

Five Year Conservation and Demand Management Plan 2014-2018



Prepared June 2014 by:





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1 EXECUTIVE SUMMARY

The Ontario Provincial Government has committed to help public agencies better understand and manage their energy consumption. As part of this commitment, **Ontario Regulation 397/11** under the **Green Energy Act 2009** requires public agencies, including municipalities, municipal service boards, school boards, universities, colleges and hospitals to report on their energy consumption and greenhouse gas (GHG) emissions annually beginning in 2013, and to develop and implement energy Conservation and Demand Management (CDM) Plans starting in 2014.

The purpose of the Canadore College (the College) energy Conservation and Demand Management Plan is to develop a framework for Canadore College to understand the historical impact of its operations on greenhouse gas emissions, and to take action by setting greenhouse gas reduction targets. The first objective of this report was the development of an energy Conservation and Demand Management Plan that addressed the facets of energy consumption in the College. This included the development of a greenhouse gas emissions inventory, benchmarking Canadore College's existing energy intensity performance relative to other Post-Secondary Institutions identifying potential energy efficiency projects, and establishing a greenhouse gas emissions reduction target. This strategic approach to energy management (“energy Conservation and Demand Management Plan”) supports Canadore College’s ***Strategic Plan – Skilled Solution 2017***.

Energy efficiency and the wise use of energy are two of the lowest cost options for meeting energy demands, while providing many other environmental, economic and social benefits, including reducing greenhouse gas (GHG) emissions, cost avoidance and savings. Along with the aforementioned benefits, energy efficiencies and the wise use of energy also promote local economic development opportunities, energy system reliability, improved energy supply security, and reduced price volatility.

There are a variety of low cost/no cost initiatives available to Canadore College, which can jump-start energy consumption and dollar savings. Simple actions such as turning lights and appliances off, shutting off heaters in the summer, establishing efficient usage times, efficient production requirements, and many other actions can result in energy savings. Such actions, along with energy efficient capital and operating process improvements and project implementation, are key components which are outlined within the energy Conservation and Demand Management Plan (CDM Plan).

This CDM Plan is the culmination of a non-linear process involving the:

- Integration of establishing a baseline for performance to be measured against,
- Setting of future performance goals and objectives,
- Continuous improvement through identification of energy conservation potential,
- Strategic alignment of measure implementation and fiscal constraints, and

- Evaluation, measurement and communication of results achieved.

This CDM Plan contains three perspectives: historical, current and future. It looks at “what we have done”, “what we are doing”, and “what are we planning to do”.

2 KEY COMPONENTS

The Big Picture

Sustainability is a concept which meets the needs of the present without compromising the ability of future generations to meet their own needs. This is sometimes referred to as the “triple bottom line”.

- Environmental Sustainability: Managing the effects of human activity so that it does not permanently harm the natural environment.
- Economic Sustainability: Managing the financial transactions associated with human activities so that they can be sustained over the long term without incurring unacceptable human hardship.
- Social/Cultural Sustainability: Allowing human activity to proceed in such a way that social relationships between people and the many different cultures around the world are not adversely affected or irreversibly degraded.

An energy Conservation and Demand Management Plan is the sum of measures planned and carried out to achieve the objective of using the minimal possible energy while maintaining the comfort levels (in offices or dwellings) and production rates (in factories). It can be applied to any process or building where energy use is required. To make an efficient use of the energy and, as a consequence, to save it, the actions are focused on:

- Energy Conservation,
- Energy Recovery,
- Energy Substitution,
- Corporate Goals and Objectives, and
- Corporate Fiscal Management.

Analysis and Benchmarking

It is important to recognize the value of benchmarking and comparison as a starting point. By examining the College’s current energy consumption patterns and comparing them with others, a better understanding of the opportunities and the pitfalls of energy conservation and sustainability planning as experienced by other public agencies is gained. This exposure, combined with the information gleaned from the energy audits, will allow the College to focus on strategies that have been proven successful elsewhere and can be tailored to the unique nature of the College.

It is apparent that energy conservation is being considered and implemented in most Public Sectors across Ontario and Canada. As well, the insights gained through their experiences with energy conservation can be used as a springboard to further the College’s sustainability strategies to encompass both operational and policy improvements. Many public agencies are taking their understanding of environmental issues

and conservation beyond energy consumption and recycling, by addressing the more complex issues of water management, heat island effect, and light pollution, to name a few.

Regulatory Requirements

Under Ontario Regulation 397/11 (Part of the **Green Energy Act**, 2009), all public sector agencies must now comply with mandatory reporting requirements. By 2013, all energy consumption at College facilities will have to be recorded and submitted to the Ministry annually. By 2014, the requirements become more stringent as the College will have to submit a CDM Plan, which encompasses measures taken to date with results, as well as a five year plan for further energy conservation measures to be implemented. The College is well positioned to meet this requirement as audits have been completed at most facilities, resulting in a compiled list of energy reduction projects, some of which are already implemented. The full list is reviewed throughout this Plan while the implementation program is outlined later in this report. This Plan itself is meant to serve as the College's CDM Plan and will help assist the College to meet all of its mandatory reporting requirements.

Key Factors and Constraints

It is important to both the College's future and to its image in the public at large to understand the value of a comprehensive CDM Plan. Many people around the world are beginning to embrace the notion that the earth's environment and precious resources need to be conserved. However, the necessary changes will not happen overnight. To be successful, a comprehensive energy management plan should embrace long-term thinking, taking advantage of "low hanging fruit" to achieve immediate cost savings which will be redirected to more complex projects involving higher initial costs with larger net benefits.

Public agencies should realize that each of their circumstances is unique and may not lend themselves to 'boiler plate' solutions used in many private sector segments. Those who have met their goals have utilized the advantages of the unique physical and non-physical attributes of their facilities, including green power generation on large flat roofs and community gardens on their large properties. While it is easy to be focused on the larger solutions, even seemingly small efforts can make a major long-term impact on the overall goal. A good example of this is Energy Awareness training which encourages Staff to take simple and effective actions such as turning off lights and computers when not in use.

Ongoing professional development is also a key factor in the success of a CDM Plan to ensure that Staff Members understand their role in the greater goal. The CDM Plan and accompanying education should be a required part of their daily activities.

While realities of budget restrictions are an important consideration in any planning activity, it is possible to achieve energy savings while adhering to the financial constraints of a publicly-funded College system. It is clear that new technology and ideology changes have produced continued operational cost reductions

while improving indoor comfort and environmental sustainability. These cost saving projects can often fund themselves by avoiding the use of previously allocated funds. As long as the savings are reinvested, these improvements can continue for the foreseeable future, ensuring a sustainable process. Many industries have had environmental programs running for over a decade and continue to hit their 3%-5% intensity reduction goals without sacrificing product quality.

3 HISTORICAL ENERGY MANAGEMENT

Historically, the College has addressed Energy Conservation and Demand Management on a project-by-project basis through the activities of the Facilities Operations department. Capital projects were implemented based on equipment's expected useful life or in response to equipment emergency breakdowns. Utility savings, realized as a result of the implementation of these individual projects, have not historically been uniquely reported formally, but have been considered as a component of general operations. Thus, they have been reported through utility expenses in the Accounting System. Sustainability and long-term energy reduction goals, through this CDM Plan, will become integral components of the business reporting system.

Utility costs were viewed as a fixed overhead cost. The management of these costs relied on an exception-based investigation approach. In other words, utility costs were only reviewed if a utility bill was much higher, or lower, than typical.

In 2013, the College embarked upon a strategic energy auditing project. The purpose of these audits was to identify and analyze potential energy conservation and demand management opportunities. These efforts have been instrumental in assisting the College in aligning the CDM Plan with the College's ***Strategic Plan – Skilled Solution 2017***.

4 CURRENT STATE OF CORPORATE ENERGY

Energy Data Management

While the College has an admirable history of managing its energy consumption, the Ontario government has required an increase in College energy management practices. This has resulted in the need to enhance current practices and develop new approaches. To meet this need, the College will design a comprehensive program for collecting and analyzing monthly energy billing information, and ensuring Staff is informed about energy consumption. This effort will produce an energy costs and consumption database that will be used for monitoring excessive variations, targeting facility follow-up evaluations, and highlighting areas that could be candidates for improved conservation. These monitoring enhancements will improve the College's understanding of the bottom line impact of energy management.

Energy Supply Management

The College has currently adopted a strategy of procuring its electricity from North Bay Hydro and Parry Sound Energy. The College has chosen to contract its natural gas through Union Gas Limited. This strategy is reviewed annually during the budgeting process.

Energy Use in Facilities

The College Staff Members have retained a great deal of knowledge with regard to their facility's energy use. This knowledge base has been enhanced by a series of comprehensive audits completed at the College's facilities. Through the deployment of energy management software, the College Staff will be equipped with the information necessary to make effective energy management decisions. This will make it possible to implement an effective energy procurement process, pursue appropriate capital projects, and implement successful conservation and demand management programs.

Equipment Efficiency

The College has pursued many measures to improve the energy efficiency of the College's equipment. Some of these measures include:

- Heating and cooling equipment retrofits,
- Building envelope improvements,
- Electrical systems upgrade, and
- The pursuit of the feasibility of solar thermal and solar photovoltaic applications.

As the understanding of corporate energy consumption improves, College Staff will be equipped with the knowledge necessary to make informed decisions. This improved understanding will also reveal how

simple actions like commissioning and maintenance procedures can improve existing equipment efficiencies.

Organizational Integration

Day to day management of energy has been primarily the responsibility of the College Director, Facility Operations. Current practices will be enhanced with future plans including:

- The creation of an interdepartmental energy management team,
- Improved energy monitoring and feedback, and
- Interactive energy training and awareness.

Staff across all departments will be given the necessary tools to address corporate energy concerns such as budgeting, procurement, conservation, and generation.

Prior to the development of the CDM Plan, VIP assessed the College's energy management practices. This assessment was completed by speaking to College Staff and reviewing relevant College material. Upon completion of this review, VIP determined that the College had provided Staff Members with a mandate to pursue proper energy management, and through College Staff ingenuity, the College was able to direct resources to energy management. However, VIP also noted that if the College is to achieve the Ministry's mandate, it will require the development of this CDM Plan that will address the College's energy management needs.

5 CURRENT ENERGY CONCERNS

Environmental, societal, and fiscal pressures accentuate the need for an energy Conservation and Demand Management Plan (CDM Plan).

Environmental

Concerns surrounding energy consumption with regard to climate change and air pollution have been well documented. Since 1990, Ontario's greenhouse gas emissions have increased 14%. The Government of Ontario estimates that 75% of Ontario's greenhouse gas emissions are associated with the consumption of fossil fuels for energy purposes. Increased smog and air pollution are also connected to the consumption of energy. Ontario's electricity generation is the Province's second largest source of sulfur dioxide and the third largest source of nitrogen oxides. These pollutants can cause irreparable harm to human health.

Societal

The 2003 Blackout heightened societal concerns surrounding the stability and security of our energy supply. Energy has been imbedded into most societal practices. If energy consumption is not managed appropriately, the frequency of energy interruption and the subsequent societal disruption will increase.

Fiscal

The fossil fuels traditionally used for the generation of energy are no longer financially accessible or environmentally acceptable. This has resulted in the promotion of renewable energy generation which comes with an additional expense. Energy costs are also anticipated to increase as Ontario's existing energy infrastructure is taken off-line or refurbished. Coming off of the lows of the 2009 recession, national electricity and natural gas prices are 27% and 21% greater than they were at the start of the decade. It is not anticipated that this upward trend will be altered in the short to medium future. The Province of Ontario has recently projected an annual 3.5% to 7.9% increase in electricity costs over the next 20 years. Natural gas is also projected to trend upward.

In recent years, the College has experienced substantial student enrollment growth and is projected to grow into the future. As the College grows so will the College's environmental, societal, and fiscal energy concerns. The College recognizes that proper energy management must be pursued if these concerns are to be addressed

6 SCOPE OF THE CDM PLAN

Here in the beautiful city of North Bay, just 180 minutes north of Toronto, you'll discover three easily accessible campuses - the Aviation Campus, Commerce Court and the Education Centre, which is situated on a stunning 650-acre wooded escarpment overlooking the city. Within the walls of our campuses, you'll find a personalized environment where you can excel in smaller than average classes and where you'll have your own academic advisor. Come to a college where you are more than just a number, a place where every applicant has access to career counselling and our graduates get jobs. Come to the college where you're more than just a number and take advantage of smaller classes where you really get to know your professors.



Canadore College Facilities - General Information

Building Name	Operation Type	Address	City	Postal Code	Total Floor Area (m ²)
The Education Centre	Administrative offices	100 College Drive	North Bay	P1B8K9	1,424
The Education Centre	Classrooms and related facilities	100 College Drive	North Bay	P1B8K9	3,675
The Education Centre	Laboratories	100 College Drive	North Bay	P1B8K9	4,424
The Education Centre	Student residences	100 College Drive	North Bay	P1B8K9	7,871
The Education Centre	Student recreational and athletic facilities	100 College Drive	North Bay	P1B8K9	1,424
The Education Centre	Library	100 College Drive	North Bay	P1B8K9	2,602
Aviation Centre	Administrative offices	55 Aviation Avenue	North Bay	P1B8K9	338
Aviation Centre	Classrooms and related facilities	55 Aviation Avenue	North Bay	P1B8K9	856
Aviation Centre	Laboratories	55 Aviation Avenue	North Bay	P1B8K9	3,458
Commerce Court	Administrative offices	60 Commerce Crescent	North Bay	P1B8K9	713
Commerce Court	Classrooms and related facilities	60 Commerce Crescent	North Bay	P1B8K9	1,622
Commerce Court	Laboratories	60 Commerce Crescent	North Bay	P1B8K9	5,060
Commerce Court	Student recreational and athletic facilities	60 Commerce Crescent	North Bay	P1B8K9	659
Commerce Court	Library	60 Commerce Crescent	North Bay	P1B8K9	526
West Parry Sound Campus	Administrative offices	1 College Drive	Parry Sound	P2A0A9	60
West Parry Sound Campus	Classrooms and related facilities	1 College Drive	Parry Sound	P2A0A9	339
West Parry Sound Campus	Laboratories	1 College Drive	Parry Sound	P2A0A9	188
					35,239

7 ENERGY BASELINE AND CURRENT ENERGY PERFORMANCE

Effectively managing energy requires implementing appropriate energy monitoring procedures. The establishment of an accurate energy baseline is essential in this process. It will assist 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. The College, like many Colleges, relies on its utility bills to establish its energy baseline.

In 2013, the college undertook a strategic energy assessment, executed by Honeywell Automation & Controls Solutions. The energy audits consist of a detailed analysis of historical consumption and demand information as well as a walkthrough of the facility by a qualified energy auditor. Based on the auditor's survey, a detailed equipment list and an energy consumption breakdown have been created, as well as a comprehensive list of potential energy conservation measures for each facility.

BASELINE PERFORMANCE (2011)

The College has elected to utilize the consumption data from 2011 to represent its baseline energy consumption performance. Based on this information, and normalizing for weather conditions, the baseline energy performance may be represented by a normalization analysis.

Canadore College Facilities - General Information					
Building Name	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m ³)	GHG Emissions (kg)	Energy Intensity (ekWh/ft ²)	Energy Intensity (GJ/m ²)
The Education Centre	215,277	29,426	72,855	34	1.34
The Education Centre	555,705	75,957	188,064	34	1.34
The Education Centre	669,040	91,449	226,419	34	1.34
The Education Centre	1,190,367	162,707	402,848	34	1.34
The Education Centre	215,333	29,433	72,874	34	1.34
The Education Centre	393,436	53,777	133,148	34	1.34
Aviation Centre	28,763	4,611	11,019	21	0.83
Aviation Centre	72,732	11,661	27,865	21	0.83
Aviation Centre	293,891	47,117	112,592	21	0.83
Commerce Court	59,140	7,752	19,387	18	0.71
Commerce Court	134,544	17,635	44,105	18	0.71
Commerce Court	419,610	55,001	137,554	18	0.71
Commerce Court	54,640	7,162	17,912	18	0.71
Commerce Court	43,584	5,713	14,288	18	0.71
West Parry Sound Campus	8,656	1,265	3,084	34	1.32
West Parry Sound Campus	48,621	7,106	17,324	34	1.32
West Parry Sound Campus	26,994	3,945	9,618	34	1.32
	4,430,332	611,718	1,510,956	29	1.12

CURRENT PERFORMANCE (2012)

It is imperative to understand the energy characteristics of each facility. By understanding these values, baselines can be established and future retrofits and improvements to the buildings can be monitored and tracked to ensure that the intended benefits are fully realized. The College's most recent energy consumption inventory was completed in 2012. This inventory took into account the electricity and natural gas consumption of College facilities. In 2012, the College's total energy use, including electricity and natural gas, was 30,920,097 equivalent kilowatt hours (ekWh). This total consisted of 14,213,465 kWh of electricity and 1,571,978 m³ of natural gas, which is equivalent to 16,706,632 ekWh.

Canadore College Facilities - 2012 Energy					
Building Name	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m³)	GHG Emissions (kg)	Energy Intensity (ekWh/ft²)	Energy Intensity (GJ/m²)
The Education Centre	3,347,021	362,102	952,362	45	1.76
The Education Centre	5,102,092	551,977	1,451,751	45	1.76
The Education Centre	979,173	105,933	278,614	45	1.76
The Education Centre	1,784,564	193,066	507,780	45	1.76
The Education Centre	198,285	21,452	56,420	45	1.76
The Education Centre	590,317	63,864	167,969	45	1.76
Commerce Court	658,136	75,931	196,207	17	0.66
Commerce Court	41,108	4,743	12,255	17	0.66
Commerce Court	552,090	63,696	164,592	17	0.66
Commerce Court	71,161	8,210	21,215	17	0.66
Commerce Court	35,621	4,110	10,620	17	0.66
Aviation	319,052	48,918	118,009	19	0.75
Aviation	19,072	2,924	7,054	19	0.75
Aviation	273,678	41,961	101,226	19	0.75
Aviation	13,668	2,096	5,055	19	0.75
West Parry Sound Campus	153,351	14,095	38,917	31	1.20
West Parry Sound Campus	26,428	2,429	6,707	31	1.20
West Parry Sound Campus	48,648	4,472	12,346	31	1.20
	14,213,465	1,571,978	4,109,101	36	1.41

In all, the College has increased its energy intensity from 2011 to 2012 indicating a slight degradation in energy utilization from 1.12 GJ/m² to 1.41 GJ/m².

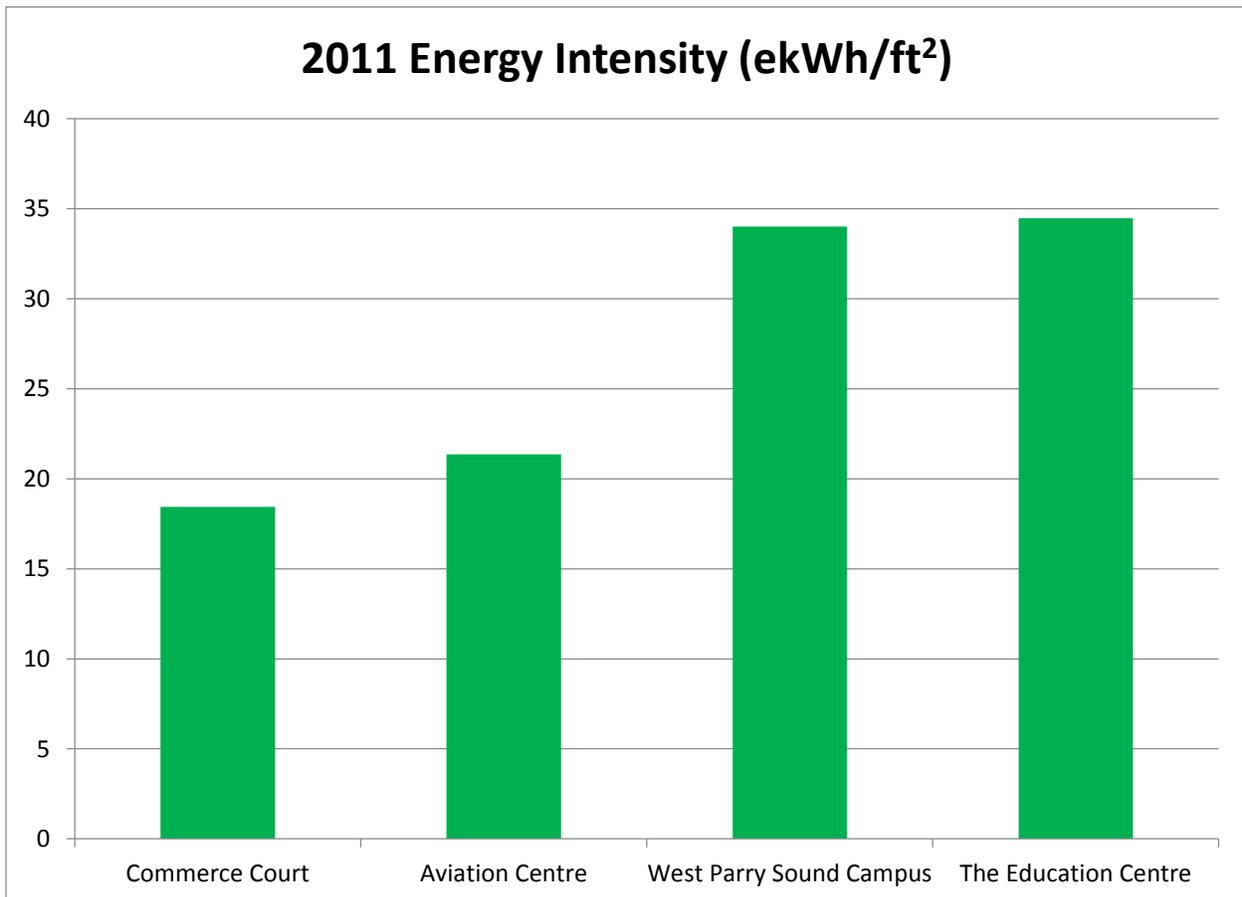
BENCHMARKING

Market Sector

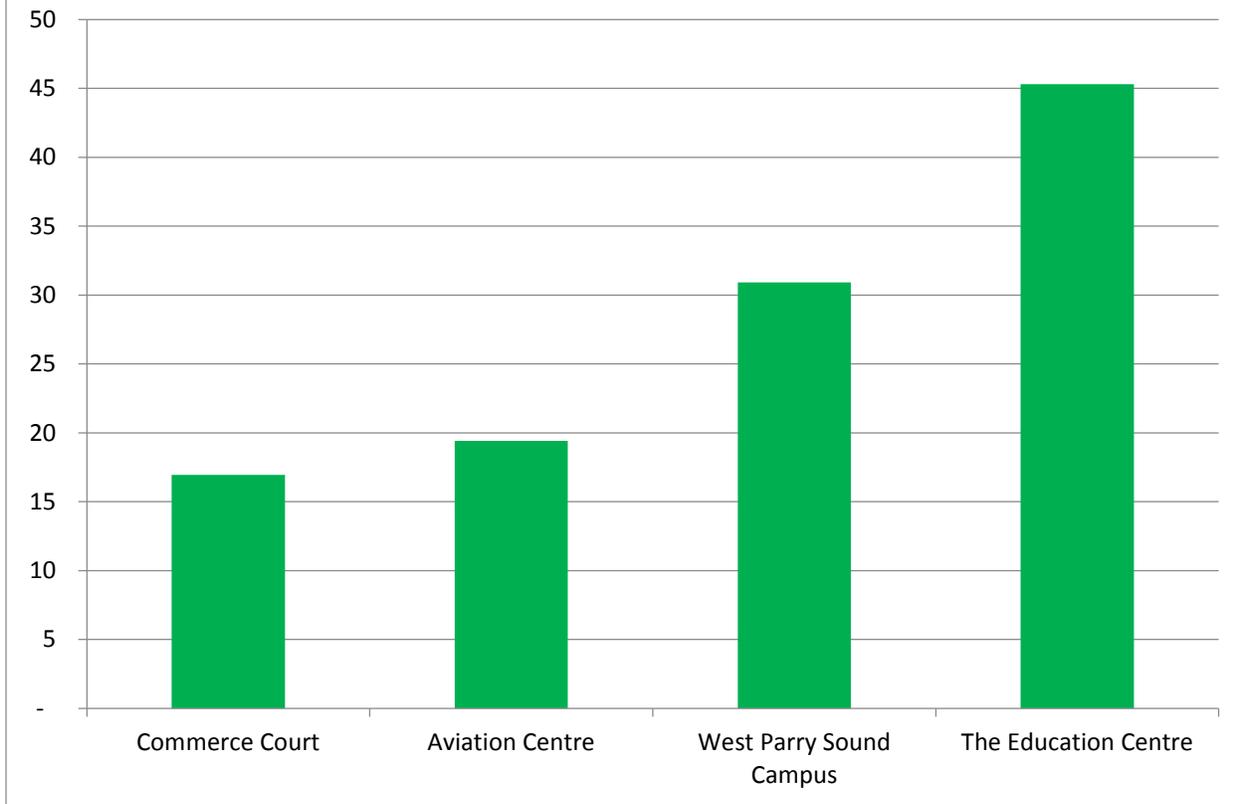
Energy Intensity (ekWh/ft ²)				
Sector	Minimum	Average	Maximum	No. of Organizations
Universities	0.0	34	196	46

The College's facilities have an average 36 ekWh/ft² energy intensity, slightly above the industry average based on the Ministry of Energy's 2011 Public Sector Energy Consumption Data. The College ranks 23rd amongst all Post-Secondary Institutions in Ontario for energy intensity.

College Facilities



2012 Energy Intensity (ekWh/ft²)



8 MISSION AND VISION

Mission:

“To provide outstanding applied education and training for an ever-changing world.”

Vision:

Canadore is the college of choice for connecting people, education and employment through leadership and innovation.

The CDM Plan has been developed to address the fiscal, societal, and environmental costs and risks associated with energy consumption. Proper energy management will allow the College to display leadership, improve the delivery of services, and enhance the overall quality of life with respect to the community and campus.

This CDM Plan outlines key actions that must be pursued to make this vision a reality. The completion of these actions will assist the College to meet its energy conservation targets and its greenhouse gas emission reduction commitment. Achieving these goals will assist the College in securing a strong energy management reputation and will allow for cost savings that can benefit the College, its employees, and its students.

It is acknowledged that, for this vision to come to fruition, energy management at the College must become an inclusive process. Recognizing that energy affects everyone differently, this Plan was created to address a variety of energy related concerns, while capturing innovative and relevant actions that will lead to meaningful change.

This CDM Plan will allow energy management to be incorporated into all College activities, including organizational and human resource procedures, procurement practices, financial management and investment decisions, and facility capital, operations, and maintenance.

Overview

This CDM Plan is designed to meet the current energy needs and obligations of the College. The intent is to guide the College in the development of an energy management foundation. This will be a living Plan that will evolve as the College’s energy needs are revealed and better understood.

The College’s approach to energy management is three pronged. It begins with:

- Elimination of waste,
- Improving efficiencies, and

- Optimizing energy supply.

Prior to pursuing these actions, the College must be aware of the facility and Staff behaviours that influence energy consumption. Once encapsulated, this knowledge must be dispersed throughout the organization, allowing for the development of a culture of sustainability.

An improved understanding of corporate energy consumption will require improvements in energy management and awareness. Energy awareness campaigns will strive to make energy a tangible asset that Staff Members can appreciate when it is being consumed or wasted. In addition to increasing energy awareness, this energy Plan will integrate energy efficiency into the capital and operational decision making of the organization.

9 GOALS AND OBJECTIVES

It is of critical importance to improve energy efficiency and reduce our operating costs. Equally important is displaying our commitment to the environment through the reduction of greenhouse gases, while improving our air quality. It is also important that these actions are carried out without adversely impacting the College's operations. All College Staff will have an essential role in the success of this energy management Plan. It will be the responsibility of the Energy Management Team to ensure that energy management measures are properly communicated and effectively implemented. An Energy Mandate for the College has been developed and is an integral component of this CDM Plan.

The College's CDM Plan was completed to help support the following goals:

- Encourage reduced greenhouse gas emissions and energy consumption in the College by promoting built forms that create more sustainable, efficient, healthy, and livable school communities,
- Maximize the use of operational budgets by ensuring that College facilities are operating in as energy efficient manner as possible,
- Ensure that minimizing energy use is considered throughout the various aspects of Canadore's operations including purchasing where financially viable, and
- Recognize the importance of the input and participation of Canadore's employees and students in supporting energy conservation and sustainability initiatives through education, awareness and training.

The primary objective of this Plan is to improve the management of the College's energy consumption. Part of this objective is setting a conservation target that will see the College reduce its 2011 energy consumption by 2% by the end of 2018. Recognizing that the College has a growing student base, the College's energy conservation target will be intensity based. It is also the objective of this Plan to improve the College's understanding of energy consumption which is essential for the College to meet its corporate energy management goals.

Measurements of Success

The measurements of success will be based on a variety of indicators:

- Reaching the CDM Plan's energy conservation target,
- Assisting with the corporate greenhouse gas reduction target,
- Achieving the savings outlined in the Plan's budget section, and
- Imbedding energy management in the College's strategic, capital and operations decision making process.

Reporting Standards

The CDM Plan will allow for the monitoring and reporting that is necessary for the College to meet the regulatory requirements of the **Green Energy Act** and the College's greenhouse gas reduction targets. Regular energy monitoring and feedback to the Ministry and College Management and Staff will improve knowledge and help make energy consumption a tangible asset, making possible appropriate behavioural changes. The intent of monitoring and reporting on energy consumption is to make energy management transparent and the consumer accountable. The Ministry will be provided with annual updates on the state of energy management at the College. Energy consumption feedback provided to Staff will be imbedded into the College's regular business.

10 ENERGY MANAGEMENT TEAM

Historically, the College addressed Energy Conservation and Demand Management on a project-by-project basis through the activities of the Building Services Group. Strategic directives have been provided by the College Board of Governors and the Senior Executive Team.

This CDM Plan outlines a commitment to integrate Energy Conservation and Demand Management into the operations of the College, as indicated in the covering letter from the President and Chief Executive Officer. Within the duration of the CDM Plan, CDM planned activities will become an integral component of the annual budgeting process. A collaborative effort will be undertaken to achieve this integration, involving:

- Internal Staff (which may include but will not be limited to Facilities Management, Finance, and Procurement),
- Advisement from the Ministry of Energy and the Ministry of Education, and
- Consultations with Energy Management experts.

The current energy management team is comprised of the:

- President and Chief Executive Officer,
- Director, Facilities Operations.

11 FINANCIAL ASSESSMENT

The energy Conservation and Demand Management Plan's financial assessment philosophy is to treat fiscal resources as if they were energy assets. Therefore, financial investments follow the same three pronged approach used for the management of energy:

- Elimination of waste,
- Improving efficiencies, and
- Optimizing energy supply.

The initial cost and saving estimates for the proposed process improvements, program implementation, and projects are broken down as follows:

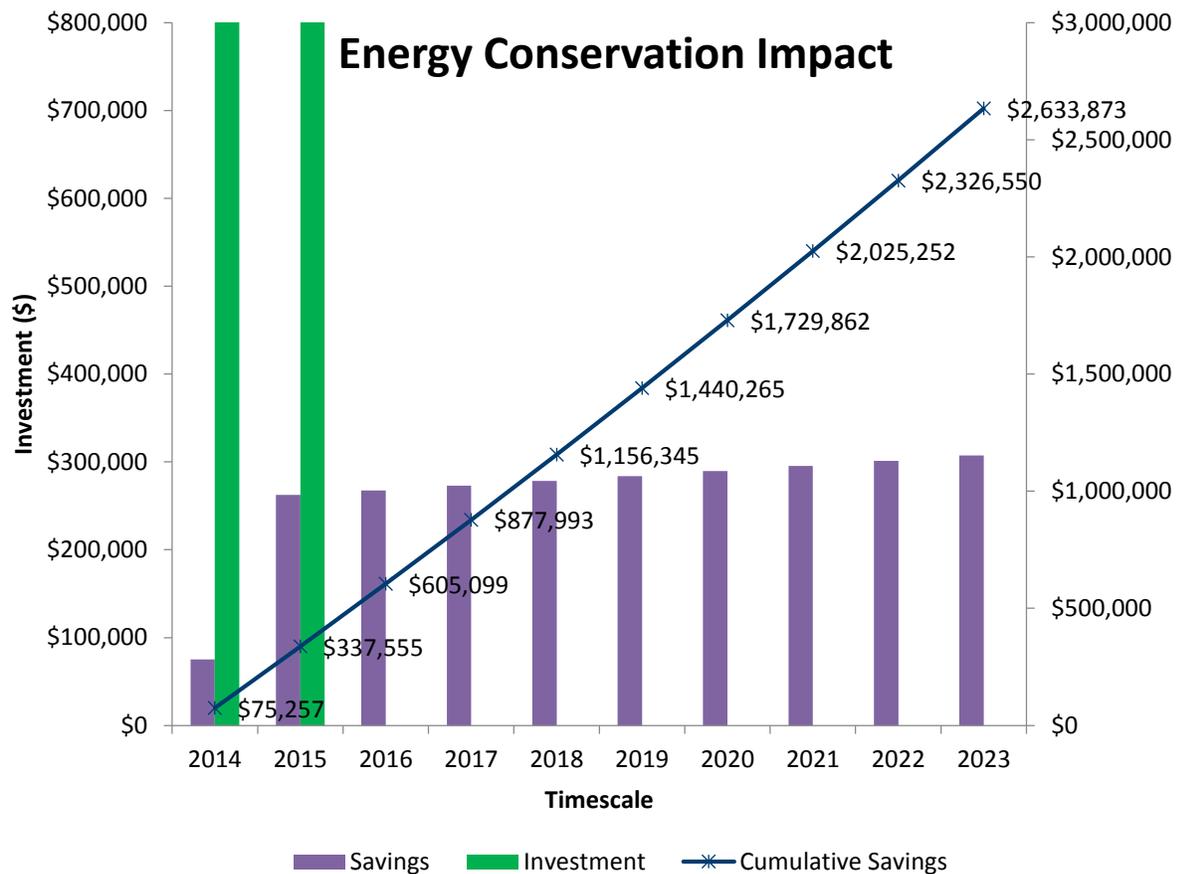
Canadore College			
Opportunity	Annual Savings (\$)	Estimated Installation Cost (\$)	Payback Period (years)
AV Building Envelope	843	6,427	7.6
Gym Lighting Upgrade	2,652	26,163	8.0
IT Power Management	41,257	123,142	2.3
LED and T8 Lighting - B wing	4,395	215,810	38.2
LED and T8 Lighting - C wing	18,208	1,231,625	50.8
LED and T8 Lighting Upgrade – G wing	1,139	13,183	9.5
T8 Lighting Upgrade - D wing	6,763	89,852	10.0
AV Campus Controls Upgrade	2,787	22,701	8.1
CC Building Controls Upgrade	13,664	168,500	12.3
HVAC Upgrade - C and D wings	127,408	3,619,779	15.7
ICAMP Controls Upgrade		36,870	N/A
Upgrade AHU 44 and 45	13,986	119,937	8.6
Upgrade AHU-8 Controls	3,249	21,081	6.5
Upgrade C-wing AHU Controls	26,435	26,435	0.3
UPS Room Ventilation	-1,994	47,676	N/A
Total	\$260,792	\$5,769,181	22.1

The listed costs and savings are for the inaugural year of a process, program, or project. If initiated and monitored effectively, it can be anticipated that these savings can be sustained. It should also be noted that the price of energy is anticipated to increase, whereas the costs of capital projects will likely decrease with advancements in technology. This could potentially lead to increased savings and decreased costs in the later years of the plan. The potential for avoided costs adds to the relevance of a plan of this nature.

This fiscal assessment does not take into account the economic benefits of achieving all of the corporate energy management goals. Due to the difficulty in quantifying the economic value of extended equipment longevity, improved comfort and productivity, and climate change mitigation, it should not be discounted.

12 CORPORATE ENERGY BUDGET

The following budget was derived from the planned actions within the CDM Plan. Each year's estimated cumulative savings have also been displayed in the figure below. These projected costs and savings do not consider the human resource expenditures.



Prior to requesting funding for energy actions, the College will consult with utility representatives and/or energy consultants, allowing the College to schedule project launch dates in parallel with applicable incentive funding programs. The projects may be moved forward or delayed based on changes to incentive programs as well as changes to the CDM Plan. However, the College will not make significant alterations to the Plan in a quest for incentive funding. This is not a prudent approach to planning. Actions will be pursued only when they coincide with the College's objectives and are appropriate to be pursued at that time.

As the College continues to evolve and its energy needs become greater, it will be essential to reassess and clarify, as necessary, the financial indicators that are applied to investment analysis and prioritization of proposed energy projects. Energy efficiency projects must be weighted appropriately relative to other

investment needs. There will also be a need to develop procedures for the annual allocation of capital resources for energy efficiency measures in the capital budget.

13 ENERGY MANAGEMENT ACTIONS

The economic feasibility of proposed actions played a large role in the prioritization of the processes, programs, and projects. Equally important in this prioritization exercise was the evaluation of the College's internal capacity to complete the proposed initiatives. Recognizing the need to develop the College's internal capacity, the initial years of the Plan focus heavily on processes and programs. The implementation of the recommended processes and programs will result in an improved understanding and awareness of energy consumption. This will allow for improved decision making and greater success with future energy projects (See **Appendix C** for the CDM Plan timeline). As these actions are completed, the Energy Management Team will meet to discuss monitoring results and how they can be used to enhance the Plan. The CDM Plan is intended to be a living document. Anticipated improvements in knowledge and capacity will result in enhancement of the proposed actions.

Annual Reporting

An Annual Conservation and Demand Management Plan Update Report will be provided that details Canadore's activities and results relating to this 2014-2018 Energy Conservation and Demand Management (CDM) Plan. The Report will describe the CDM Plan related activities that have happened in the previous year and will focus on linking actions to results. In addition, the Report will take a forward view of the upcoming year to lay out the roadmap and identify any changes or adjustments that should be considered based on what the current market conditions are. The overarching goal of the report is to make the 5 year CDM Plan a living document that is reviewed and updated on a yearly basis.

Future Energy Projects

Energy projects at the College were evaluated prior to the development of the CDM Plan. College Staff Members have advocated for some ambitious energy initiatives that were investigated and determined to be not feasible for a variety of reasons. It is anticipated that as the College grows and energy management practices improve, these actions will be reassessed.

Future Energy Reduction Projects Summary	
Year	Planned Activity
2014	AV Building Envelope Gym Lighting Upgrade IT Power Mgmt LED and T8 Lighting - B wing LED and T8 Lighting - C wing LED and T8 Lighting Upgrade – G wing T8 Lighting Upgrade - D wing
2015	AV Campus Controls Upgrade CC Building Controls Upgrade HVAC Upgrade - C and D wings ICAMP Controls Upgrade Upgrade AHU 44 and 45 Upgrade AHU-8 Controls Upgrade C-wing AHU Controls UPS Room ventilation
2016	A 250 kW Rooftop Solar project at Commerce Court.
2017	A shared Rooftop Solar project with Nipissing University at 100 College Dr. of 500 kW
2018	T.B.D.

Renewable Energy

Feasibility and promotion of renewable energy technologies were examined throughout the development of the CDM Plan. These technologies have been incorporated into the CDM Plan where it made sense to do so, strategically or fiscally.

Purchasing Practices

Traditionally, purchasing practices in the public sector were designed to favour equipment or physical retrofits at the lowest cost in order to ensure the highest possible financial responsibility. As energy conservation best practices emerged, it was revealed that there is a major issue in doing this. Almost all wasteful energy consuming equipment is less expensive than their energy conserving counterparts. The practice in itself does not encourage energy efficiency, as most energy intensive alternatives such as standard efficiency motors are less costly than their higher efficiency counterparts. When dealing with energy intensive hardware, the initial capital cost is only a fraction (5%-10%) of the total lifecycle cost.

The practice of ‘low bidder wins’ purchasing limits the Staff when trying to make the right environmental decision. Making a specific amount of money available to include the conservation upgrades allows the College to take advantage of necessary investments in order to reduce their impact on the bottom line

after the cost of purchase. For example, when purchasing a motor, all suppliers will specify standard efficiency motors. An energy smart buyer will know that 90%+ of the motor's lifecycle cost is in its energy use. Therefore, buying a premium efficiency motor at a small incremental cost has a payback of less than three years. Missing this opportunity translates into a long-term financial increase. In fact, the incremental cost between a less efficient and a more efficient alternative is often less than 5% of the capital cost. That 5% capital cost difference is often recuperated in less than three years. This allows Staff to make the right environmental decision based on industry best financial practices.

Energy Management and Information Systems

An Energy Management and Information System (EMIS) is an important element of a comprehensive Energy Management Program (EMP), as it helps to ensure that the full benefits of other energy conservation efforts are achieved and sustained. In fact, a quality EMIS can reduce energy use and cost by at least 5%. (Ref: Office of Energy Efficiency, National Resources Canada). Current industry and international standards, such as the International Performance Measurement & Verification Protocol (IPMVP), use an average of an 8%-10% reduction in energy consumption and costs. VIP Energy Services has documented a conservation average of 17% over customers served to date. However, in order to be as conservative as possible in its financial calculations, VIP generally uses NRCan's conservative numbers (5%) to ensure objectivity in the investment matter. The savings from an EMIS result from the following measured impacts:

- Early detection of poor performance,
- Support for optimal decision making,
- Effective performance reporting,
- Auditing of historical performance,
- Identification and justification of energy projects,
- Evidence of implementation success,
- Support for energy budgeting and accounting, and
- Provision of energy data to other systems (such as Building Automation Systems, BAS).

When looking at performance reports, an EMIS facilitates ensuring that upgrades or changes actually meet forecasted savings, as well as the quantification of losses or gains. However, it is important to note that placing meters to isolate individual retrofit projects determined by their scope is generally cost ineffective and typically does not allow incorporation of out-of-scope project factors that directly affect equipment performance.

A one-time, comprehensive metering solution allows for a much more cost effective view, while enabling accountability to 90% of the planned projects budgeted to date. Reporting can be the most essential part of this plan as multiple portions of the organization rely on this data to make periodic decisions. The

Finance Team can use this information to verify billing accuracy and other potential costs, such as construction back-charges. Energy Conservation Managers generally look at this data for building performance, future opportunity and functional trending. Project Managers rely on this information to ensure that vendors are supplying and meeting contractual obligations. Collecting the information in any EMIS program is really only the first step, as the data must then be used to instigate change and push action. This can only be done through analysis and warning systems built on baseline information. In order for an EMIS system to function properly, communication loops must also be established between departments in order for the maximum benefit to be realized.

Building Re-Commissioning

Building re-commissioning, or retro-commissioning, refers to the optimization of the current automation, controls and energy consuming systems. As buildings age, both the functionality of the equipment and the functions that they serve can undergo significant changes. A re-commissioning program generally focuses on ensuring that the equipment operations are modified to include any new or deleted duties. The following is a list of common problems found in re-commissioning projects that result in increased energy costs:

- Inefficient scheduling of HVAC equipment,
- Simultaneous heating and cooling,
- Economizer sequences not optimized,
- Incorrect airflow and water balance,
- Malfunctioning sensors or incorrect calibration,
- Fan VFD control overridden,
- Supply air static pressure set-points not optimized,
- Boiler controls not operating efficiently,
- Balancing dampers and valves not installed or installed in poor or unusable locations,
- Incorrectly piped water coils,
- Process or space classification changes (lab space to office, etc.),
- Incomplete or incorrect control component installation,
- Control sequence incorrectly implemented,
- Substituted control components,
- Incomplete installations (missing control valve, actuators, etc.), and
- Testing, adjusting, and balancing (TAB) not completed or only partially completed.

National Resources Canada (NRCan) has published several guidelines for costing and expected returns from re-commissioning projects. Building re-commissioning is an increasingly important practice, not only

from an energy standpoint, but also from a comfort and safety perspective as well. The more complex building controls and ventilation become, the more risk there is that one or more components will fail or deliver incorrect measurements.

Current practices in re-commissioning indicate that the cost to complete these initiatives is between \$2.90 and \$4.50/m². Expected savings from the projects are typically between \$1.00 and \$4.00/m², depending upon the starting efficiency of the building, thus creating very attractive paybacks in this area.

Energy and Resource Awareness (ERA) Programs

Independent studies done by organizations such as Natural Resources Canada (NRCAN) show that initiatives directed at Staff and facility users, in particular ERA Programs, can lead to significant savings on their own. In fact, NRCAN reports indicate that dedicated, consistent Energy Awareness Programs are proven to be the most effective way to reduce energy usage with no capital costs and minor operational expenses. A conservative estimate of savings for an effective ERA Program can be as high as 5% -7% of annual utilities spending.

An effective ERA Program is designed to assist organizations to attain energy savings by promoting a fundamental shift in the personal philosophies of Staff and facility users towards reducing their energy use. The Program utilizes community-based social marketing to develop influential communication materials and in-house displays that are carefully designed to inform and motivate employees to effectively decrease energy consumption. In many cases, an ERA Program has proven to be the most effective way to lower energy usage without any capital costs and minimal operational expenses. A typical ERA Program would include features such as:

- A detailed ERA Program written plan including a GANTT chart,
- The creation of a program email address for suggestions and concerns and access to ERA experts to answer questions,
- A customized identity and marketing program,
- Training and support for an Energy Steward Team,
- ERA displays with various relevant conservation themes, and
- Annual Marketing Effectiveness Reports and Feedback system.

A continuous and consistent ERA Program is not only an effective way to lower energy use within a facility, but can also serve to be an effective marketing tool to spread the word that the College is a community leader in energy conservation and environmental sustainability.

APPENDIX A

Energy Data



ENERGY CONSUMPTION

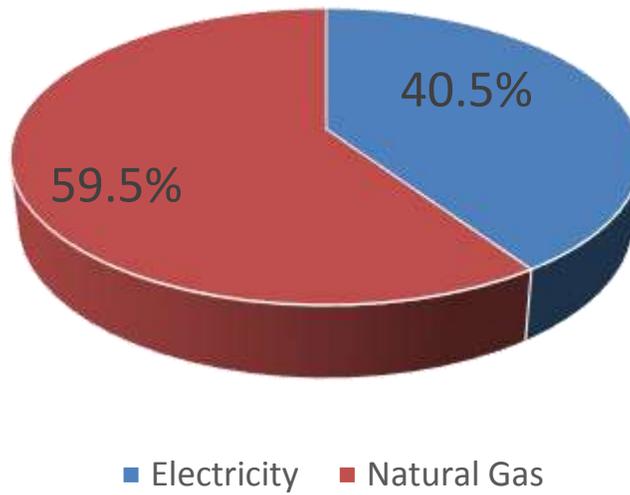
Canadore College – Energy Consumption				
Building Name	2011 Electricity (kWh)	2011 Natural Gas (m³)	2012 Electricity (kWh)	2012 Natural Gas (m³)
The Education Centre	215,277	29,426	3,347,021	362,102
The Education Centre	555,705	75,957	5,102,092	551,977
The Education Centre	669,040	91,449	979,173	105,933
The Education Centre	1,190,367	162,707	1,784,564	193,066
The Education Centre	215,333	29,433	198,285	21,452
The Education Centre	393,436	53,777	590,317	63,864
Aviation Centre	28,763	4,611	319,052	48,918
Aviation Centre	72,732	11,661	19,072	2,924
Aviation Centre	-	-	273,678	41,961
Aviation Centre	293,891	47,117	13,668	2,096
Commerce Court	59,140	7,752	658,136	75,931
Commerce Court	134,544	17,635	41,108	4,743
Commerce Court	419,610	55,001	552,090	63,696
Commerce Court	54,640	7,162	71,161	8,210
Commerce Court	43,584	5,713	35,621	4,110
West Parry Sound Campus	8,656	1,265	153,351	14,095
West Parry Sound Campus	48,621	7,106	26,428	2,429
West Parry Sound Campus	26,994	3,945	48,648	4,472
TOTAL	4,430,332	611,718	14,213,465	1,571,978

APPENDIX B

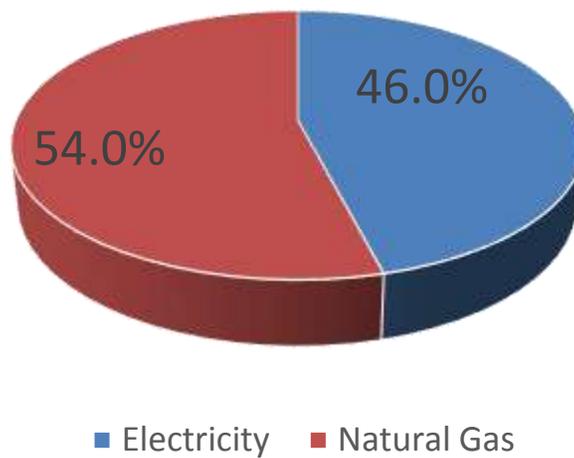
Energy Use Breakdown

ENERGY USE BREAKDOWN

2011 Energy Breakdown (ekWh)



2012 Energy Breakdown (ekWh)





APPENDIX C

Energy Conservation Measure Schedules



Canadore College Energy Management Strategies

Annual Energy Savings			Annual Savings								
EMS #	Opportunity	Electricity (kWh/yr)	Electricity Demand (kW/yr)	Natural Gas (m ³ /yr)	Water (m ³ /yr)	Estimated Installation Cost (\$)	Incentives (\$)	Estimated Cost with Incentives (\$)	Total Energy Savings (\$)	Payback Period (years)	tCO ₂ e Savings
EMS 01	AV Building Envelope							6,427	843	7.6	
EMS 02	Gym Lighting Upgrade	24,974	7					26,163	2,652	8.0	
EMS 03	IT Power Management							123,142	41,257	2.3	
EMS 04	LED and T8 Lighting - B wing	35,146	19.5					215,810	4,395	38.2	
EMS 05	LED and T8 Lighting - C wing	158,042	58.3					1,231,625	18,208	50.8	
EMS 06	LED and T8 Lighting Upgrade – G wing	9,311	4.6					13,183	1,139	9.5	
EMS 07	T8 Lighting Upgrade - D wing	55,136	25.2					89,852	6,763	10.0	
EMS 08	AV Campus Controls Upgrade							22,701	2,787	8.1	
EMS 09	CC Building Controls Upgrade							168,500	13,664	12.3	
EMS 10	HVAC Upgrade - C and D wings							3,619,779	127,408	15.7	
EMS 11	ICAMP Controls Upgrade							36,870		N/A	
EMS 12	Upgrade AHU 44 and 45							119,937	13,986	8.6	
EMS 13	Upgrade AHU-8 Controls							21,081	3,249	6.5	
EMS 14	Upgrade C-wing AHU Controls							26,435	26,435	0.3	
EMS 15	UPS Room Ventilation							47,676	-1,994	N/A	
Totals								\$260,792	\$5,769,181	22.1	

Canadore College Projected Energy Conservation Savings and Investment

EMS	Savings	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	TOTAL
EMS 01	AV Building Envelope	843	860	878	895	913	931	950	969	988	1,008	\$9,235
EMS 02	Gym Lighting Upgrade	2,652	2,705	2,759	2,814	2,871	2,928	2,987	3,046	3,107	3,169	\$29,039
EMS 03	IT Power Management	41,257	42,082	42,924	43,782	44,658	45,551	46,462	47,391	48,339	49,306	\$451,753
EMS 04	LED and T8 Lighting - B wing	4,395	4,483	4,573	4,664	4,757	4,852	4,949	5,048	5,149	5,252	\$48,124
EMS 05	LED and T8 Lighting - C wing	18,208	18,572	18,944	19,322	19,709	20,103	20,505	20,915	21,334	21,760	\$199,373
EMS 06	LED and T8 Lighting Upgrade – G wing	\$1,139	1,162	1,185	1,209	1,233	1,258	1,283	1,308	1,335	1,361	\$11,333
EMS 07	T8 Lighting Upgrade - D wing	6,763	6,898	7,036	7,177	7,320	7,467	7,616	7,769	7,924	8,082	\$74,053
EMS 08	AV Campus Controls Upgrade		2,787	2,843	2,900	2,958	3,017	3,077	3,139	3,201	3,265	\$27,186
EMS 09	CC Building Controls Upgrade		13,664	13,937	14,216	14,500	14,790	15,086	15,388	15,696	16,010	\$133,287
EMS 10	HVAC Upgrade - C and D wings		127,408	129,956	132,555	135,206	137,911	140,669	143,482	146,352	149,279	\$1,242,818
EMS 11	ICAMP Controls Upgrade			-	-	-	-	-	-	-	-	\$0
EMS 12	Upgrade AHU 44 and 45		13,986	14,266	14,551	14,842	15,139	15,442	15,751	16,066	16,387	\$136,428
EMS 13	Upgrade AHU-8 Controls		3,249	3,314	3,380	3,448	3,517	3,587	3,659	3,732	3,807	\$31,693
EMS 14	Upgrade C-wing AHU Controls		26,435	26,964	27,503	28,053	28,614	29,186	29,770	30,366	30,973	\$257,864
EMS 15	UPS Room Ventilation		(1,994)	(2,034)	(2,075)	(2,116)	(2,158)	(2,202)	(2,246)	(2,290)	(2,336)	-\$19,451
	Total Savings	75,257	262,298	267,544	272,894	278,352	283,919	289,598	295,390	301,297	307,323	\$2,633,873

EMS	Cost (Investment)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	TOTAL
EMS 01	AV Building Envelope	6,427										\$6,427
EMS 02	Gym Lighting Upgrade	26,163										\$26,163
EMS 03	IT Power Management	123,142										\$123,142
EMS 04	LED and T8 Lighting - B wing	215,810										\$215,810
EMS 05	LED and T8 Lighting - C wing	1,231,625										\$1,231,625
EMS 06	LED and T8 Lighting Upgrade – G wing	13,183										\$13,183
EMS 07	T8 Lighting Upgrade - D wing	89,852										\$89,852
EMS 08	AV Campus Controls Upgrade		22,701									\$22,701
EMS 09	CC Building Controls Upgrade		168,500									\$168,500
EMS 10	HVAC Upgrade - C and D wings		3,619,779									\$3,619,779
EMS 11	ICAMP Controls Upgrade		36,870									\$36,870
EMS 12	Upgrade AHU 44 and 45		119,937									\$119,937
EMS 13	Upgrade AHU-8 Controls		21,081									\$21,081
EMS 14	Upgrade C-wing AHU Controls		26,435									\$26,435
EMS 15	UPS Room Ventilation		47,676									\$47,676
	Total Costs	1,706,202	4,062,979	267,544	272,894	278,352	283,919	289,598	295,390	301,297	307,323	\$2,633,873