



Energy Management Plan

Conservation and Demand Management Plan

Rainy River District School Board

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This publication is available in accessible formats upon request.

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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

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 5 YEARS

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	16	16	0
Total Number of Portables/Portapaks	3	3	0
Total Floor Area	524505.38 ft ²	525839.50 ft ²	1334.12 ft ²
Average Operating Hours	37	37	0
Average Daily Enrolment	1913	2115	202

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)	4,750,079	4,008,959
Total Natural Gas (ekWh)	7,980,136	6,556,898

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.

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.

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.

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)	13,267,620	15,626,800
Energy Intensity (ekWh/ft2)	25.3	29.72
Energy Intensity (ekWh/m2)	272.3	319.9

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. The Board was determined to save %5 over the 5 year term.

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	0.24	2.58	1 %	8.89	95.6	35.1
2014 to 2015	0.24	2.58	1%	.75	8.1	-2.2
2015 to 2016	0.24	2.58	1%	-2.34	-25.2	6.7
2016 to 2017	0.24	2.58	1%	1.24	13.3	-3.8
2017 to 2018	0.24	2.58	1%	-4.10	-44.2	12.1

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.

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.

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.

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.

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 Intensity Goal from Fiscal Year 2013 to 2014 through Fiscal Year 2017 to 2018

Cumulative Energy Intensity	(ekWh/ft2)	(ekWh/m2)	Variance
Forecasted. Cumulative Energy Intensity Conservation Goal of Fiscal Year 2013 to 2014 through Fiscal Year 2017 to 2018	1.2	12.9	
Forecasted Cumulative Energy Intensity Conservation Goal as a Percentage			5
Actual Cumulative Energy Intensity Reduced or Increased from Fiscal Year 2013 to 2014 through Fiscal Year 2017 to 2018 – Weather Normalized	2,358,180	2,358,180	
Variance between 2014 Forecast Cumulative Conservation Goal and Actual Cumulative Energy Intensity– Weather Normalized	3.26	47.6	
% of Cumulative Energy Intensity Conservation Goal Achieved - Weather Normalized			370

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

This is a summary of some of the successful energy savings measures implemented in the 5 year plan. These measures have resulted in a 3% reduction in energy use and an approximate \$50,000 annual savings.

Project/Initiative	Implementation Date	Project Description	Estimate Savings eMWH/year	Estimated Savings \$
DYS Addition Construction (Phase 1)	August 2017	New Construction of Main Wing of Elementary School	125MWh *need more time to confirm after the 2 nd phase of construction)	\$20,000
SCS Air Unit Replacement	May 2014	Air Unit not required due to loading occupancy of school.	50MWh	\$7,500
FFHS Boiler Optimization	March 2018	Replaced 2 oil boilers with high efficiency boilers	715 eMWH/year	\$12,000
EDC ITS Equipment Improvements	January 2018	Upgrades to IT servers and related UPS systems	5MWH/year	\$750
FFHS Lighting Upgrades	Summer 2018	Replaced all T8 lights with LED equivalent (12000 lights)	40 MWH	\$6,000
Controls Upgrades	Various	Standardized controls systems to allow for better scheduling and use of equipment as well as tracking consumption	Not measured	
Implement Energy Policy	August 2012		Not measured	
Establish Energy Steering Committee	August 2012		Not measured	

- Cost based on \$0.15/kwh and \$0.17/m³

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.

O. Reg. 507/18 (Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans) requires broader public sector (BPS) organizations to develop a CDM plan and update it every five years. The Rainy River District School Board (RRDSB) has developed this updated CDM plan in compliance with the regulation. It covers the five fiscal years from September 1, 2020 to August 31, 2024.

The plan describes the school board’s commitment to energy conservation by ensuring our staff and students have the resources required to achieving success.

RRDSB’s Goals and Objectives for Conserving Energy

Our school board’s goal in energy conservation is to be an innovative community which finds ways to conserve energy by:

- supporting operations and maintenance to operate our buildings effectively and efficiently;
- integrating energy conservation lessons into our schools and offices to lead by example and prepare our students for the future; and
- making good choices when purchasing or developing projects to ensure energy conservation is a foundation in our decisions for tomorrow, today.

Our school board’s objectives in this five year plan are to:

- reduce our overall energy consumption by 2.5%;
- reduce water consumption in our buildings by 2.5%; and
- build a foundation of energy conservation into our schools to support every student in achieving success.

Energy Management Strategies

The Board currently has an in-house part time energy management position who supports the strategies outlined in this CDM plan.

Energy management strategies fall into four key categories:

Renewable Energy

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.

The Board currently has 2 solar installations, one on JW Walker School and one on Fort Frances High School. At this time there are no plans to implement any new renewable energy projects

Design/Construction/Retrofit

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.

Operations and Maintenance

Operations and maintenance include the strategies the Board uses to make sure that the existing buildings and equipment performs at maximum efficiency.

Occupant Behaviour

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 Appendix A: Energy Conservation Goals FY 2019 to FY 2023.

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	0.7	0.7	0.7	0.7	0.7
ekW/m²	7.8	7.8	7.8	7.8	7.8
Percentage Decrease	0.5%	0.5%	0.5%	0.5%	0.5%

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	3.5
ekWh/m²	39
Percentage Decrease	2.5%

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.

Environmental Programs

In Fiscal Year 2018 to 2019, schools within the Board did not participate in any documented environmental programs such as Eco Schools, Earth Care Schools, or School Energy Challenges.

Our facilities do an excellent job with environmental and energy based curriculum activities but we struggle with having a system to document or capture the efforts formally. We are also challenged in the North as to the limitations due to our area i.e. our municipalities do not offer a recycling program.

In this five year plan, we are striving to change this and are determined to encourage teachers and administrators to participate in these programs and to take advantage of the environmental programs available to them.

Energy Efficiency Incentives

The Board applies to incentive programs to support the implementation of energy efficient projects on a regular basis. Between Fiscal Year 2013 to 2014 and Fiscal Year 2017 to 2018, the Board has applied for \$16,975 in incentive funding from different agencies to support the implementation of energy efficient projects. The Board also uses the services of the sector's Incentive Programs Advisor (IPA).

Energy Procurement

The Board does not participate in a consortia to purchase Natural Gas or Electricity.

The purchasing department is very small and allows the Board to monitor its purchases related to energy consuming equipment and fixtures very closely. The purchasing department, working along with operations and maintenance, uses energy efficiency as a measure when it makes sense and also monitors purchases to flag whether a more efficient product can be sought.

Capital projects are also being monitored closely to ensure that energy efficiency is taken into account when making decisions on project details. The Board's Lead of Capital projects is also the part-time energy manager which allows for energy management to be a forefront in capital project equipment purchases.

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:

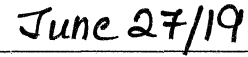
- Equipment scheduling
 - Phased/staged use of equipment
 - Demand-limit equipment
 - Deferred start-up of large equipment (e.g. chiller start-up in spring)
 - Other:
-

Senior Management Approval

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



Heather Campbell
Director of Education



Date

Appendix A: Energy Conservation Goals FY 2019 to FY 2023

Energy Conservation Goals for the Rainy River District School Board are available upon request.