\$ -	\$ -	\$ -	\$ -	\$ -
Geothermal	\$ 17,037	\$ 30,802	\$ -	\$ 47,775	\$ -
Heat Recovery/Enthalpy Wheels	\$ -	\$ -	\$ -	\$ -	\$ -
Economizers	\$ -	\$ -	\$ -	\$ -	\$ -
Energy Efficient HVAC Systems	\$ 17,344	\$ -	\$ 39,121	\$ 699,927	\$ 517,565
Energy Efficient Rooftop Units	\$ -	\$ -	\$ -	\$ -	\$ -
High-efficiency Domestic Hot Water	\$ -	\$ -	\$ -	\$ -	\$ -
Efficient Chillers and Controls	\$ -	\$ -	\$ -	\$ -	\$ -
High-efficiency Motors	\$ -	\$ -	\$ -	\$ -	\$ -
VFD	\$ 26,481	\$ -	\$ -	\$ 44,497	\$ -
Demand Ventilation	\$ -	\$ -	\$ -	\$ -	\$ -
Entrance Heater Controls	\$ -	\$ -	\$ -	\$ -	\$ -
Other (Describe)	\$ -	\$ -	\$ -	\$ -	\$ -

	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Controls	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies
Building Automation Systems - New	\$ -	\$ -	\$ -	\$ -	\$ -
Building Automation Systems - Upgrade	\$ 17,681	\$ -	\$ 48,788	\$ 444,097	\$ 43,489
Other (Describe)	\$ -	\$ -	\$ -	\$ -	\$ -

	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Building Envelope	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies
Glazing	\$ -	\$ -	\$ -	\$ -	\$ -
Increased Wall Insulation	\$ -	\$ -	\$ -	\$ 49,865	\$ -
New Roof	\$ 397,841	\$ 1,006,389	\$ 962,840	\$ 1,662,164	\$ -
New Windows	\$ 23,917	\$ 73,690	\$ 113,739	\$ 728,249	\$ -
Treatments	\$ -	\$ -	\$ -	\$ -	\$ -
Shading Devices	\$ -	\$ -	\$ -	\$ -	\$ -
Other (Describe)	\$ -	\$ -	\$ -	\$ -	\$ -
Total Investment in Design, Construction and Retrofit Strategies	\$ 578,175	\$ 1,244,268	\$ 1,578,140	\$ 4,859,387	\$ 571,763

Investments in Energy Management Strategies

Operations and Maintenance Strategies

	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Policy and Planning	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies
New School Design/Construction Guidelines and Specifications	\$ -	\$ -	\$ -	\$ -	\$ -
Day and Night Temperature Guidelines for all Schools	\$ -	\$ -	\$ -	\$ -	\$ -
Nighttime Blackout of Sites - Interior	\$ -	\$ -	\$ -	\$ -	\$ -
Nighttime Blackout of Sites - Exterior	\$ -	\$ -	\$ -	\$ -	\$ -
Procures Only Energy Star Certified Appliances	\$ -	\$ -	\$ -	\$ -	\$ -
Daylight Harvesting (servicing)	\$ -	\$ -	\$ -	\$ -	\$ -
Demand Ventilation (servicing)	\$ -	\$ -	\$ -	\$ -	\$ -
Other (Describe)	\$ -	\$ -	\$ -	\$ -	\$ -
	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Energy Audits	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies
Walk Through Audit	\$ -	\$ -	\$ -	\$ -	\$ -
Engineering Audit	\$ -	\$ -	\$ -	\$ -	\$ -
Other (Describe)					
Total Investment in Operations and Maintenance Strategies	\$ -	\$ -	\$ -	\$ -	\$ -

Investments in Energy Management Strategies

Occupant Behaviour Strategies

	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Training and Education	Estimated Cost of Implementation	Estimated Cost of Implementation	Estimated Cost of Implementation	Estimated Cost of Implementation	Estimated Cost of Implementation
Building Operator Training	\$ -	\$ -	\$ -	\$ -	\$ -
NRCan Benchmarking Program	\$ -	\$ -	\$ -	\$ -	\$ -
Building Automation Training (site specific)	\$ -	\$ -	\$ -	\$ -	\$ -
Ongoing Training and Awareness Programs for Energy Conservation	\$ -	\$ -	\$ -	\$ -	\$ -
Provide Detailed Information on Building Operational Costs	\$ -	\$ -	\$ -	\$ -	\$ -
Provide Detailed Information on Energy Consumption (e.g. via the Utility Consumption Database or other database)	\$ -	\$ -	\$ -	\$ -	\$ -
Participate in Environmental Programs, such as EcoSchools, Earthcare	\$ -	\$ -	\$ -	\$ -	\$ -
Other tools (Define)	\$ -	\$ -	\$ -	\$ -	\$ -
Total Investment in Occupant Behaviour Strategies	\$ -	\$ -	\$ -	\$ -	\$ -

Investments in Energy Management Strategies

	Investment in Renewable Energy Technology (\$)					Number of systems added	Capacity Added (kW)
	Fiscal Year 2013-2014	Fiscal Year 2014-2015	Fiscal Year 2015-2016	Fiscal Year 2016-2017	Fiscal Year 2017-2018		
Solar Photovoltaic	\$ -	\$ -	\$ -	\$ -	\$ -		
Solar Air	\$ -	\$ -	\$ -	\$ -	\$ -		
Solar Water	\$ -	\$ -	\$ -	\$ -	\$ -		
Wind Turbine	\$ -	\$ -	\$ -	\$ -	\$ -		
Biomass	\$ -	\$ -	\$ -	\$ -	\$ -		
Other	\$ -	\$ -	\$ -	\$ -	\$ -		
Total	\$ -	\$ -	\$ -	\$ -	\$ -		

Investments in Energy Management Strategies

Summary of Investment by Type						
	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2013/2014-2017/2018
Total Investments in Energy Management Strategies FY 2012-13 to FY 2017-18	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Total Investment in Energy Management Strategies
Design, Construction and Retrofit Investments Total	\$ 578,175	\$ 1,244,268	\$ 1,578,140	\$ 4,859,387	\$ 571,763	8,831,733
Operations and Maintenance Investments Total	\$ -	\$ -	\$ -	\$ -	\$ -	0
Occupant Behaviour Investments Total	\$ -	\$ -	\$ -	\$ -	\$ -	0
Renewable Energy Investments Total	\$ -	\$ -	\$ -	\$ -	\$ -	0
Total Investment Per Fiscal Year	\$ 578,175	\$ 1,244,268	\$ 1,578,140	\$ 4,859,387	\$ 571,763	8,831,733

Calculating Energy Conservation Goals for FY 2019 to FY 2023

Press TAB to move to input area. Press UP or DOWN ARROW in column A to read through the document.

Renewable Energy			Estimated number of systems installation					Estimated total number of ekWh generated annually						
Type of Renewable Energy	Define	Number of existing systems in asset portfolio (owned)	Fiscal Year 2018-2019	Fiscal Year 2019-2020	Fiscal Year 2020-2021	Fiscal Year 2021-2022	Fiscal Year 2022-2023	Fiscal Year 2018-2019	Fiscal Year 2019-2020	Fiscal Year 2020-2021	Fiscal Year 2021-2022	Fiscal Year 2022-2023	Total Size (kW)	Actual or Estimated Generation (ekWh)
Solar photovoltaic														0
Solar air														0
Solar water														0
Wind Turbine														0
Biomass														0
Other														0

End of worksheet.

Design, Construction and Retrofit Strategies

Lighting	Quantity of Time that Measure will be in place (years)	2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023		Energy Payback Period	% related to Electricity	% related to Natural Gas					
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Saving (kWh)	Estimated Total Accumulated Energy Savings (kWh)									
High Efficiency Lighting Systems	15	\$ -	-	\$ -	438,000	\$ -	357,551	\$ -	214,000	\$ -	174,694	\$ -	100,000	81,633	\$ -	50,000	40,816	2,158,367	7	100	0
Outdoor Lighting	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	100	0	0
Occupancy Sensors	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	5	100	0
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	0	-	100

H.V.A.C.	Quantity of Time that Measure will be in place	2010-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023		Energy Payback Period	% related to Electricity	% related to Natural Gas					
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Total Accumulated Energy Savings (kWh)									
Efficient Boilers (near condensing)	30	\$ -	-	\$ -	24,000	\$ -	44,405	\$ -	148,380	\$ -	275,045	\$ -	113,000	209,448	\$ -	25,000	46,338	1,481,307	15	5	95
High-efficiency Boilers (condensing)	15	\$ -	-	\$ -	-	\$ -	-	\$ -	16,000	\$ -	41,704	\$ -	150,000	41,704	\$ -	-	-	500,482	10	5	95
High-efficiency Boiler Burners	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	-	-	5	5	95
Geothermal	20	\$ -	-	\$ -	11,000	\$ -	1,796	\$ -	125,000	\$ -	20,408	\$ -	135,000	22,041	\$ -	145,000	-	23,673	35	100	0
Heat Recovery/Enthalpy Wheels	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	-	-	8	20	80
Economizers	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	-	-	7.5	50	50
Energy Efficient HVAC systems	30	\$ -	-	\$ -	465,000	\$ -	60,888	\$ -	298,000	\$ -	39,021	\$ -	275,000	36,009	\$ -	308,000	-	472,668	75	50	50
Energy Efficient Rooftop Units	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	-	-	30	50	50
High Efficiency Domestic Hot Water	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	-	-	10	15	85
Efficient Chillers and Controls	25	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	-	-	100	100	0
High-efficiency Motors	20	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	-	-	10	100	0
VFD	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	45,000	-	65,023	\$ -	35,000	-	50,573	5	75	25
Demand Ventilation	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	45,000	65,023	\$ -	35,000	-	50,573	5	50	50
Entrance Heater Controls	20	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	-	-	5	50	50
Reactivation Fans	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	-	-	7	100	0
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	-	-	-	0	-	100

Controls	Quantity of Time that Measure will be in place	2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023		Energy Payback Period	% related to Electricity	% related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Total Accumulated Energy Savings (kWh)				
Building Automation Systems - New	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	15	50	50
Building Automation Systems - Upgrade	10	\$ -	-	\$ -	33,000	\$ -	21,608	\$ -	250,000	\$ -	163,680	\$ -	-	15	50	50
Real-time energy data for operators to identify and diagnose building issues	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	3	50	50
Voltage Harmonizers	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	7	100	0
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	0	-	100

Building Envelope	Quantity of Time that Measure will be in place	2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023		Energy Payback Period	% related to Electricity	% related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Total Accumulated Energy Savings (kWh)				
Glazing	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	80	20	80
Increased Wall Insulation	30	\$ -	-	\$ 12,000	5,180	\$ 325,000	140,288	\$ 250,000	107,907	\$ -	-	657,372	40	20	80	
New Roof	25	\$ -	-	\$ 173,000	14,934	\$ 925,000	79,852	\$ 31,000	2,876	\$ 846,000	73,032	377,676	200	20	80	
New Windows	30	\$ -	-	\$ 294,000	63,450	\$ 276,000	59,565	\$ 125,000	26,977	\$ 135,000	29,135	515,562	80	20	80	
Treatments	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	10	20	80		
Shading Devices	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	20	100	-	-	
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	-	-	100

Design, Construction & Retrofit Strategies Total	Quantity of Time that Measure will be in place	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 (kW/h)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kW/h)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kW/h)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kW/h)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kW/h)	Estimated Total Accumulated Energy Savings (kW/h)	
Total		\$ -	-	\$ -	1,450,000	\$ 569,890	2,311,390	\$ 788,864	1,339,000	\$ 757,099	1,694,000	720,942	6,861,289

Keys	
colour: yellow	= Default value
colour: blue	= Calculated Value
\$ 173	= cost of 1 kWh electricity
\$ 0.0287	= cost of 1 kWh natural gas
0.0095	BTU to kWh (as per NRCES conversion table)
\$ 3.58	= cost of 1 m³ of natural gas

*This table is based on a range of estimates. The range of estimates is based on a range of estimates.

Operations and Maintenance Strategies																
Policy and Planning	Quantity of Time that Measure will be in place (years)	2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023		Energy Payback Period	% related to Electricity	% related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Total Accumulated Energy Savings (kWh)				
New School Design/Construction Guidelines and Specifications	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	5	50	50
Day and Night Temperature Guidelines for all Schools	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	5	20	80
Nighttime Blackout of Sites - Interior	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	7	100	-
Nighttime Blackout of Sites - Exterior	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	7	100	-
Requires Only Energy Star Certified Appliances	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	5	100	-
Demand Ventilation (savings)	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	5	50	50
HVAC Optimization (cool sharing, recalibration of equipment)	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	2	50	50
Commissioning (new and re)	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	10	50	50
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	0		100

Energy Audits		Quantity of Time that Measure will be in place	2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023		Energy Payback Period	% related to Electricity	% related to Natural Gas
			Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Total Accumulated Energy Savings (kWh)				
Walk Through Audit	5	\$	-	-	\$	-	\$	-	\$	-	\$	-	-	-	1000	50	50
Engineering Audit	5	\$	-	-	\$	-	\$	-	\$	-	\$	-	-	-	1000	50	50
Other (Describe)		\$	-	-	\$	-	\$	-	\$	-	\$	-	-	-	0		100

		2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023			
Operations and Maintenance Strategies Total	Quantity of Time that Measure will be in place	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (kWh)	Estimated Total Accumulated Energy Savings (kWh)			
Total		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-			

Keys	
\$6.175	= cost of 1 kWh electricity
\$5.000	= cost of 1 kWh natural gas
\$1.000	= cost of 1 m³ of natural gas

Press TAB to move to input areas. Press UP or DOWN ARROW in column A to read through the document.

Occupant Behaviour Strategies

Training and Education	Quantity of Time that Measure will be in place (years)	2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023	Energy Payback Period	% related to Electricity	% related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)			
Building Operator Training	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	3	60	40
Energy Benchmarking Program	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	1000	50	50
Building Automation Training (site specific)	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	1	60	40
Ongoing Training and Awareness Programs for Energy Conservation	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	10	90	10
Detailed Information on Building Operational Costs	1	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	1000	50	50
Detailed Information on Energy Consumption (e.g. via the Utility Consumption Database or other database)	1	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	1000	50	50
Participate in Environmental Programs, such as EcoSchools, Earthcare	1	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	5	90	10
Other Tools (Define)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	0		100
Occupant Behaviour Strategies Total		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-			

Keys	
\$0.175	= cost of 1 ekWh electricity
\$0.0287	= cost of 1 ekWh natural gas
0.0955	m³ = 1 ekWh
\$0.30	= cost of 1 m³ of natural gas

End of worksheet.

Calculating Energy Conservation Goals for FY 2019 to FY 2023

Press TAB to move to input area. Press UP or DOWN ARROW in column A to read through the document.

Conservation Goal		FY 2018	
Total Building Area (includes portables) (m²)		61,171	Enter from UCD. - use square meters
Total Building Area (includes portables) (ft²)		658,433	Enter from UCD - use square feet
Energy Consumption for the board (ekWh)		9,914,384	Enter from UCD

1 ft² = 0.0929 m²

	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)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
Appendix B: Design, Construction and Retrofit Strategies Total	\$ -	0	\$ 1,450,000	569,890	\$ 2,311,390	788,864	\$ 1,339,000	757,099	\$ 1,694,000	720,942	6,881,289
Appendix C: Operations and Maintenance Strategies Total	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	0
Appendix D: Occupant Behaviour Strategies Total	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	0
TOTAL	\$ -	0	\$ 1,450,000	569,890	\$ 2,311,390	788,864	\$ 1,339,000	757,099	\$ 1,694,000	720,942	6,881,289
Percentage reduction	-	-	-	5.75	-	7.96	-	7.64	-	7.27	28.61
Conservation Goal (ekWh/m²)	-	-	-	9.32	-	12.90	-	12.36	-	11.79	46.38
Conservation Goal (ekWh/ft²)	-	-	-	0.87	-	1.20	-	1.15	-	1.09	4.31
Note		Note		Note		Note		Note		Note	
Check the total in cell B15 to confirm validity of estimated amount to be spent during that year		Check the total in cell D15 to confirm validity of estimated amount to be spent during that year		Check the total in cell F15 to confirm validity of estimated amount to be spent during that year		Check the total in cell H15 to confirm validity of estimated amount to be spent during that year		Check the total in cell J15 to confirm validity of estimated amount to be spent during that year		Check the total in cell L15 to confirm validity of estimated amount to be spent during that year	

End of worksheet.

APPENDIX C: DRAFT ENERGY AND RESOURCE CONSERVATION POLICY

SUPERIOR-GREENSTONE DISTRICT SCHOOL BOARD

<i>Section</i>	FACILITIES AND GROUNDS
<i>Management Guideline</i>	ENERGY AND RESOURCE CONSERVATION
<i>Applicable Policy</i>	ENERGY AND RESOURCE CONSERVATION

Board Approved:

Reviewed:

Review by:

RATIONALE

A strong commitment on the part of the Board, administration, staff, and students, is key to an effective energy and resource conservation plan. Successful resource conservation can only be achieved with the support and assistance of each and every building user.

Energy management has become very important and necessary in order for the Board to minimize the cost of energy needed to operate the schools. Savings that are made in energy costs will lessen the funding burden on the Superior-Greenstone District School Board. This in turn translates into more funding available for actual use on school programs in the classroom.

This energy management-conservation guideline is a living document which will be updated on a frequent and ongoing basis as new technology comes into existence and as best practices are identified. The Plant Services Department manages all physical aspects of the Board's properties, and is the main contact for issues related to energy and resource use. Questions or suggestions can be directed to the SGDSB Manager of Plant Services.

1.0 Heating, Cooling and Ventilation

- 1.1 Acceptable classroom and workspace thermal conditions shall be maintained through mechanical heating ventilation, natural heating, ventilation, or other means as appropriate.
- 1.2 Building Occupied Hours: Thermal environmental conditions for human occupancy are currently targeted at:
 - a) Building heating system target temperature = 19-24 C
 - b) Building cooling system target temperature = 25 C or below (if mechanical cooling is available).
- 1.3 Building Unoccupied Hours: Outside of normal operating hours, building systems are, where equipped, automatically set back and optimized for energy conservation. This differs between buildings but generally, targets are set to be:
 - a) Setback room temperature = 15C
 - b) Fan forced ventilation is turned off on a schedule, or via occupancy sensors
 - c) Exhaust fans are turned off manually, or via timers.
- 1.4 It is the objective of the Plant Department to eventually have all heating, cooling, and ventilation equipment operate on an automated energy management system. It is not always economically feasible to control every device from a central point. Therefore, it is important that where a SMART thermostat is not in

use, people using the room ensure that thermostats are turned down at the end of the workday.

2.0 Lighting

- 2.1 Light Levels in rooms and buildings are set in accordance to the Ontario Building Code, and other applicable codes and regulations.
- 2.2 Where possible, exterior natural light should be used to supplement, or in place of, artificial lights (daylight harvesting).
- 2.3 When light bulbs are replaced, they are to be replaced with energy efficient bulbs which are compatible with the fixture in place.
- 2.4 The use of energy saving dimmable fluorescent ballasts or dimmable LED lights is encouraged in spaces such as video conference rooms, where the use of the room sometimes requires low-level lighting.
- 2.5 Occupancy sensors and light controls should be installed in gymnasiums and classrooms during renovations or upgrades. These devices should be kept in good working condition with any suspected malfunction reported promptly to the custodial staff who will submit work orders as needed to repair.
- 2.6 Lights should be turned off during unoccupied times. Most fluorescent light ballasts no longer use an initial excessive starting energy. Therefore, if the room is to be vacant for as little as five (5) minutes, turn off the lights.
- 2.7 Outside lights should be set on automatic sensors so they do not turn on until the light levels outside are low enough to warrant. Outside lights should be turned off, where practical, between the hours of 11:30 p.m. and 5:00 a.m.
- 2.8 Motion sensor lights should be used in areas where suitable, and as a security measure.

3.0 Water

- 3.1 Leaking taps, valves, or fixtures, should be reported to the custodian as soon as possible. The custodian will ensure that a work order is put in to have the repairs carried out as soon as practical.
- 3.2 Lawn irrigation systems shall be used in accordance to municipal bylaws, and only when weather conditions require. Moisture sensing systems must be utilized to ensure the systems do not run during rainy weather.
- 3.3 Automatic faucets shall be installed during renovations, new construction, or upgrades, in washrooms and other suitable spaces. This does not include food preparation areas and staff rooms.
- 3.4 Automatic toilet and urinal flush valves shall be installed during renovations, new construction or upgrades.

- 3.5 The use of flush tanks shall be discouraged. These systems should be replaced with automatic sensor valves on an ongoing basis, as funding becomes available.
- 3.6 Aside from the flushing of drinking water sources as prescribed by regulation, drinking fountains and sink taps shall not be left running when not in immediate use.

4.0 Information Technology

- 4.1 Power saver settings should be set on all Board computers to maximize energy savings on computer installations.
- 4.2 Where practical, computers and ancillary electronic equipment are to be turned off when not in use.
- 4.3 Wall outlet transformer power supplies must be unplugged from the wall, or switched off using a switched power bar, when the peripheral is not in use for an extended period.
- 4.4 Prior to each school break period (Christmas Break, Spring Break, and Summer Break), the IT Department shall carry out shutdown procedures for all information technology equipment that is not required to run during the break periods. Shutdown records and logs are to be kept to ensure that all devices are turned back on as needed.

5.0 Miscellaneous

- 5.1 Energy efficiency shall be taken into account in the design of new building projects and during major renovation or refurbishment.
- 5.2 Energy efficiency shall be considered in the purchase of new equipment, or implementation of new cleaning processes.
- 5.3 Energy efficiency opportunities shall be reviewed during the annual Plant Budget preparation process. The Plant Department Budget Workbook shall include a worksheet for energy saving needs to be listed.
- 5.4 Use of portable heaters or air conditioner units is discouraged, and subject to approval for use by the Manager of Plant Services or designate.
- 5.5 Energy Operational checklists shall be completed annually by each school and forwarded to the Manager of Plant Services.
 - a) SGDSB – Maintenance Energy Checklist
 - b) SGDSB – Custodial Energy Checklist
 - c) SGDSB – IT Energy Checklist
- 5.6 Prior to each school break period (Christmas Break, Spring Break, and Summer Break), the custodians, in consultation with the Principal and Maintenance Working Foreman, shall carry out the shutdown procedures for their buildings. The work carried out shall be listed in the Plant Shutdown Worksheet, which, upon completion, is to be submitted to the Manager of Plant Services.

6.0 Responsibilities

6.1 Site Administrator

- 6.1.1 Provide energy information/programs for staff and students with information tailored to schools on how to reduce energy waste;
- 6.1.2 Encourage the use of educational programs related to energy use and conservation;
- 6.1.3 Establish a resource center for energy education in your school;
- 6.1.4 Inform the students, staff, public, parents and other groups about your school's energy conservation efforts;
- 6.1.5 Implement a lighting procedure; keep lights off when space is unused;
- 6.1.6 Avoid the use of assembly areas, such as the gymnasium for small groups that can comfortably meet in smaller areas;
- 6.1.7 Schedule the use of classrooms and other spaces through the Board on-line Facility Scheduling program (FS Direct) to reduce energy consumption and schedule classes to maximize the utilization of classroom space in the school;
- 6.1.8 Discourage staff and students from using closed and unused classrooms that may have the heat turned down;
- 6.1.9 Use the fewest number of rooms necessary for summer and night programs as this will not only save energy, it will save custodial cleaning time and materials;
- 6.1.10 Reduce the movements of students and staff in and out of the school;
- 6.1.11 Report situations where energy or resources are being wasted using the *SGDSB – Wasted Energy Report Form II*.

6.2 All staff

- 6.2.1 Have a responsibility to set a good example on the issue of energy and water efficiency;
- 6.2.2 Involve students in monitoring energy usage;
- 6.2.3 Keep classroom doors and windows shut when the heat or air conditioning is on;
- 6.2.4 Close all windows and doors when leaving the classroom at the end of the day;
- 6.2.5 Do not block classroom air supply and return grills with furniture or displays;
- 6.2.6 Turn off all items listed below after the end of each day:
 - Calculators

- SMART Boards
- Computers
- Display lights
- Classroom lights
- Printers
- Projectors
- Hall lights
- Office lights
- Photocopiers
- Data & overhead projectors
- Computer monitors
- Laptop carts unplugged
- Portable Heaters
- Portable air conditioners
- Coffee pots, except pour through units, which should be on a timer
- TVs, DVDs, VCRs

6.2.7 Do not block thermostat covers;

6.2.8 Report faulty thermostats and other equipment that may be malfunctioning to the Head Custodian;

6.2.9 Wear warmer clothes in cold weather and encourage students to do the same;

6.2.10 Wear cooler clothes in hot weather;

6.2.11 Where classroom lighting systems are on multiple switches, only turn on as many lights as needed;

6.2.11 Refrigerators, microwaves, and coffee makers should only be used in designated food preparation, serving, eating and science storage rooms. Exceptions may be permitted by the principal for special events or circumstances;

6.2.12 Report situations where energy or resources are being wasted using the *SGDSB – Wasted Energy Report Form II*.

6.3 Maintenance and Custodial

6.3.1 Check for overheated and over cooled areas, use Delta Building Management System, and/or advise the Plant Maintenance Coordinator;

6.3.2 Turn off lights in unused spaces, especially crawlspaces, storage rooms, mechanical rooms, electrical rooms, etc. Do not turn gym lights on until needed, if not on automatic sensor control;

6.3.3 Isolate unoccupied spaces from heating and cooling systems and set thermostats to energy saving settings;

6.3.4 Check for proper thermostat settings and functions;

- 6.3.5 Disconnect all unused electrical equipment;
- 6.3.6 Replace ceiling tiles when dislodged, broken or missing;
- 6.3.7 Check all building insulation, caulking and weather-stripping. Repair caulking and weather-stripping as necessary;
- 6.3.8 Keep refrigerator and mechanical system compressors and condensers clean;
- 6.3.9 Check all plumbing for leaks;
- 6.3.10 Perform scheduled maintenance on all Heating, Ventilation and Air Conditioning (HVAC) equipment.
- 6.3.11 Reduce Hot Water to 49C except in food preparation areas;
- 6.3.12 Repair damaged windows and doors immediately, and ensure all windows are closed;
- 6.3.13 Keep doors closed and closers in good working condition;
- 6.3.14 Blinds and drapes on windows that receive direct sunlight should be closed when mechanical cooling systems are on and at night during winter hours;
- 6.3.15 Report situations where energy or resources are being wasted using the *SGDSB – Wasted Energy Report Form II*.
- 6.3.16 Turn off all items listed below after the end of each day:
 - Calculators
 - SMART Boards
 - Computers
 - Display lights
 - Classroom lights
 - Printers
 - Projectors
 - Hall lights
 - Office lights
 - Photocopiers
 - Data & overhead projectors
 - Computer Monitors
 - Laptop carts unplugged
 - Portable Heaters
 - Portable air conditioners
 - Coffee pots, except pour through units, which should be on a timer.
 - TVs, DVDs, VCRs

6.4 Plant Services Department Administration

- 6.4.1 Promote and raise awareness of energy use and savings within the Board;

- 6.4.2 Monitor the performance of the various energy saving systems across the Board;
- 6.4.3 Set realistic energy reduction targets and monitor progress throughout the year;
- 6.4.4 Carry out site inspections and audits of energy saving systems;
- 6.4.5 Make system and programming improvements as they become necessary;
- 6.4.6 Log building energy consumption and make the collected information available to the schools via hallway display monitors;
- 6.4.7 Make historic energy consumption data available, in hardcopy or spreadsheets, to all schools within the Board upon request;
- 6.4.8 Receive and follow up *SGDSB - Wasted Energy Report Form II's* as they are submitted. Responses are also to be made to those who submit forms;
- 6.4.9 Investigate and implement best practices, as they are identified, Board wide;
- 6.4.10 Review time of day (TOD) changes for heating and cooling schedules which have been forwarded by work order to the Maintenance Coordinator. Events will be reviewed for compliance and programmed with a start date and finish date. All requests for heating/cooling scheduling shall be submitted a minimum of one (1) working week prior to the requested start date;
- 6.4.11 Work directly with the school administration to implement required changes for multiple or complex modifications to the TOD schedule;
- 6.4.12 Stay current on the latest technology available and practices in use by schools across Ontario.
- 6.4.13 Meet annually with school site administrators during the Plant Budget preparation process to review progress, saving initiatives, and budget new energy saving measures. An energy conservation work sheet will be part of the budget process;
- 6.4.14 An annual energy performance report will be compiled and used during budgeting process;
- 6.4.15 Energy purchasing and negotiation with utility providers will be investigated and arranged if practical and beneficial to the Board.

7.0 Forms and Resource Material

Various forms and tools have been created to assist staff with their energy and resource conservation efforts. These forms will be posted on the SGDSB website with the Policy 414 Energy and Resource Conservation Management Guideline.

- SGDSB - Time of Day Schedule Change Request - Form I (Appendix A)
- SGDSB - Wasted Energy Report Form II (Appendix B)
- SGDSB - Energy and Resource Management Tool Kit
 - Includes: Ontario Eco Schools
 - ✓ Energy Cards (Appendix C-1)
 - ✓ Tally Chart Energy (Classroom) (Appendix C-2)
 - ✓ Tally Chart Energy (Lights) (Appendix C-3)
 - ✓ Tally Chart Energy (Monitors) (Appendix C-4)
 - Includes: Superior-Greenstone DSB Energy Operational Checklist
 - ✓ Maintenance Energy Shut Down (Appendix C-5)
 - ✓ Custodial Energy Shut Down (Appendix C-6)
 - ✓ Information Technology Energy Conservation Energy Shut Down (Appendix C-7)

DRAFT

APPENDIX D: SUPPLEMENTAL CONSERVATION AND DEMAND MANAGEMENT PLAN

Superior-Greenstone District School Board
Plant Services Department

Energy Conservation Plan

Energy management has become very important and necessary in order for the Board to minimize the cost of energy needed to operate the schools. Savings that are made in energy costs will then lessen the burden on the funding that the Superior-Greenstone District School Board receives.

A strong commitment on the part of the Board, administration, staff, and students, is key to an effective energy plan. Successful energy conservation can only be successful with the support and assistance of each building user.

This energy conservation plan is a living document which plots the path to be followed in creating a successful energy plan with supporting documents and policies. The plan will be updated as new technology comes into existence, and as best practices are identified.

In accordance with the Ontario Green Energy Act, the Superior-Greenstone District School Board energy plan will focus on:

- Consultation with building users and other stakeholders.
- Management of energy and water consumption
- Reduction of the emission of pollutants into the environment by reducing the carbon footprint of each school.
- Tracking and comparing energy use year by year
- Identification of successful activities
- Communication to staff, students, and other stakeholders

A) Current Energy and Water Waste Reduction measures in place:

The Plant Services Department has been involved in energy conservation for many years. Some of the measures already in place include:

Heating, Cooling and Ventilation

- Acceptable classroom and workspace thermal conditions are maintained through mechanical heating ventilation, natural heating, ventilation, or other means as appropriate.
- Thermal environmental conditions for human occupancy are currently targeted at:
 - 1) Building heating system target temperature = 19-24 C
 - 2) Building cooling system target temperature = 24 C or below

- Building Unoccupied Hours: Outside of normal operating hours, building systems are, where equipped, automatically set back and optimized for energy conservation. This differs between buildings but generally targets are set to be:
 - 1) Set-back room temperature = 15C.
 - 2) Fan forced ventilation is turned off on a schedule, or via occupancy sensors.
 - 3) Exhaust fans are turned off manually, or via timers.
 - 4) Classroom scheduling allows for a warm up period prior to student arrival.

Demand Control

- Where buildings are billed under a demand consumption meter, measures should be investigated and strategies drawn up to minimize the impact of moments of high energy demand (consumption).
- Concepts explored and implemented might include: Load shedding, supply priorities, load rotation (blackouts to low priority loads).

Time of Day Consumption

- Where buildings are billed under a time of day meter, measures should be investigated and strategies drawn up to minimize the use of energy during the high cost periods.
- Strategies might include: Preheating of buildings prior to start of higher energy cost period, energy storage systems, generators, or windmills.

Lighting

- Light Levels in rooms and buildings are set in accordance to the Ontario Building code.
- Where possible exterior natural light is used to supplement or in place of artificial lights (daylight harvesting).
- When light bulbs are replaced, they are replaced with energy efficient wattage bulbs or LEDs.
- The use of dimmable fluorescent ballasts, or dimmable LED devices, is becoming more common in spaces, such as video conference rooms, where the use of the room sometimes required adjustable lighting. Offices are also being considered as well.
- Lights are controlled by automatic sensors in many gymnasiums and classrooms, and turn off automatically when a room is left unoccupied.

Water

- School staff currently assists with the reduction of water waste, by informing custodial staff and the maintenance department of any plumbing leaks.

- Water meter readings are recorded in schools to ensure that unusual elevated consumption rates are caught and reported for follow-up by the Plant Maintenance Department. Most recently, interval meters have been put in place to track real time water consumption and outline elevated consumption.
- Lawn sprinklers systems are used in accordance to municipal bylaws.
- Automatic sink tap sets have been installed in many schools. This helps save water, and has the added benefit of reducing the transmission of germs due to the non-contact operation of the taps.
- Automatic flush valves have been installed in many schools through capital upgrades.

Information Technology

- The IT Department sets power saver settings to maximize energy savings on computer installations. Password levels are maintained to ensure the power-saving settings are not compromised.
- Where practical computers and ancillary electronic equipment (e.g. printers) are turned off when not in use.

Other

- Some vending machines have been put on timers to save energy over evenings and weekends.
- Energy efficiency is taken into account in the design of new building projects and during any refurbishment.
- Energy efficiency is considered in the purchase of new equipment, or implementation of new cleaning processes.
- Energy efficiency opportunities are reviewed during the annual Plant Budget preparation process.

B) The Consultation Process:

Over the school year, consultation will take place between the Plant Department and various employee groups, students, and other building users to formulate a list of actions that are both energy saving and practical in a school environment.

Some of the topics to be discussed and studied are as follows:

- 1) Development of an Energy Efficiency Policy for SGDSB
- 2) Efficient use of space required for school programming
- 3) Space not needed for classroom use or other school program (locked, lights off, heating and ventilation turned down)
- 4) Fume hoods (closed, exhaust fans off) when not in operation
- 5) Portable heaters or air conditioner units
- 6) Dressing for the season
- 7) Blinds and drapes on windows

- 8) Scheduling use of classrooms and other spaces to reduce energy consumption
- 9) Schedule classes to maximize the utilization of classroom space in the school;
- 10) Movements of students and staff in and out of the school, and door hardware to minimize heat loss, using door closers, etc.
- 11) Establish a resource center for energy education in schools
- 12) Communication to parents and other groups about school energy conservation efforts
- 13) After hours limited lighting to perform work safely
- 14) Refrigerators, microwaves, and coffee makers in schools.
- 15) Classroom air supply and return grills
- 16) Classroom doors and windows closed when the heat or air conditioning is on
- 17) Close windows and doors when leaving the classroom at the end of the day
- 18) Turning off unused machines. (Calculators, computers, display lights) Thermostat covers, damaged or faulty thermostats, and other equipment that may be malfunctioning.
- 38) Identification of over-heated and over-cooled areas
- 39) Verify lighting controls are operational where applicable
- 40) Isolation of unoccupied spaces from heating and cooling systems;
- 41) Proper thermostat settings and functions
- 42) Keeping ceiling tiles in place
- 43) Building insulation, caulking and weather-stripping.
- 44) Keep refrigerator compressors and condensers clean
- 45) Plumbing leaks
- 46) Hot water heater set points for washrooms and food preparation areas
- 47) Students involvement in monitoring energy usage
- 48) Establishment of a student energy patrol (elementary or middle school) or a student energy commission (middle or high school) to help monitor school energy use.
- 49) Provide for an energy waste reporting process with possible reward program
- 50) Student involvement and opportunity to learn energy savings skills that can be used at school and at home

C) Goals and Targets (5 Year Plan):

- See Appendix A: 5 Year Energy Action Plan
- All items in the Energy Action Plan are subject to funding being available to carry out the work.

D) Plan Updates:

This plan will be reviewed and updated as required by the Plant Department.

Appendix A: 5 Year Energy Action Plan

Target Year	Description	Action Department
2019	Use of online energy management systems, interval meters, and utility consumption database to track energy and water consumption.	Plant Dept
2019	Historic data will be compared from year to year to verify savings and develop budgets for energy needs for the coming years.	Plant Dept
2019	Make energy consumption data, on a school by school basis, available to the schools upon request, to assist with their energy based programming for children.	Plant Dept
2019	Consider energy efficiency in capital planning and focus on low-performing schools to identify the highest need for energy-efficient equipment and systems.	Plant Dept
2019	Consumption will be monitored carefully and any unusually high usage or billings will be investigated and corrected.	Plant Dept
2019	Continue with the ongoing conversion of light fixtures to energy efficient units, when renovation projects provide opportunity to do so.	Plant Dept
2019	Review schools for demand control costs and compile a demand control program, utilizing load shedding steps, and develop a cost estimate to level out demand costs, based on priority and potential savings per dollar invested.	Plant Dept
2019	Install 10 kw photovoltaic systems on all schools phased over 5 year period.	Plant Dept
2019	Energy Level III Audit performed in high utility consumption of usage in schools.	Plant Dept
2019	Reduce overall energy consumption by .5%.	All
2020	An Energy Efficiency Policy will be created to map out the will of the board to save energy, and the methods to do so.	Plant Dept with Board Admin
2020	Maintenance Coordinator will provide annually each fall, a review and report on changes that might be needed to the multi-year energy saving plan to the Manager of Plant Services.	Plant Dept
2020	School and office based vending machines shall be put on timers, or other energy control devices, to save energy over evenings and weekends.	Plant Dept
2020	Implement demand control program Phase 1, to investigate and implement demand controls and programming to reduce costs due to demand on high energy use buildings	Plant Dept
2020	Implement school curriculum programming to raise awareness of energy use and savings to students of all grade levels, where practical and appropriate.	Education Dept
2020	Reduce overall energy consumption by .5%.	All
2021	Carry out annual preventative maintenance inspection, or failure notification follow-up, of all large area automatic lighting controls to ensure they are functioning as designed.	Plant Dept

2021	Installation of LED stage lighting system in school stage areas to replace old high wattage Par64, Par56, and other stage light fixtures. Replace high amp dimmer systems with modern DMX controlled LED.	Plant Dept
2021	Conversion of all heating systems utilizing fossil fuels to a greener, highly controllable, and more energy efficient type.	Plant Dept
2021	Implement demand control program Phase 1, to investigate and implement demand controls and programming to reduce costs due to demand on high energy use buildings	Plant Dept
2021	Create a eBASE/Wellnet type training program and have all Plant Dept staff complete the training to bring awareness to the need to save energy in school and office buildings.	Plant Dept
2021	Reduce overall energy consumption by .5%.	All
2022	Implementation of a full blackout program for evenings, after hours, and weekends.	Plant Dept
2022	Create an energy committee with various stakeholders to do inspections and make recommendations	Plant Dept
2022	Complete the conversion of every light fixture in school classrooms and hallways to LED or other high efficiency type.	Plant Dept
2022	Implement remote monitoring and energy related alarms on mobile phones or other appropriate devices to notify Plant Dept staff and managers if there are energy waste situations occurring outside of preset parameters.	Plant Dept
2022	Extend the Wellnet training program and have all board staff complete the training to bring awareness to the need to save energy in school buildings.	Plant Dept with Board Admin
2022	Reduce overall energy consumption by .5%.	All
2023	Extend the Wellnet training program and have all students & staff complete the training to bring awareness to the need to save energy in school buildings.	Education Dept
2023	Installation of monitoring system to generate alarms when unusual energy consumption occurs that is outside of the normal usage historic data.	Plant Dept
2023	Water meter readings are recorded in schools to ensure that unusual elevated consumption rates are caught and reported for follow-up by the Plant Maintenance Department. Most recently, interval meters have been put in place to track real time water consumption and outline elevated consumption.	Plant Dept
2023	Install alternative energy generating systems (Micro-fit or equivalent) to feed power back into the grid, or into the schools directly for use on site.	Plant Dept
2023	Investigation of the removal of all circulating water heating and cooling systems and replacement with direct heat or cooling coil systems, where feasible.	Plant Dept

2023	Maximizing recovery of heat or cooling from exhaust air systems using economizers, heat recovery units, or other available technology in welding shops	Plant Dept
2023	Continue with a reward program that recognizes innovative energy saving ideas from staff and students.	Plant Dept in conjunction with the Education Dept.
2023	Ensure that where new buildings are constructed, or major renovations take place to existing building, that electrical devices which use energy are grouped together on smart electrical panels which provide a high level of individual control and time of day function for blackout capabilities. Examples include but are not limited to: Electrical panels for parking plugs in parking lots, lighting panels, classroom power outlet panels, computer rooms, etc. This would permit power to be turned off with minimal/no effect on essential services, which would also be on an essential service power supply. This would also make it easier to have transfer switches to introduce alternate energy sources when available or when needed.	Plant Dept
2023	Investigate and develop a zero grid energy status approach to buildings that are not open (evenings, weekends, school breaks, etc) to bring energy draw, from the grid, as near as practical to a zero net consumption state. This may include storage battery, wind, and solar power supply systems to replace energy normally used from the grid.	Plant Dept
2023	Reduce overall energy consumption by .5%.	All