

Simcoe County District School Board
5-Year Energy Conservation
and Demand Management Plan

June 27, 2019

Ontario's broader public sector organizations, including school boards, are required to develop and publish an Energy Conservation and Demand Management (ECDM) plan every five years, beginning in 2014. Technical advice and analysis for this document were provided by [Enerlife Consulting Inc.](#)

For additional information regarding this document, please contact:

Kayla Kalalian
Supervisor, Water Treatment and Energy Management
Simcoe County District School Board
kkalalian@scdsb.on.ca

Mark Twardowski
Manager, Maintenance and Environmental Services
Simcoe County District School Board
mtwardowski@scdsb.on.ca

TABLE OF CONTENTS

Executive Summary	1
1 A Review of Progress and Achievements in the Past 5 Years	2
1.1 Asset Portfolios and Energy Management Planning.....	2
1.2 Asset Portfolio	2
1.3 Energy Usage Data	2
1.4 Review of 2014 ECDM Plan & Achievements.....	3
1.5 Measures Implemented from FY 2012-13 to FY 2017-18	4
2 Energy Conservation and Demand Management Plan for FY 2018-19 to FY 2023-24	6
2.1 Background	6
2.2 Future Energy Conservation Goals.....	7
2.3 Energy Management Strategies.....	7
2.4 Demand Management	10
3 Senior Management Approval of this Energy Conservation and Demand Management Plan.....	11
Appendix A	Error! Bookmark not defined.

EXECUTIVE SUMMARY

As set out in Ministry Memo 2019:SB05 dated April 25, 2019, the Simcoe County District School Board (SCDSB) has prepared a 5-Year Energy Conservation and Demand Management Plan (2019 ECDM Plan), in compliance with regulatory reporting requirements due July 1, 2019. The 5-Year ECDM Plan outlines progress against the ECDM plan that was completed in 2014, including energy management measures that were implemented from FY 2013-2014 through FY 2018-2019, and actual energy conserved against the stated annual and cumulative energy conservation goals. In addition, the 5-Year Energy Conservation and Demand Management Plan sets out the SCDSB's energy management strategies for the next five fiscal years – FY 2018-2019 through FY 2022-2023 – including proposed measures to reduce energy consumption, annual and cumulative conservation goals, and demand management strategies.

In the previously approved ECDM plan posted July 1, 2014, SCDSB set a goal of reducing energy use intensity by 15.5% over the plan's 5-year term, with projected annual savings of \$677,000 and utility company incentives totaling \$409,000. Between 2014-2017, SCDSB invested \$480,000 of operational funding for project readiness including energy audits, measurement, testing and preliminary design. This enabled SCDSB to proceed immediately with project implementation at 22 schools under a revised 2014 ECDM plan when the provincial Greenhouse Gas Reduction Fund (GGRF) was provided in 2017-18 for a total capital investment of \$3.38 million. SCDSB was successful in reducing energy use intensity by 16.85% board-wide compared to the baseline year (September 2012 – August 2013).

The 2019 ECDM plan builds on the successes and lessons learned from the SCDSB's energy efficiency program which has been in effect since 2009. This ECDM plan will implement the proven energy efficiency retrofits and control improvements across the rest of the SCDSB's highest-savings potential facilities. Implementation will be dependent on the availability and timing of capital funding over the 5-year period. The goal is to further reduce board-wide energy use intensity by 8.8% versus the FY 2017-18 baseline, further reducing the board-wide total energy use intensity from 15 to 13.7 equivalent kilowatt-hours per square foot (ekWh/ft²).

In 2017-18, the SCDSB spent almost \$6.6 million on electricity and over \$1.5 million on natural gas. With current utility prices escalating and without further energy efficiency improvements, those costs would grow to over \$10 million/year by FY 2023-24. Implementation of the proposed 2019 ECDM plan will reduce the annual utility costs by over \$800,000 at the end of the 5-year period, with cumulative savings over 5 years in excess of \$2.1 million. Implementation of the Plan is also expected to earn an additional \$434,000 in utility company incentive payments.

1 A REVIEW OF PROGRESS AND ACHIEVEMENTS IN THE PAST 5 YEARS

1.1 Asset Portfolios and Energy Management Planning

A school board’s asset portfolio can experience significant changes that may impact the energy consumption over a five-year period.

Some of the most common variables and metrics that change in the education sector include major additions and renovations, sites sold/closed/demolished/leased, addition and removal of portables, changes in equipment, and changes in the use of the spaces such as the addition of child care spaces, before/after school programs, summer school, community use of schools, and occupancy.

1.2 Asset Portfolio

Table 1 outlines the energy-related variables and metrics in SCDSB’s asset portfolio that changed from the baseline year (FY 2012-13) to the end of the five-year reporting period (FY 2017-18).

Table 1 SCDSB’s asset portfolio

	FY 2012-13 (Baseline)	FY 2017-18	Variance %
Total Number of Buildings	112	120	7.1%
Total Number of Portables	245	298	21.6%
Total Floor Area ft2 (excluding portables)*	6,461,369	6,613,214	2.4%
Average Operating Hours / Week	43	43	0%
Average Daily Enrolment	46,802	48,209	3.0%

**Between FY 2012-13 and FY2017-18 the SCDSB added 259 learning spaces to accommodate FDK, and also additional childcare facility spaces. These added spaces are captured in the 151,575 additional ft2.*

SCDSB’s conservation goals were forecasted in Spring 2014, based on the 2012-13 baseline year. Since then, a number of factors may have had a negative impact on the energy performance of SCDSB’s schools, such as additional learning spaces added for Full Day Kindergarten (FDK), extended use of schools to accommodate permits and community hub programs. SCDSB actively works to optimize the operations of facilities, taking into account the increased occupancy and hours of operation.

1.3 Energy Usage Data

Table 2 below lists the metered, non-weather-normalized consumption values for SCDSB in the common unit of equivalent kilowatt-hours (ekWh).

Table 2 SCDSB’s energy consumption data (non-weather-normalized)

Utility	Fiscal Year 2012-13 (Baseline)	Fiscal Year 2017-18 (Current)
Total Electricity (kWh)	43,223,500	38,243,910
Total Natural Gas (ekWh)	68,767,210	61,187,600
Total Heating Fuel (ekWh)	2,726,510	1,981,493*
Total Propane (ekWh)	0	711,456*
Total Energy (ekWh)	114,717,220	102,124,459

**4 schools converted from Heating Oil to Propane between 2012-13 and 2017-18*

In Ontario, 25-35% of energy consumption for a facility is impacted by weather. Weather-normalizing energy consumption values takes into consideration the impact of weather on energy performance and allows for a more accurate comparison from one year to another.

Table 3 Ontario Degree Days from 2012-13 to 2017-18

	Fiscal Year					
	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Heating Degree Days (HDD)	3698	4285	4091	3355	3583	3989
Cooling Degree Days (CDD)	289	217	271	462	303	432

Source: Environment Canada

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 building area and newly implemented programs, which will significantly impact energy consumption. As a result, weather-normalized energy use intensity (EUI), the quantity of total energy consumed divided by the total floor area, is the most accurate measurement that allows the evaluation of a board's energy consumption from one year to another as it negates any change in floor areas. The unit of measurement used in this ECDM plan is equivalent kilowatt hours per square foot (ekWh/ft²).

Table 4 below shows SCDSB's weather-normalized energy consumption and energy use intensity in the baseline year and FY 2017-18.

Table 4 SCDSB's energy consumption data (weather-normalized)

Weather-Normalized Values	Fiscal Year 2012-13 (Baseline Year)	Fiscal Year 2017-18 (most recent available data)	Variance
Total Energy Consumed (ekWh)	109,691,800	93,624,930	16,066,870
Energy Use Intensity (ekWh/ft ²)	16.98	14.16	2.82

1.4 Review of 2014 ECDM Plan & Achievements

In June 2014, the SCDSB Board of Trustees approved the 2014 Energy Conservation and Demand Management (ECDM) plan. The 2014 ECDM plan laid out the approach and financial framework for achieving an energy reduction of 15.7 million ekWh and average utility cost savings of approximately \$560,000 per year. The ECDM plan was built on the SCDSB's successful implementation of its Energy Efficient Schools Funding project in 2009-2012 by extending similar methodology with proven savings into an additional 28 schools over a 5-year period with projected energy savings of \$5.6 million over 10 years.

In April 2017, the Ministry of Education announced the release of a Greenhouse Gas Reduction Fund (GGRF) to retrofit or install energy efficient equipment and measures at existing schools. The GGRF was to be used on prescribed energy and greenhouse gas savings measures within existing buildings that are planned to remain open for at least 5 years. The funding required all projects to be completed by March 31, 2018. The SCDSB allocation from the grant was \$2.47 million; in addition, the SCDSB allocated \$425,000 from its accumulated surplus for a total project budget of \$2.89 million. With most of the

preparatory work already completed on identified buildings, a spending plan was readily prepared for proposed energy conservation projects at 22 schools, under a revised ECDM plan.

Table 5 compares energy conservation goals based on the 2014 ECDM plan with actual results (for each year, and cumulative reduction achieved over 5 years).

Table 5 Previous energy conservation goals and actual energy savings (weather normalized)

Fiscal Year	Conservation Goal		Actual Energy Savings		
	Investment (\$)	Energy intensity reduction (ekWh/ft2)	Energy intensity reduction (%)	Energy intensity reduction (ekWh/ft2)	Energy intensity reduction (%)
2013-14	\$0	0.00	0.0%	1.96	11.52%
2014-15	\$103,942	0.48	3.1%	-0.45	-2.99%
2015-16	\$265,249	0.97	6.2%	-0.7	-4.54%
2016-17	\$110,848	0.48	3.1%	0.92	5.70%
2017-18	\$2,602,107	0.48	3.1%	1.09	7.16%
Total	\$3,082,146	2.42	15.5%	2.82	16.85%

1.5 Measures Implemented from FY 2012-13 to FY 2017-18

Between 2014-2017, SCDSB invested \$480,000 of operational funding for project readiness including energy audits, measurement, testing and preliminary design. This enabled SCDSB to proceed immediately with project implementation at 22 schools under a revised 2014 ECDM plan when the provincial Greenhouse Gas Reduction Fund (GGRF) was provided in 2017-18. Retrofit measures implemented under the revised 2014 ECDM plan include LED lighting retrofits, variable frequency drive (VFD) installations, BAS reprogramming, sheet metal work, sensors installation (CO₂ and gym occupancy sensors), and portables controller installation and BAS reprogramming. Table 6 below shows measures implemented together with project costs, projected full annual savings projected, and the actual savings to date. The actual savings to date are based on the utility data available at the time of writing of this plan, and are cumulative after project implementation (from April 2018 to December 2018, for most schools). It takes a minimum of one full year after implementation to evaluate and fully capture the energy savings of a project, the savings to date (April to Dec 2018) for the partial year following ECDM implementation indicate that forecasted annual savings of \$677,000 will be achieved. Note that some schools were excluded from revised 2014 ECDM plan, with a corresponding revision to resulting projected energy savings.

Table 6 Measures implemented by SCDSB in 2012-13 - 2017-18

Measures implemented	Project cost (\$)	Target annual savings (\$)	Target annual savings (ekWh)	Cumulative savings to date (\$)
LED lighting retrofits	\$917,487	\$117,563	839,736	\$88,172
HVAC retrofits (VFD installation; BAS reprogramming; CO2 sensors and gym occupancy sensors; audits and testing)	\$2,164,659	\$445,010	8,083,624	\$195,316
Total	\$3,082,146	\$562,573	8,923,360	\$283,489

2 ENERGY CONSERVATION AND DEMAND MANAGEMENT PLAN FOR FY 2018-19 TO FY 2023-24

This section outlines SCDSB's plan to reduce energy consumption and manage demand through energy management and renewable energy strategies, including the design, construction and retrofit of buildings, operations and maintenance, and occupant behaviour under the 2019 ECDM plan.

2.1 Background

The SCDSB's energy management strategy is built upon the methodology and proven success developed through the successful Energy Efficient Schools Funding (EESF) project in 2011 and again in the 2014 ECDM plan, which lays out the approach and framework for continuing systematic implementation of energy efficiency measures. The comprehensive approach of lighting, mechanical and building automation system upgrades focuses on high-savings potential schools. The plan follows the principles of performance-based conservation, relying on benchmarking large data sets of comparable buildings to determine energy targets and identifying where the savings are to be found. Energy audits and system testing establishes the specific system improvements in individual buildings. The necessary work is implemented through a well-integrated project management and procurement process. This is followed by intensive monitoring and verification to ensure that systems are operating as intended to achieve the savings and receive the utility company incentives.

The SCDSB makes full use of the Utility Consumption Database (UCD) to track the results of energy efficiency retrofit projects implementation, as well as to continuously monitor the energy performance of the rest of the SCDSB facilities.

SCDSB was preparing to proceed with further 2014 ECDM plan implementation with the second stage of GGRF funding, announced in April 2018. Audits at selected schools, testing, and preliminary design work were undertaken, but the funding was withdrawn as of July 5, 2018, putting a stop to further energy conservation projects. This preparatory work positions SCDSB well to get 2019 ECDM plan implementation underway with available funding.

2.2 Future Energy Conservation Goals

SCDSB has set out the following energy intensity reduction conservation goals for the next five fiscal years. Due to staggered project implementation, the full projected savings will be realized after the fifth year.

Table 7 Energy intensity conservation goals

Fiscal Year	Conservation Goal	
	Energy intensity reduction (ekWh/ft2)	Energy intensity reduction (%)
2019-20	0.05	0.3%
2020-21	0.22	1.5%
2021-22	0.29	2.0%
2022-23	0.31	2.1%
2023-24	0.25	1.7%
Total over 5 years	1.13	7.5%
2024-25	0.19	1.3%
Total after full 2019 ECDM plan implementation	1.32	8.8%

2.3 Energy Management Strategies

The SCDSB energy management strategies fall into three key categories. These strategies are reviewed in more detail below.

- Design, construction and retrofit
- Operations and maintenance
- Occupant behaviour

2.3.1 Design, Construction and Retrofit

Design, construction and retrofit strategies encompass the original and ongoing intent of how a building and its systems are to perform as a whole through the integration of disciplines such as architecture and engineering.

The 2019 ECDM plan builds on the successes and lessons learned from the SCDSB's ongoing energy efficiency program, in effect since 2009. SCDSB has developed sector-leading design standards and energy performance metrics for major renovations and new school construction. For schools undergoing infrastructure renewal projects, the energy efficiency work will be incorporated into those project scopes in order to optimize costs and minimize disruption. SCDSB design standards shown in Table 8 below govern the requirements for new school construction and major renovations to ensure that high levels of energy efficiency are achieved.

Table 8 Energy intensity targets for new construction and existing schools in SCDSB

	New Schools		Existing Schools	
	Elementary	Secondary	Elementary	Secondary
Electricity (kWh/ft ²)	4.5	5.5	5.5	6.5
Monthly Demand (W/ft ²)	1.5	1.6	1.5	1.6
Thermal (ekWh/ft ²)	5.5	6.5	6.5	7.5
Total	10	12	12	14

Proven energy efficiency retrofits and control improvements will be implemented across the rest of the SCDSB’s highest-savings potential buildings. The scope of work is as follows:

1. Audits, testing (electrical and HVAC), design of measures;
2. Ventilation system upgrades (including CO2 sensors, variable frequency drives, BAS reprogramming, and sheet metal work);
3. Lighting retrofits to LED (including portables);
4. Portables HVAC controls and reprogramming; and
5. Commissioning, monitoring and performance verification.

The 2019 ECDM covers 33 facilities and prioritizes schools with high energy savings potential. Schools that have been identified as surplus, closing, or in disposition process in the SCDSB 2018-2019 Capital Plan, have been excluded.

Table 9 below shows the projected retrofit costs per school for high- and mid-savings potential groups of schools. Table 10 presents the planned phasing of the energy efficiency projects (shown as the number of schools to be retrofitted in each year).

Table 9 Proposed measures and estimated costs for highest savings potential schools

Measure Description	Elementary		Secondary	
	High potential	Mid potential	High potential	Mid potential
LED lighting retrofits	\$43,900	\$31,112	\$129,960	\$125,431
HVAC retrofits (VFD installation; BAS reprogramming; CO2 sensors and gym occupancy sensors; audits and testing)	\$79,000	\$64,000	\$139,000	\$115,000
Total	\$122,900	\$95,112	\$268,960	\$240,431

Table 10 ECDM plan implementation – project phasing

School group	Year 1	Year 2	Year 3	Year 4	Year 5	Total
High-savings potential elementary	1	3	3	5	5	17
Mid-savings potential elementary	1			2	2	5
High-savings potential secondary		1				1
Mid-savings potential secondary		1	2			3
TOTAL # of schools	2	5	5	7	7	26
Additional lighting retrofits, elementary	3					3
Additional lighting retrofits, secondary	4					4

Table 11 ECDM plan implementation – costs

	Year 1	Year 2	Year 3	Year 4	Year 5
LED lighting retrofits	\$752,113	\$387,092	\$382,563	\$281,725	\$281,725
HVAC retrofits (VFD installation; BAS reprogramming; CO2 sensors and gym occupancy sensors; audits and testing)	\$268,000	\$641,077	\$641,337	\$719,487	\$744,518
Total cost with inflation	\$1,020,113	\$1,028,169	\$1,023,900	\$1,001,212	\$1,026,243

2.3.2 Operations and maintenance

Operations and maintenance includes the strategies the SCDSB uses to ensure that the existing buildings and equipment perform at peak efficiency, and that the scheduling of heating and ventilation equipment is being optimized to match the occupancy of the buildings.

SCDSB recognizes that achieving and sustaining high levels of energy performance across its large and growing portfolio depends as much on organizational capacity and alignment and management practices as on retrofits and control improvements to its buildings. The 2019 ECDM Plan further develops and ensures compliance with practices that have supported success to date:

1. Close monitoring of retrofitted schools to ensure that intended operation and savings are achieved along with regular team reviews with SCDSB staff to identify and implement any necessary corrective action.
2. Integration of design and performance standards in the development process for new-builds and major renovations to ensure high-performance energy targets are met.
3. Regular updating, communication and enforcement of board-wide temperature set-point, HVAC scheduling and lighting operation standards.
4. Quarterly team reviews with SCDSB staff of energy performance trends for all schools together with implementation of identified corrective action through the work order system.

5. Regular reporting, training and technical support for caretakers in understanding the energy performance of their schools and making effective use of their building automation systems.

2.3.3 Occupant Behaviour

The 2019 ECDM plan proposes to continue to upgrade staff competency in energy management and building automation through training, defining expectations, and working with service providers to provide necessary training and support. The SCDSB enhances transparency and motivation by regular communication of actual savings results to stakeholders. The SCDSB actively supports participation in Ontario EcoSchools to help inspire awareness and action to improve energy and environmental performance.

2.4 Demand Management

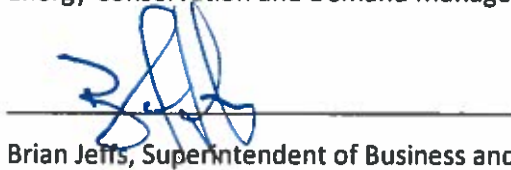
To monitor electrical demand the SCDSB uses the following; utility invoices and online data from local distribution companies (LDCs).

To reduce electrical demand the SCDSB has implemented several strategies with success;

1. Staging cooling equipment to come on based on the differential between space temperature and space set-point and limit cooling based on outside air temperature.
2. Lowering fan speeds based on the requirements of the space.
3. Putting all equipment into “unoccupied mode” when the building’s alarm system is armed.
4. Shutting down all outside lighting 20 minutes after the building’s alarm system is armed until 5:30am when custodial staff arrive.
5. Optimize permitting of schools, consolidating to more efficient buildings, and HVAC zones.
6. Optimizing equipment scheduling to reduce electrical demand where possible, while ensuring occupant comfort.
7. Lighting retrofits from fluorescent and HID to LED.

3 SENIOR MANAGEMENT APPROVAL OF THIS ENERGY CONSERVATION AND DEMAND MANAGEMENT PLAN

I confirm that Simcoe County District School Board's senior management has reviewed and approved this Energy Conservation and Demand Management Plan.



Brian Jeffs, Superintendent of Business and Facility Services

June 27, 2019