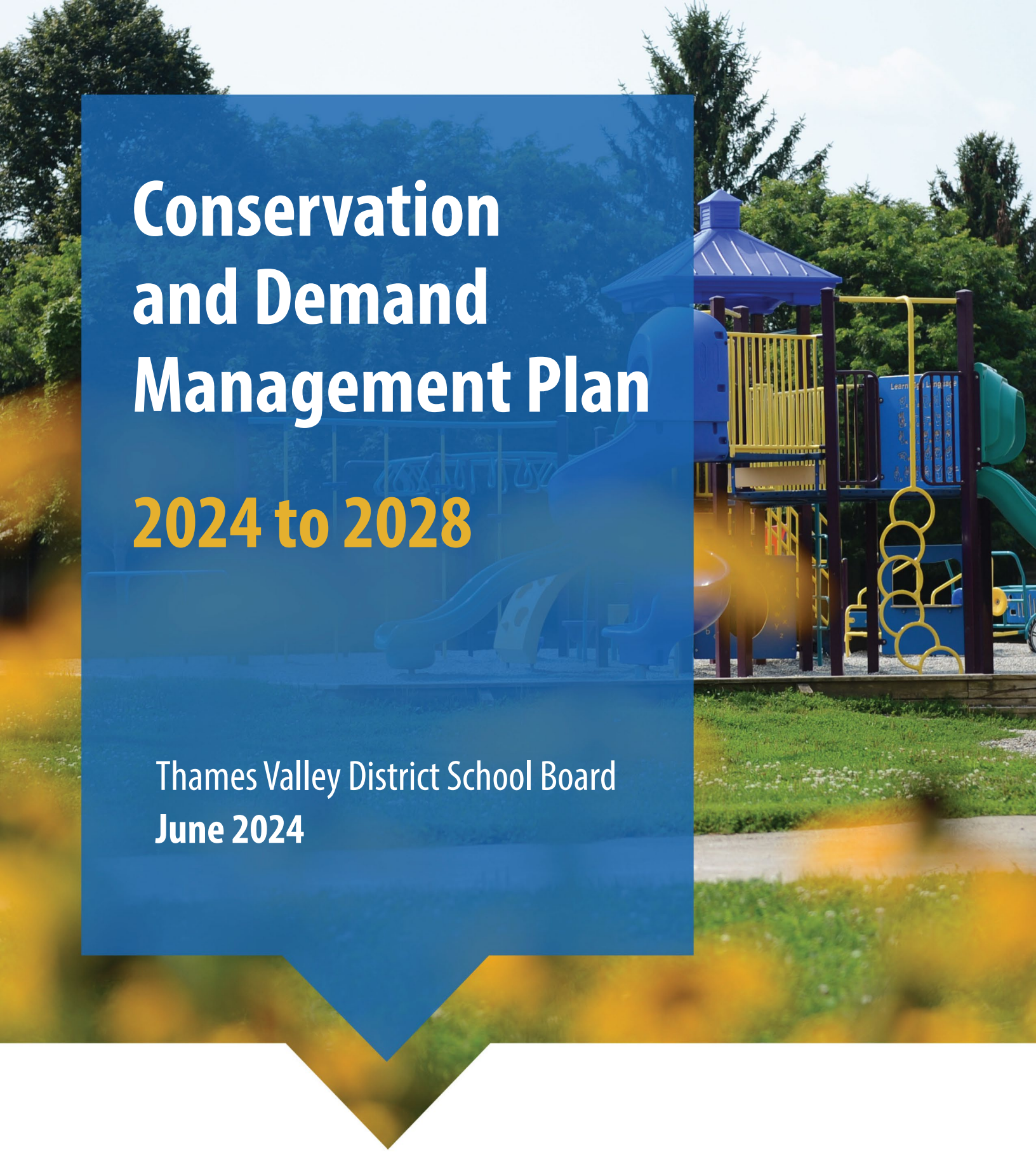

Conservation and Demand Management Plan

2024 to 2028

Thames Valley District School Board

June 2024

Thames Valley
District School Board

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Thames Valley District School Board

2024 to 2028 Energy Conservation and Demand Management Plan

1. Introduction

In 2013, all Ontario public agencies were required to start publicly reporting their annual energy consumption and Greenhouse Gas (GHG) Emissions as per Ontario Regulation 397/11, part of the Green Energy Act. Included in this regulation, in 2014, Ontario Public agencies were required to create and publish a 5-year Conservation and Demand Management (CDM) plan. In 2018, these reporting requirements moved to Ontario Regulation 507/18, part of the Electricity Act. As of February 2023, this regulation was revoked and replaced with, Ontario Regulation 25/23, also part of the Electricity Act. Our reporting requirements remain the same as previous although methods and timing of reporting have been updated/ aligned.

The goal of the legislation is to help public agencies manage their energy use by evaluating facilities from across the province; creating benchmarks for future goals; and identifying best practices and energy-savings opportunities.

TVDSB recognizes the importance of the environment and sustainability in education for all. Environmental concerns continue to evolve, in response TVDSB has created and implemented a sustainability framework that will provide meaningful targets for 3 core pillars of the environment: energy, water, and waste. The framework will guide staff and students on how the school board will reduce its environmental impact, and how we can all help make a difference along the way.

2. Thames Valley District School Board

TVDSB has approximately 84400 students covering 7000 square kilometres of Southwestern Ontario. TVDSB facilities include: 131 elementary schools, 27 secondary schools, 3 continuing education sites, 4 environmental centres, 5 administrative facilities and 3 closed facilities. Our students and almost 14,000 staff are situated in over 1 million square metres of floor space. TVDSB's energy usage for the FY 2022-23 year consisted of:

- 71,100,000 kWh of electricity
- 10,400,000 cubic metres of natural gas
- 114,000 Litres of Propane
- 425,000 cubic metres of Water

TVDSB continues to investigate innovative strategies to reduce energy consumption to minimize budget increases to offset rising energy costs.

3. Guiding Principles

TVDSB's energy management guiding principles include the following:

- Reduce energy consumption through building systems, partnerships, energy conservation initiatives, and education opportunities.
- Renew building equipment with high efficiency equipment.
- Invest in schools and education to create better environments for students.
- Research innovative sustainable technologies and initiatives.
- Manage energy budgets through energy conservation and competitively procuring commodities.
- Manage GHG emissions through a balanced plan to manages energy costs while meeting GHG reduction goals.
- Monitor and track energy usage to ensure our facilities are operating effectively and efficiently.

4. TVDSB's Asset Portfolio

As outlined below in Table 1, TVDSB has experienced a significant change in fundamental factors that affect energy consumption. Increases in total floor area (permanent and non permanent) and enrolment have contributed significant pressure on energy budgets and energy demand. Section 5 also outlines several other risks that have an impact on energy consumption at TVDSB.

Table 1:TVDSB Portfolio change Baseline to 2023

	FY 2018 (Baseline)	**FY 2023**	**Variance**
Total number of buildings	182	177	-2.7%
Total number of portables/portapaks	225	344	+52.9%
Total floor area(m^2)	1009014	1026899	+1.8%
Average daily enrolment	76720	82561	+7.6%

Source: ECIS and TVDSB planning department

5. Review of Performance to Plan

5.1. Metered Energy Consumption

TVDSB utilizes ekWh[1] as a unit of measure to track total energy consumption. The unit of measures allows conversion comparisons between different fuel sources. Table 2 below summarizes changes in total metered[2] energy consumption per fuel source over the past five years.

Table 2: Energy Consumption Baseline to FY 2023

	FY 2018 (Baseline)	FY 2023	Variance
Electricity (kWh)	72,281,162	71,030,145	-1.7%
Natural gas (ekWh)	129,951,199	108,596,924	-16.4%
Total propane (ekWh)	812,408	994,547	+22.4%
Total metered energy consumption (ekWh)	203,044,769	180,621,615	-11.0%
Metered energy intensity[3](ekWh/M^2)	201.2	175.9	-12.6%

TVDSB achieved a 11.0% total metered reduction in energy usage over the past five years. Table 2 does not consider the effect that yearly weather fluctuations has on the energy consumption of TVDSB facilities.

GHG emissions were reduced by 10% when comparing baseline to FY 2023. Over the 5 years of the plan, there were 3900 tons of CO2 emissions that were avoided. This is equivalent to taking 1195 cars off the road.

[1] EkWh is Equivalent kilowatt-hour and is used to convert different types of energy into a common term of kilowatt-hour. Allowing for comparison of energy use in a facility no matter what fuels are used.
2 Metered consumption is the quantity of energy used and does not include a loss adjustment value (the quantity of energy lost in transmission).

[3] Energy Intensity is the total energy input into a facility divided by the floor area of facility. It is a tool to compare facilities energy use over period of time or against other facilities.

5.2. Weather Normalized Energy Consumption:

Weather changes on a yearly basis. Therefore, the amount of energy consumed to maintain buildings at appropriate temperatures changes year to year. Weather normalization is a methodology that allows for comparison of building performance from year to year. Heating degree-days[4] (HDD) and cooling degree-days[5] (CDD) are used along with the average usage over a defined period to calculate the energy consumption based on a weather normal year. Table 3 below compares weather normalized data for the baseline year to the latest fiscal year that is complete.

Table 3: Weather Normalized ekWh

Weather Normalized Values	**FY 2018 (Baseline)**	**FY 2023**
Total energy consumed (ekWh)	197,493,426	188,227,053
Energy intensity (ekWh/M^2)	195.7	184.7

Although there were challenges experienced throughout the Covid-19-pandemic that negatively affected energy consumption, TVDSB did meet the target set out in the previous CDM plan.

5.3. Energy Conservation Goals

In 2019, TVDSB set the energy conservation goal of reducing weather normalized usage by 5.0% over five years. In fiscal year 2023, TVDSB achieved a reduction of 5.6% in energy intensity from the baseline year. Table 4 compares the energy intensity conservation goal with the actual performance.

[4] HDD or heating degree-days is a measurement of the demand for energy to heat a building. It is the number of degrees that the average daily temperature is below 18 degrees Celsius.
[5] CDD or cooling degree-days is a measurement of the demand for energy to cool a building. It is the number of degrees that the average daily temperature is above 18 degrees Celsius.

Table 4: Weather Normalized Energy Intensity Comparison- Goal to Actual Performance

	ekWh/M^2	%
Energy Intensity reduction goal from FY 2019 to FY 2023	9.3	5.0
Actual reduction- FY 2023	11.0	5.6%

6. Renewable Energy Production

TVDSB has 120KW of Solar Photovoltaic(PV) capacity installed on multiple sites and in multiple configurations. Over the life of the installations, 1000 MWh of electricity has been produced that was either part of a Micro-FIT[6] contract or used to offset energy consumption at the schools through a net metering agreement[7] with the local distribution company.

Due to equipment age, we are identifying reduced output and premature failures. Our renewable energy systems are over 12 years old now, and increased maintenance efforts are required to maintain energy production.

We are currently evaluating renewable energy technologies and how to best move forward. There is currently no dedicated capital funding to invest into renewable energy, TVDSB is reviewing alternative funding opportunities and will continue to investigate ways to implement renewable energy technologies.

7. Vehicle Fleet

TVDSB has a large fleet of service vehicles operating on compressed natural gas (CNG). Bi-fuel CNG vehicles reduce operating costs as well as GHG emissions of our fleet while still providing the range needed.

[6] Micro- FIT- Micro Feed-in-Tariff is a contract with the Independent Electricity System Operator (IESO) that pays a set rate for Electricity produced via the solar Photovoltaic system. These contracts are no longer available.
[7] Net metering Agreement is an agreement with the Local Distribution company(LDC) where the solar PV system is connected to the power grid and offsets the facilities usage by the amount the PV system produces and if the system produce excess, the utility will reduce

The board will continue investment in efficient, low emission vehicle fleet. With new and emerging technologies, TVDSB will continue to assess the validity of pursuing different sustainable energies in the future.

8. Energy Efficiency Incentives

Incentive programs are offered by the Independent Electricity System Operator (IESO) and Enbridge Gas that provide monetary incentive to organizations who demonstrate that an implemented energy conservation project can reduce utility consumption. Over the last 5 years, TVDSB has successfully applied for and received incentives that have totaled over $ 704,000.

Currently the IESO has updated their incentive methodology for LED lighting by creating a distributor-based incentive distribution model to replace the previous application-based incentive. This model reduces administrative burden for Owners to obtain approvals; however, by providing the incentive to the distributor there are no guarantees incentives will be distributed to TVDSB. This may will affect the future amount of incentives that we directly receive

Over the last 5 years, this funding has been used to support energy management projects at administrative sites where capital funding is limited. Example projects included:

- Building automation system upgrades;
- Pilot projects for new products/technologies;
- Lighting upgrades;
- HVAC upgrades; and
- Solar PV maintenance.

TVDSB will continue to reinvest energy efficiency incentives back to energy management and sustainability related projects that may not otherwise be able to be funded through other typical funding streams.

9. Energy Conservation Risks

There are various risks outside of TVDSB's control that may pose risks with meeting the proposed plan, these may include:

9.1. Funding

All school boards receive most of their funding from the Ministry of Education (MOE). The MOE typically announces funding allocations in the spring preceding the next fiscal year, which operates from September 1st to August 31st. The MOE does not provide boards with multi-year funding allocations. Therefore, the ability to implement a 5-year energy management strategy is contingent on sustained MOE capital funding.

9.2. Unbalanced Utilization of Schools/ Enrollment growth

TVDSB has continued to experience accommodation pressures that have resulted in over-utilization and under-utilization of schools. When enrolment increases in an unbalanced manner, energy consumption increases at over-utilized schools due to additional temporary accommodation space (modular portable classrooms) yet empty classrooms at under-utilized schools still require energy to be supported in a manner that allows them to be reoccupied when required.

TVDSB has experienced a growth of approximately 7.6% in student population when compared to the baseline year of 2018. We anticipate continued growth and continued reliance on temporary accommodation strategies.

This growth has increased the need to use Portables, increasing from a low of 225 units in the baseline year to high of 344 in 2023. Portable floor area is approximately 2.5% of TVDSB total floor area but is responsible for 7% of TVDSB electricity use. This is due to Portables being a more energy intensive structure. They are over 11% more energy intensive than our average facility and over 50% more energy intensive than a typical new school build.

A proactive capital plan has allowed TVDSB to receive funding for new schools as growth has increased. TVDSB will actively pursue new capital funding opportunities to minimize the need for temporary accommodations and balance enrolment throughout the board.

9.3. Community Use of Schools and Community Hubs

The MOE has encouraged collaborations with community partners to utilize schools during vacant periods. The MOE introduced funding to all school boards to 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. TVDSB has also entered into several reciprocal use agreements with community partners, which further increases the use of facilities.

Community Use, Before and After school programs, Childcare and Family centres all require extended operating hours that increase energy consumption at the facilities.

Although the Pandemic temporarily reduced a larger amount of these programs, usage has recovered to pre pandemic levels and is projected to surpass previous levels as shown in Figure 1.0.

While community use extends facility operating hours, TVDSB is verifying that the mechanical and electrical systems are operating efficiently during that extended run time.

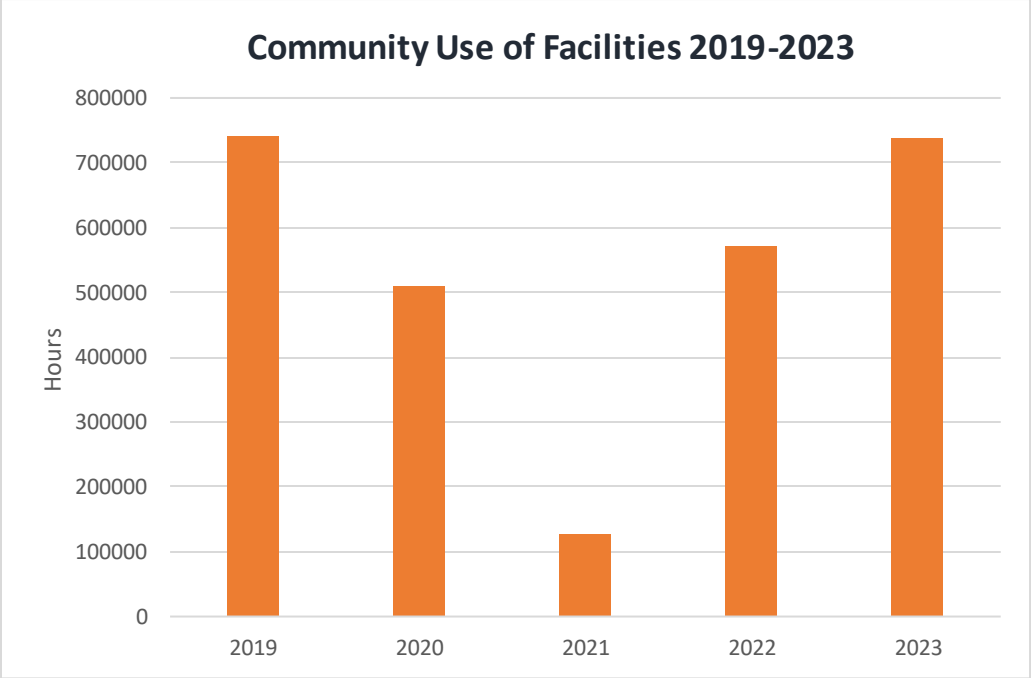

Figure 1: Community Use of Schools 2018-2023

9.4. Air Conditioning

TVDSB continues to make progress to add air conditioning where there is an appropriate opportunity such as during a major renovation or for a new school.

Figure 2 illustrates the increase of almost 10% in air conditioned permanent gross floor area in schools when comparing the 2018 baseline year to 2023 data.

All non-permanent (portables, etc.) square footage are also air conditioned. When non-permanent and permanent are combined, 75% of TVDSB's gross floor area is air conditioned.

Building automation systems are used extensively to ensure the efficient use of cooling. Where applicable, Energy recovery systems are employed to further reduce energy consumption of the installed HVAC systems.

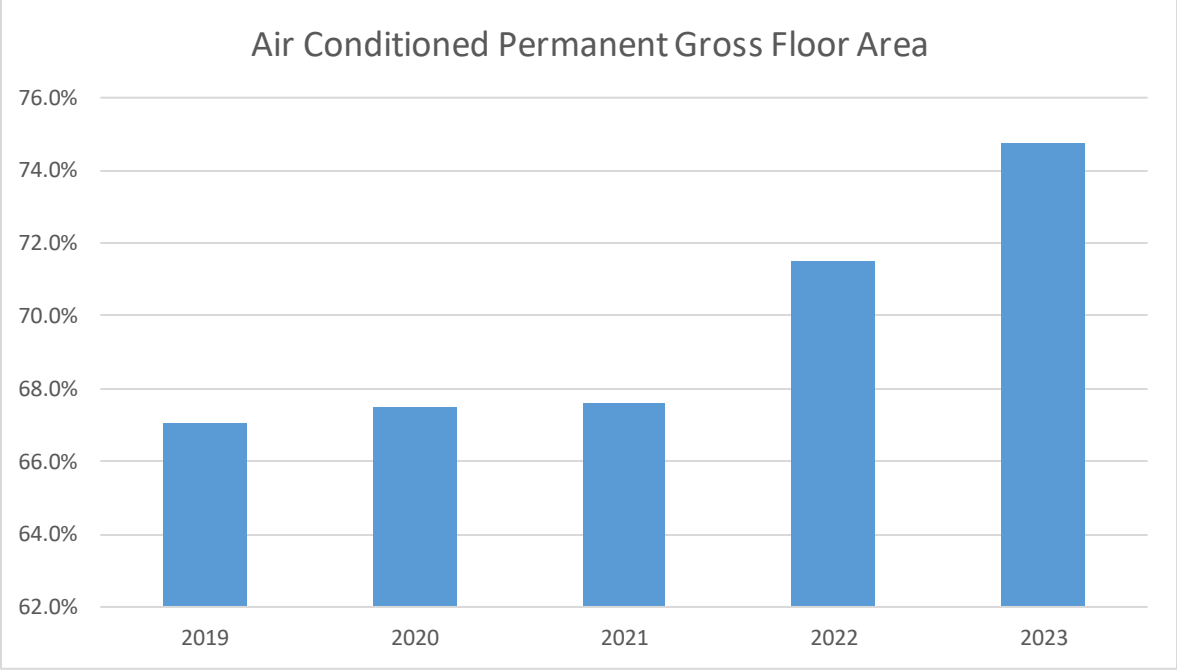

Figure 2: Air Conditioned Schools

10. Energy Conservation Projects: FY 2018 to FY 2023

TVDSB utilizes available yearly capital funding grants to complete energy conservation projects. A list of the projects completed, associated costs, and fiscal year that the projects were implemented within the TVDSB are outlined in *Appendix A.*

Projects listed include any projects that demonstrate a reduction in energy. Costs include total project costs and not just the cost of the energy conservation portion of the project.

In 2019, we completed a “Savings by Design” Integrated Design Process for a new school build. This process identified that the proposed design’s energy performance was 33.1% better than a building built to Ontario building Code (OBC). They included steps to move our typical design past this performance level. The growth TVDSB is experiencing has led to the need to a significant number of new schools to be built throughout this CDM plan. We are taking what was learned in the IDP process, and where possible, applying it to our new building designs.

11. 2024 to 2028 Energy Conservation Plan

11.1. Energy Management Strategies

11.1.1. Sustainability Framework

TVDSB embraces Environmental Sustainability and strives to provide students and staff opportunities to participate in reducing our environmental impacts. The Sustainability Framework guides our efforts in reducing our environmental impact through three pillars: Energy, Water, and Waste. TVDSB continues to manage energy consumption, ensuring reduced costs and GHG emissions while planning to transition to lower carbon-emitting sources. Optimizing our energy consumption is imperative to ensure we are working towards minimizing our environmental impact related to energy.

Our core energy principles are to reduce energy consumption, renew school equipment, invest in schools and education, and research innovative technologies. Students will have the ability to explore sustainability locally with the help of our growing energy data repository. Through the Sustainability Framework, students will interact with the goals to understand the different energy consumption values from local and board-wide context.

11.1.2. Design/Construction/Retrofit

TVDSB continues to design, construct and retrofit its buildings to renew equipment, reduce energy consumption and Greenhouse Gas emissions while providing an ideal environment for learning.

87% of TVDSB buildings are over 20 years old and due to this the capital needs are increasing as many building components are reaching the end of their lifecycle. Energy Management is a part of the assessment criteria for managing assets. End of life is only one determining factor for renewal of equipment. As Energy costs increase, there are growing opportunities to upgrade equipment prior to end of life to reduce energy consumption and costs. It is also part of our project development principles to review available technologies to ensure that we are installing the appropriate equipment to fulfill the needs while minimizing it's effect on the environment (energy and greenhouse gas emissions)

TVDSB's Facility Services and Capital Planning team will continue to improve on the following:

- Review emerging technologies to determine feasibility and integration;
- Utilize building automation systems (BAS) to optimize operations of buildings systems; and
- Invest in renewal of BAS to improve performance of equipment while maintaining occupant comfort.

TVDSB's planned projects/ programs to reduce energy consumption are listed in Appendix B.

11.1.3. Energy Procurement

TVDSB makes decisions to purchase electricity and natural gas based on market intelligence, risk to budget and supply requirements of local utility companies. When it is determined that there is an opportunity to reduce the budgetary and supply risks, we will purchase the required energy through a competitive procurement process.

TVDSB will continue to explore alternative energy procurement strategies as they become available.

11.1.4. Occupant Behaviour

As part of our Sustainability Framework, we have implemented educational goals for staff and students at TVDSB. We will continue to engage students and staff in gaining a better understanding of energy consumption, the

measures the board is taking to reduce it, and how individuals can reduce their impact at school and home. Lesson plans and educational materials for teachers to educate students on energy, water, and waste management have been developed to support the plan.

TVDSB partners with numerous environmental organizations, authorities, and the municipalities to further implement our sustainable education at schools for students and staff. As additional opportunities arise we will identify opportunities to engage occupants such as “light-out” campaigns.

Additionally, education continues to be a priority for effective energy management. Dashboards containing energy, water, and waste data will be created for each school, facilitating the integration of this information into lessons, environmental club activities, and the promotion of sustainable behavior among students and staff.

Proper utilization of equipment is essential for effective energy use, education on HVAC systems remains a crucial component of our sustainability framework. These efforts collectively aim to foster a culture of environmental awareness and responsibility within our school communities.

11.2. 2024-2028 Energy Conservation Goals

TVDSB has set individual energy conservation goals for electricity and heating fuels. This includes electrical consumption reduction by 8.0% and reduction of natural gas consumption by 1.2% over the next 5 years.

The targets include current approved capital projects combined with planned Energy Management activities. These capital projects are implemented to replace inefficient equipment, increase occupant comfort, and decrease energy consumption. Our energy management activities will optimize equipment operation to save energy while maintaining occupant comfort. Over the timespan of this CDM plan will also take into account additional new schools planned.

Table 5 illustrates a breakdown of conservation goals on a yearly basis. TVDSB will monitor actual consumption in comparison to reductions on a yearly basis.

Table 5: Annual weather normalized Energy Intensity Conservation Goals

	Fiscal Year				
	2024	**2025**	**2026**	**2027**	**2028**
% reduction in heating fuels	**0.5**	**0.9**	**0.1(increase)**	**0.1(increase)**	**0**
% reduction in Electricity	**1.1**	**4.3**	**0.5**	**1.1**	**1.3**
Total ekWh/M^2 reduction	**1.4**	**4**	**0.2**	**0.5**	**0.7**

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

I confirm that (insert Board's name)'s senior management has reviewed and approved this Energy Conservation and Demand Management Plan.

Linda Nicholls  May 28, 2024

Name Date

Associate Director

Title

Appendix A – 2019 to 2023 Energy Conservation Projects

2019 to 2023 Design, Construction and Retrofit Projects with Energy Savings

	2018-19	2019-20	2020-21	2021-22	2022-23
Lighting					
High Efficiency Lighting Systems	$ 2,849,994	$ 2,315,250	$ 4,002,176	$ 1,006,335	$ 1,258,235
HVAC					
High Efficiency Condensing Boilers	$ 3,630,831	$ 8,265,515	$ 2,220,196	$ 317,167	$ 293,897
Energy efficient HVAC systems	$ 9,094,072	$ 3,754,318	$ 10,885,579	$ 27,331,178	$ 23,215,253
Energy efficient Rooftop units	$ 1,212,206	$ 71,493	$ 123,465	$ 173,564	$ 1,090,153
High Efficiency Domestic Hot Water		$ 34,151			$ 19,818
Heat Pumps	$ 920,206	$ 3,055,091	$ 3,786,834	$ 346,860	$ -
Controls					
Building Automation Systems - Upgrade	$ 1,582,134	$ 1,218,797	$ 711,890	$ 1,813,421	$ 1,826,365
Building Envelope					
New Roof	$ 7,134,003	$ 11,222,699	$ 10,518,203	$ 8,321,960	$ 10,144,770
Roofing Survey	$ 69,060	$ 115,645		$ 115,645	$ 194,104
New Windows	$ 1,611,359	$ 1,372,977	$ 2,349,060	$ 1,691,465	$ 4,928,120
Total	**$ 28,103,865**	**$ 31,425,936**	**$ 34,597,403**	**$ 41,117,595**	**$ 42,970,716**

Appendix B – 2024 to 2028 Planned Energy Conservation Projects

2024-2028 Planned Design, Construction and Retrofit Projects with Energy Savings					
	2024	**2025**	**2026**	**2027**	**2028**
Lighting					
Lighting Systems	$ 3,000,000	$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 5,000,000
HVAC					
Condensing Boilers	$ 3,400,000	$ 2,500,000	$ 2,500,000	$ 2,500,000	$ 2,500,000
Heat recovery/enthalpy wheel audits and Maintenance	$ -	$ 50,000	$ 75,000	$ 75,000	$ 100,000
Energy efficient HVAC systems	$ 13,500,000	$ 17,500,000	$ 17,500,000	$ 17,500,000	$ 17,500,000
Energy efficient Rooftop units	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000
High Efficiency Domestic Hot Water	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000
Controls					
Building Automation Systems - Upgrade	$ 2,400,000	$ 2,500,000	$ 2,500,000	$ 2,500,000	$ 2,500,000
Improving the quality of energy data	$ 50,000	$ 25,000	$ 50,000	$ 25,000	$ 50,000
Building automation recommissioning		$ 50,000	$ 100,000	$ 100,000	$ 100,000
Building Envelope					
New Roof	$ 7,000,000	$ 7,000,000	$ 7,000,000	$ 7,000,000	$ 7,000,000
New Windows	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000
Carbon Reduction Projects					
Reports, Energy Audits, carbon reduction planning	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000
Deep Energy retro fit project		$ 2,500,000	$ 2,500,000		
Caron reduction projects		$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 5,000,000
Design, Construction and Retrofit Strategies Total	**$ 35,025,000**	**$ 47,800,000**	**$ 47,900,000**	**$ 45,375,000**	**$ 45,425,000**