

Energy Conservation and Demand Management Plan Update and 2019-2023 Plan City of Cornwall



Overview

The City of Cornwall has updated its Energy Conservation and Demand Management Plan (ECDM). This report provides an overview on the progress to date of the 2014-2018 plan and provides a summary of the strategy for 2019-2023. This report is a requirement relating to Ontario Regulation 507/18 (formerly 397/11) which was established to help public agencies better understand their energy usage, develop conservation plans to guide energy savings, and demonstrate government leadership in conservation.

Results from the completion of the Ministry of Energy's 2017 Energy Consumption and Greenhouse Gas Emissions Template is included as an energy consumption benchmark (Appendix B). In addition, completed energy reduction projects from the City's previous energy plan (2014-2018) can be found in Appendix C. A recommendations summary from the previous plan has been updated in Appendix A while a list of actionable items for consideration implement over the next five years (2019-2023) can be found in summary prior to Appendix A.

Commitment



Declaration of Commitment:

Council Resolution: We will allocate resources to develop and implement a strategic energy management plan directed at reducing our energy consumption and its related environmental impact.



Vision:

Through our commitment to long term financial planning and Asset Management planning, the stewardship in our use of finite energy resources, the City will demonstrate leadership, optimize our delivery of services, and enhance the overall quality of life in our community.



Goals:

To continuously reduce the energy requirement of our facilities through smart technologies, engineering standards, control (by-law) and through the purchase of the highest efficiency equipment available through the municipal procurement process in order to reduce our operating costs and our energy consumption.



Overall Target:

To reduce our consumption of fuels and electricity in all municipal operations by an average of 10% per year between now and 2023.



Table of Contents

- Overview ii
- Summary Statement 1
- Continual Improvement 5
- Best Practices (BP) for Continual Improvement..... 5
 - BP One – Link Conservation Demand Management to Asset Management Plan 5
 - BP Two – Purchase of Software 5
- Reporting and Tracking Examples for BP One and BP Two 6
- Summarized Reporting 6
 - Project Energy Savings for Budget and Tracking..... 6
 - Purchasing Life Cycle Energy Analysis for Procurement 6
- Data Gathering through Smart Technologies and Wireless Networking for Reporting and Decision Making 7
- Vision Goals Yearly..... 8
- Plan Mapping Development 8
- Continuous Development of the Action Items for Energy Conservation. 9
- Two Important Outcomes..... 10
- Actionable items 11
- Appendix A – Recommendations Summary..... 13
- Appendix B – Energy Data..... 15
- Appendix C – Update Ongoing/Future Initiatives..... 18



Summary Statement

The City of Cornwall's 2014-2018 contained the following overall goal:

Maintain the City's existing level of energy consumption over the next 5 years (2014-2018) given the knowledge that the City's extensive upgrades to the Wastewater Treatment Plant (WWTP) will be coming online in late 2014 and 2015.

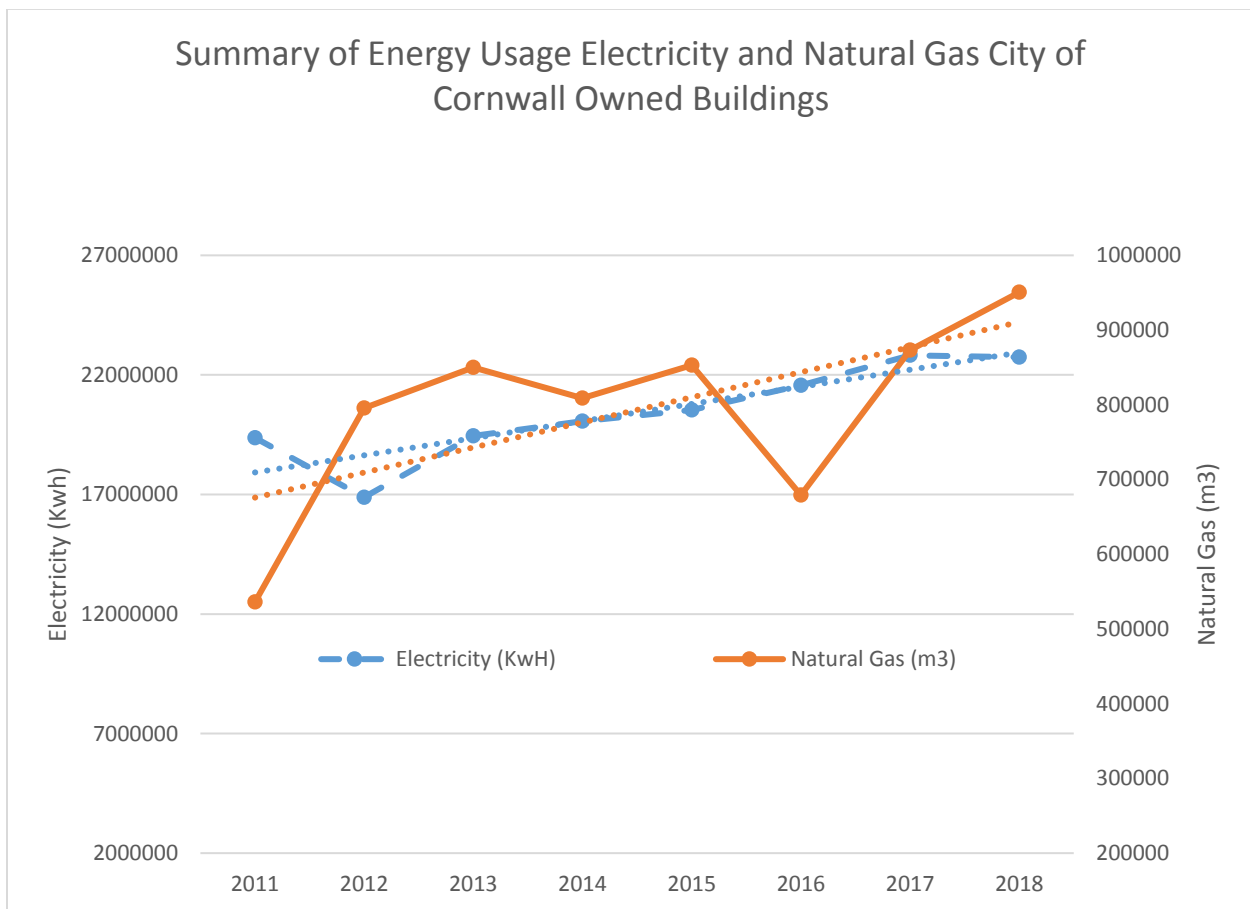


Figure 1. Energy Conservation and Demand Management (ECDM) Plan overall Totals 2011 to 2018. The dotted lines in Figure 1 are the trendlines for Electricity and Natural Gas 2011 to 2018.

Figure 1 shows an increased energy consumption due to additional building inventory including the major influence of the addition of secondary treatment at the WWTP.

The City of Cornwall included a goal to educate its workforce in energy efficient practices. To achieve these goals the City of Cornwall put several energy efficiency initiatives into place. These initiatives are summarized in Appendix C.

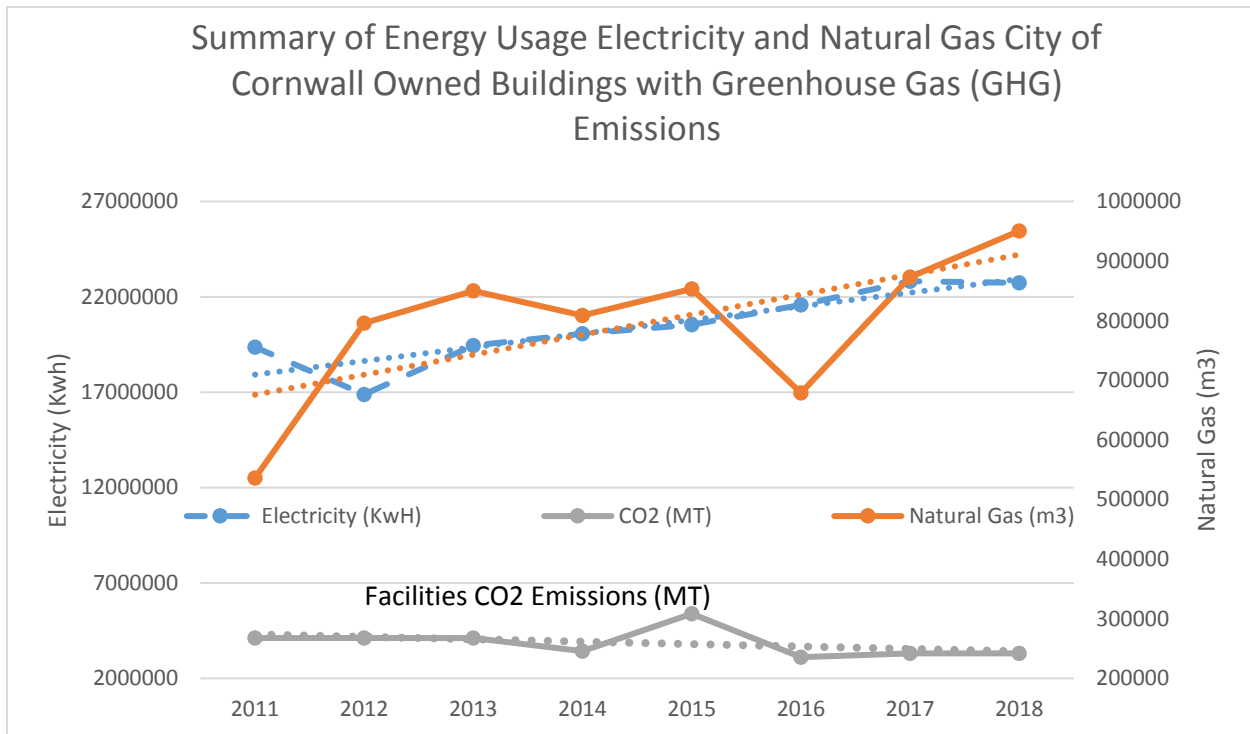


Figure 2. Greenhouse Gas (GHG) Total Emission Buildings and Treatment Plants. * Note: the emissions factor for electrical use in Ontario was dramatically lowered in 2017 due to the closing of the coal plants and upgrades of the nuclear plants.

Although, the City owned facilities saw an overall increase in energy consumption, the GHG trend was a decrease, as explained in the note of figure 2.

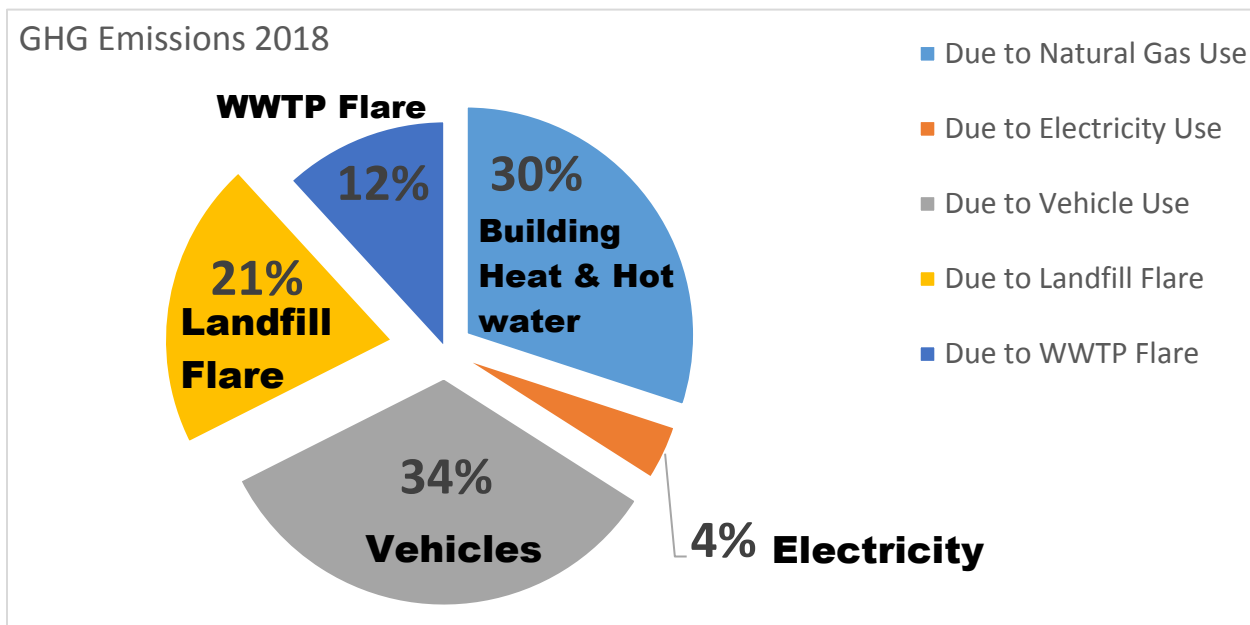


Figure 3. Corporate Energy Type and their relative contribution to Overall GHG Emissions



Vehicle GHG Emissions using a Snap Shot 2018

2018 Fuel Consumption by Fuel Type and Department

2018 GHG Emissions

DEPT	FUEL TYPE	LITRES	kg eq CO2	Mt eq CO2
FIRE	GASOLINE	6,359 L	14,626	14.63
FIRE	CLEAR DIESEL	26,587 L	70,720	70.72
POLICE	GASOLINE	141,226 L	324,819	324.82
MW	GASOLINE	129,841 L	298,634	298.63
MW	CLEAR DIESEL	141,154 L	375,470	375.47
MW	COLOURED DIESEL	50,513 L	134,364	134.36
AMBULANCE	GASOLINE	316,601 L	728,181	728.18
TRANSIT	CLEAR DIESEL	488,101 L	1,298,348	1,298.35
TRANSIT	GASOLINE	9,437 L	21,704	21.70
TOTAL		1,309,819 L	3,266,870	3,266

Table 1. GHG emission summary by fuel type and usage

Accounting for 34% of the GHG emissions in 2018 transportation is often the highest GHG emitter in communities across Canada. Table 1 shows an example of the variety of vehicles used by the corporation as they deliver community's services.

For comparison, GHG emissions are expressed as equivalent CO₂ mass released to the atmosphere. CO₂ is a natural, colourless and odourless gas that when released to the atmosphere has a greenhouse effect trapping in heat from solar energy. CO₂ is emitted when fossil fuels (ie natural gas, oil, coal, etc) are burnt.

Kg eq CO₂ is the mass in kilograms of carbon dioxide equivalent that is released into the atmosphere.

Mt eq CO₂ is the mass in metric tonnes of carbon dioxide equivalent that is released into the atmosphere.

Energy consumption and the cost of the commodity is an important consideration for decision-making. Figure 4 presents a summary of the annual cost for energy across the Corporation. The cost of electricity being the most significant.

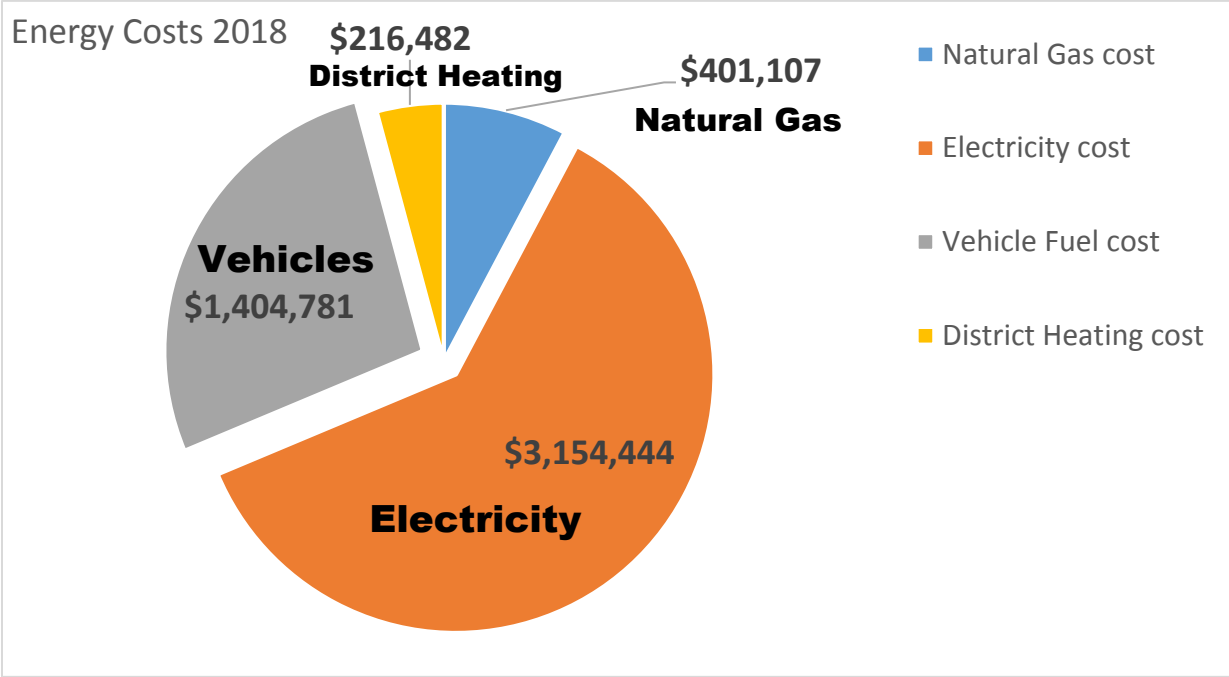


Figure 4. 2018 Annual Operating Cost of energy.

Focus on Energy Efficiency for Conservation Planning

Energy efficiency plays an important role in the overall performance and management of the electricity system in Ontario. The Independent Electricity System Operator (IESO), reports “Energy efficiency remains Ontario’s most cost-effective resource at 1.69 cents per kWh.” Compared with Cornwall’s average cost of approximately 7 cents per kWh, energy efficiency remains to be the most cost-effective option for cost savings. Therefore, investing in energy efficiency project saves 5 cents for every kWh reduction. Innovation and measuring usage can lead to new tools and insights that in turn lead to informed decision-making, new opportunities, and better management of costs. Aside from the benefits to system adequacy and reliability, and cost savings for customers, energy efficiency empowers and invests in people.

Savings from some of these projects will persist through the 10 year financial plan or longer, contributing to the longer-term energy needs of the City and building capacity for future growth.



Continual Improvement

The City of Cornwall recognizes the benefits of reporting energy usage in Figure 1 and responding to the results. The 2019-2023 plan, as described in this report, makes a commitment to use the knowledge and technology that is now available to benefit the services it provides.

Best Practices (BP) for Continual Improvement

The 2019-2023 plan includes two important initiatives formed from the review of the 2014-2018 plan.

BP One – Link CDM to AMP

As a requirement of O. Reg. 588/17: ASSET MANAGEMENT PLANNING FOR MUNICIPAL INFRASTRUCTURE, municipalities must develop and implement asset management plans for all assets. The end goal is for municipalities, the province, and the federal government to leverage asset management planning to optimize infrastructure investment decisions.

The 2014-2018 plan contained the recommendation of the establishment of an Energy Consumption Lead (ECL). During the plan period, a full time equivalent (FTE) was not available for this position. During the intervening period, there has been increased development of asset management planning (AMP). Energy is increasingly becoming a consideration of level of service calculations for capital replacement projects as part of the AMP process. New technology is often less expensive for the AMP financial plan due to lower maintenance costs, energy costs and life cycle extensions. The City of Cornwall is in the process of hiring an Engineering Technologist for its two single highest electrical energy consumers, the Water Purification Plant (WPP) and the WWTP. This position will also be given the functional capacity of the Energy Conservation Lead (ECL) mentioned as an initiative in the 2014-2018 plan.

BP Two – Purchase of Software

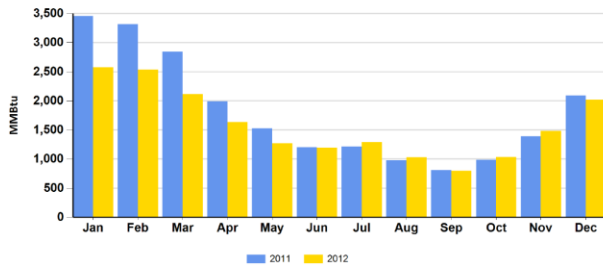
The second initiative of continual improvement will be the purchase of software that will allow efficient and graphic energy information and tracking of project progress. The evolution of software allows this initiative to be available and was not available during the last planning phase. This initiative will allow measurement of energy reduction efforts. This will provide focus on energy consumption and costs and is a behavioural external motivator. Research has shown these concepts to significantly improve performance of long-term projects.



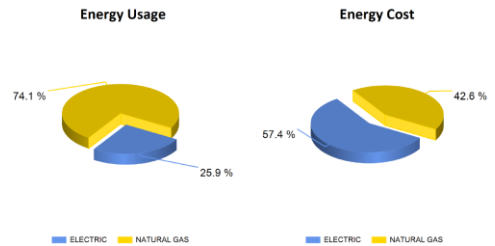
Reporting and Tracking Examples for BP One and BP Two

Summarized Reporting

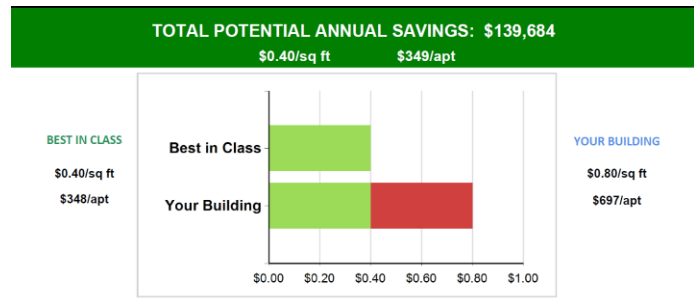
Calendarized Energy Consumption



Energy Use and Cost Breakdown for 12 months



Project Energy Savings for Budget and Tracking



Purchasing Life Cycle Energy Analysis for Procurement

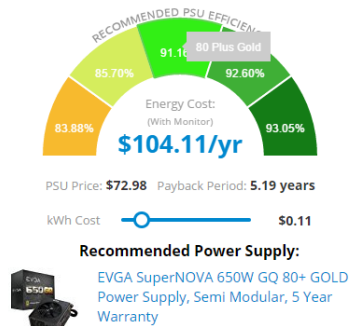
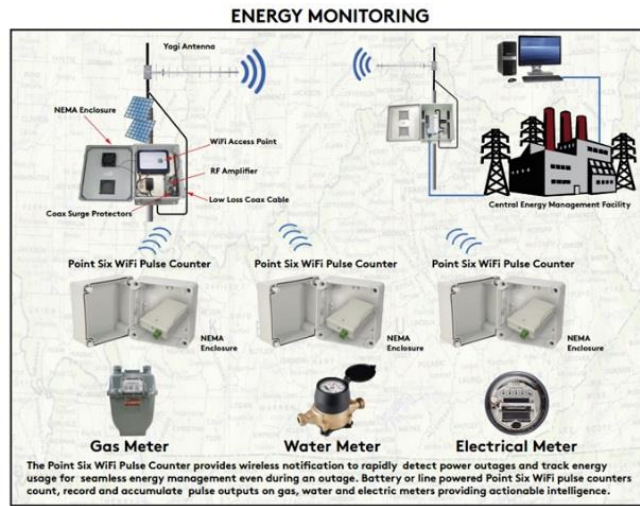


Figure 1 - Calculations and Recommendation of PSU



Data Gathering through Smart Technologies and Wireless Networking for Reporting and Decision Making



Energy Consumption Report				All Sites	
Energy used this week:					
Inside Trading Hours	7,896.10 Units	Cost	£775.95	Retail Floor Area	7788 sq'
Outside Trading Hours	1,866.50 Units	Cost	£158.70	Average Energy Cost	0.25 £/sq'
				Position in region this week	49 (49) <->

All Sites Business Hours

What you can do to reduce Energy Consumption:

1. TV's & lighting turned on when the store is not trading wastes electricity.
2. Reducing your energy consumption helps your P&L & the environment
3. Closing your doors when appropriate reduces wasted electricity

Your contribution towards energy management could help save c. £200k per annum
 Note: A 'Unit' of electricity is one Kilo-watt per Hour of consumption

nationwide
energy services utilities

Continuous Development of the Action Items for Energy Conservation.

The Energy Conservation and Demand Management Plan will be maintained through a continual improvement process as used in the City of Cornwall's Drinking Water Quality Management System (DWQMS) and the newly introduced LEAN Project Management initiative.

The ECL Engineering Technologist for the WPP and WWTP will procure and develop software for the reporting and tracking of energy measures. This will include Project Management software that will manage the status of the various proposed energy conservation projects and initiatives. The system will include various read-only capabilities to allow for website based transparency of the high-level results in graphic, infographics and report based pages. Best practices have demonstrated that tracking performance measures and then constantly adjusting them to maintain progress tends to be more successful.

The under pinning of this consideration is the current period of constant research and innovation. The assets - recreational facilities, buildings and treatment plants - have long life cycles and AMP processes with condition assessment to achieve Level of Service targets. The City of Cornwall has developed a Long Term Financial Plan that gathers together these life cycle costs along with other economic costs for providing the municipal service through tax models on the revenue side. As a result, opportunity costs can be realized if innovation is evaluated along the life cycle and capital replacement process of the AMP.



Recommendation: Task Force use facilitated meetings that find Solutions - Focused from a Strengths Based Perspective

The task force will begin their process:

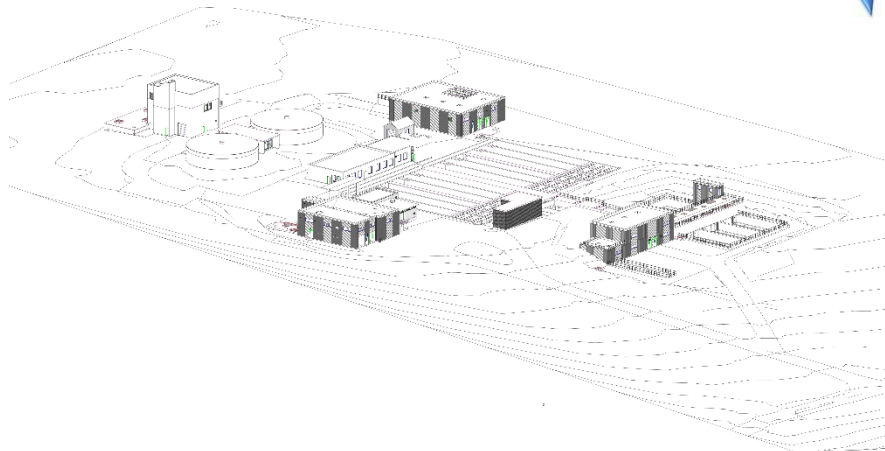
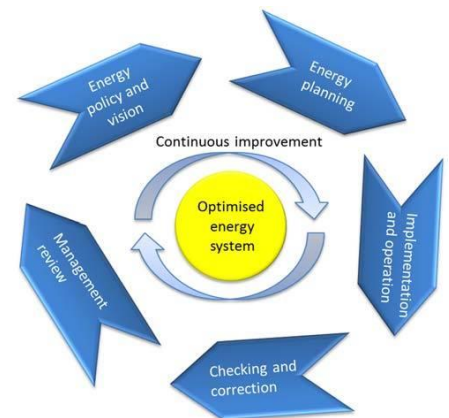
- ✓ Discovering Strengths: In the 2014 – 2019 plan, which initiatives succeeded. The actions managed beyond expectation, and realized benefits for the City of Cornwall.
- ✓ The Task Force will ask the following questions:
 - How did we do it?
 - What did we do to make it successful?
 - What helped us to do it?
 - Which knowledge or skills made the difference?
 - Which strengths do we possess which made it possible?
 - How did being part of a team help us to realize it.
 - What did team members do to help us?
 - Which strengths does our team have?

The questions will be designed based on Appreciative Inquiry, focusing on value and energy. These questions will give visibility to good things that happened and explore the underlying strengths that made it possible.

- ✓ Solution Focused approach (energy measures and measured) to find strengths which can be deployed to address problems that the Task Force is facing. Stories are a great way to communicate ideas, and stimulate creativity.
- ✓ Defining Actions: Think of a problem that we had in the past, and that is likely to happen again. Something that is hampering the task force to deliver benefits for our customers.
- ✓ And ask the questions:
 - How can we use the strengths that we possess to solve this problem?
 - What would we do more of, that would help to prevent the problem from happening again?
 - Which actions can we take, that we are capable of already?

Two Important Outcomes

- Energy and Project Tracking Reports
- Project List that focuses and prioritizes projects based on strengths of the team and stakeholders.
 - Identify and record the overall goal, strategic alignment and key deliverables for each project.



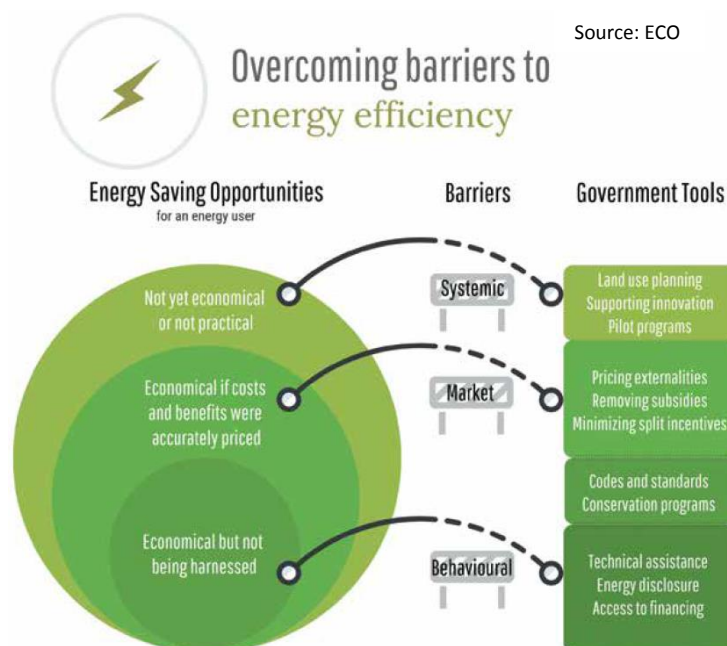
The initial list of projects for the 2019-2023 plan follows as the Actionable Items list on the next page. The list will be adjusted through the Task Force engagement with stakeholders, subject matter experts and Council decision-making for Term of Council, strategic planning and budgeting.

Actionable items:



Efficiency

- ✓ Energy usage tracking using Management Information System that collects, manages, and analyzes data from various building systems (HVAC, lighting), facility benchmarking, asset performance tracking, and create an energy dashboard.
- ✓ Task Force will prepare a report presented to Council annually to summarize results to date and provide estimate of energy savings and expected performance.
- ✓ Resource Recovery Feasibility study at the WWTP.
- ✓ Plant Optimization Project for the WPP and the WWTP with net zero goal for WWTP.
- ✓ Raise awareness around energy efficiency through annual reporting and website and workshoping.
- ✓ The City is currently reviewing the Procurement Policy which will include Environmentally Responsible (Green) Procurement.
- ✓ Review new permit standards to consider LEED standards, smart technology and water meters.
- ✓ Demand Management (water meter) report to Council Fall 2019.
- ✓ In 2019, select a vehicle either electric or hybrid to replace existing end of life vehicle as a pilot to track operating and maintenance costs (included in 2019 Budget).



Actionable items: Estimated Budget for Selected Items

For consideration, the actionable items have fundamental costs associated with staff time. Although, the Energy Management system and integration of Energy conservation into the responsibility of the Asset Management Plan (AMP) and the plants Engineering Technologist will significantly limit these costs. The application of LEAN management techniques into the integrated planning tools of the Long Term Financial Plan, Asset Management Plan, Budgetary process and ECDM will be used to create a Value Stream Map. The capital and life cycle costs associated with most of the upgrades will be integrated into the Capital replacement budget elements of the various AMPs including Level of Service decisions from the Term of Council strategic plans.

Below are initiatives for estimating future capital and broad planning consideration.

1. Energy Management System Software and programming costs for Energy Database and Reporting System
 - a. \$10,000 in development costs
 - b. \$10,000 in annual licencing and staff time to maintain
2. Purchase of metering and sub metering equipment
 - a. WPP \$10,000
 - b. WWTP \$20,000
 - c. City Facilities \$80,000
3. Purchase of Biosolids equipment to produce fertilizer WWTP \$4,000,000
4. Purchase of Electrical Generation equipment at WWTP \$2,000,000
5. Develop a drinking water master plan.
6. Join Canadian Urban Transit Research and Innovation Consortium (CUTRIC)



Appendix A

From the 2014 Energy Plan

Recommendations Summary

1. Energy Consumption Lead (ECL)

- The City is considering the assignment of an employee with the role Energy Consumption Lead (ECL).
- ❖ Update: This did not occur
- ✓ Recommendation: 2019-2023 Integration of implementation of the plan be undertaken by the approved ECL Engineering Technologist designated new hire for Asset Management Planning at the WPP and WWTP.

2. Building Studies

This study should answer those questions by identifying and making recommendations on the individual buildings such as:

- Determine whether the facility or building is used for the correct purpose and in the event that it is not, provide recommendations on more appropriate locations.
- Determine the expected useful lifespan of the facility.
- Determine the benefit, feasibility and expected cost of upgrading or replacing components of the building(s) or the entire building itself.
- ❖ Update: The Building Condition Assessment study complete.

3. Meetings

- Long distance meetings and conferences will be held via teleconference or videoconference whenever possible and practical.
- ❖ Update: Implemented.

4. Equipment and Device Replacement Guidelines and Standards for Energy Efficiency

- A separate policy is being considered by the City which outlines equipment and device replacement guidelines and standards for energy efficiency.
- ❖ Update: Incomplete.
- ✓ Recommendation: Integrate into Procurement review and engineering standards review.

5. Energy Efficiency Incentive Programs

- The City is currently investigating the feasibility of the creation of Energy Efficiency Incentive Programs for service groups and other tenants who lease City facilities.
- ❖ Update: Under review.

6. Energy Consumption Monitoring Capabilities in New Building Constructions
 - New building constructions will be considered for provisions for energy consumption monitoring capabilities which will monitor energy activities for separate and/or multiple service groups or tenants (when applicable) for all the utilities supplied to that service group or tenant.
 - ❖ Update: Incomplete.
 - ✓ Recommendation: Integrate into Planning Division Policy review and Engineering Standards review.
7. Energy Efficiency Campaign
 - An Energy Efficiency Campaign will be developed and implemented in order to educate residents, service groups, and employees of the City of Cornwall of the benefits of energy efficient practices and environmental responsibility.
 - ❖ Update: The Task Force will make recommendations.
8. Economic Development and Communications Personnel Added To EEWG
 - Economic Development and Communications personnel will be added to the Energy Efficiency Working Group in order to assist with the development and implementation of any materials and/or programs which may be required for the presentation and distribution of Energy Efficiency related information.
 - ❖ Update: This task will be co-ordinated by the ECL Engineering Technologist.
9. Purchasing and Tendering Evaluation Process Review
 - It is up for consideration that the purchasing and tendering evaluation process be reviewed in order to identify ways in which more emphasis can be placed on the importance of life cycle costs and energy efficiencies when replacing existing equipment or purchasing new equipment.
 - ❖ Update: Under review.
 - ✓ Recommendation: Integrate into Procurement process review and Engineering Standards review.

Appendix B - Energy Data

FACILITY DESCRIPTION:	HYDRAULIC FLOWS (ML)							
	2011	2012	2013	2014	2015	2016	2017	2018
Benson Centre								
Benson Centre								
Boundary Road Reservoir	1,771	1,607	1,585	1,403	1,212	1,538	1,285	1,300
Boys and Girls Club								
Champs Boxing Club								
City Hall								
Cornwall Band Shell								
Cornwall Civic Complex - Aquatic Centre								
Cornwall Civic Complex - Arena								
Cornwall Civic Complex - Finance								
Cornwall Civic Complex - Salons								
Elevated Storage Tank								
Emergency Medical Services (EMS) Station								
Fire Station #1								
Fire Station #2								
Guindon Park - Maintenance Workshop								
Justice Building - Police Station								
Justice Building - Social Services								
Optimist Park Garage								
Police Sub-Station								
Public Library								
Public Works - Administration Building								
Public Works - Carpenter Shop								
Public Works - Municipal Works Garage								
Public Works - Purchasing								
Public Works - Road Shop								
Public Works - Stores								
Public Works - Traffic Shop								
Public Works - Water & Sewer Shop								
Sewage Pumping Station - 11th Street	84	79	88	86	85	85	87	86
Sewage Pumping Station - Harbour Road	38	32	36	35	33	39	40	37
Sewage Pumping Station - James Street	43	30	33	32	31	44	45	42
Sewage Pumping Station - Pitt Street	8	7	8	7	8	8	8	8
Sewage Pumping Station - Saunders Drive	82	73	78	76	77	84	85	84
Transit Station - Administration								
Transit Station - Garage								
Waste Water Treatment Plant - Pumping Station	16,343	14,577	16,905	16,074	15,125	16,480	19,199	18,333
Waste Water Treatment Plant	16,343	14,577	16,905	16,074	15,125	16,480	19,199	18,333
Water Purification Plant - Zebra Mussel Facility	11,690	12,413	12,112	11,589	11,805	13,595	13,082	13,738
Water Purification Plant	11,690	12,413	12,112	12,535	12,867	12,279	11,764	11,881
Wood House Museum								
ANNUAL TOTALS:	58,092	55,808	59,862	57,911	56,368	60,631	64,796	63,842

FACILITY DESCRIPTION:	ELECTRICITY (kWh)							
	2011	2012	2013	2014	2015	2016	2017	2018
Benson Centre	2,236,176	2,846,361	2,891,351	2,922,480	321,569	337,947	325,800	333,366
Benson Centre	248,464	283,060	321,261	324,720	2,894,122	3,041,523	2,932,200	3,000,293
Boundary Road Reservoir	281,137	219,424	290,508	267,600	214,119	237,005	252,240	254,887
Boys and Girls Club	23,161	10,494	314,417	23,322	22,571	16,937	17,222	17,222
Champs Boxing Club	4,569	25,897	24,047	37,340	9,797	7,410	27,210	35,126
City Hall	338,777	309,171	291,505	292,763	257,744	246,956	240,600	258,861
Cornwall Band Shell	10,641	22,516	32,933	33,285	34,251	26,403	37,902	43,680
Cornwall Civic Complex - Aquatic Centre	883,496	1,149,165	1,342,053	1,340,544	1,293,781	803,689	1,434,998	1,511,481
Cornwall Civic Complex - Arena	3,352,547	2,907,112	2,829,227	2,826,045	2,707,007	3,557,994	3,025,168	3,186,404
Cornwall Civic Complex - Finance	425,734	346,096	377,242	376,818	363,673	395,345	403,368	424,867
Cornwall Civic Complex - Salons	106,423	173,031	188,603	188,391	181,819	197,654	201,665	212,414
Elevated Storage Tank	72,360	63,895	66,683	72,175	58,596	62,240	67,224	68,220
Emergency Medical Services (EMS) Station	274,140	295,623	311,849	325,800	333,000	503,032	324,000	327,983
Fire Station #1	178,860	177,957	184,493	199,860	181,137	182,275	194,820	205,959
Fire Station #2	162,388	140,392	147,586	138,809	133,114	131,258	116,611	122,012
Guindon Park - Maintenance Workshop	34,993	36,298	28,848	42,979	22,429	28,999	31,828	29,678
Justice Building - Police Station	1,061,012	1,101,885	1,096,183	1,000,272	1,053,922	197,256	987,023	963,005
Justice Building - Social Services	364,388	259,972	268,098	343,528	267,590	67,745	338,977	330,729
Optimist Park Garage	134,605	126,879	126,385	124,581	140,469	129,875	122,149	142,419
Police Sub-Station	25,800	37,269	40,417	42,377	26,213	25,724	36,267	31,652
Public Library	803,520	813,071	818,046	770,952	734,223	768,021	772,688	771,428
Public Works - Administration Building	201,015	196,126	213,335	223,526	206,369	207,104	213,415	227,628
Public Works - Carpenter Shop	41,265	34,510	37,539	39,332	36,313	36,442	37,553	40,054
Public Works - Municipal Works Garage	168,960	121,426	128,379	132,102	138,308	214,450	152,781	131,814
Public Works - Purchasing	1,897	1,883	2,229	2,526	2,436	1,703	3,289	4,296
Public Works - Road Shop	24,243	21,966	23,224	23,898	25,020	15,365	18,426	15,897
Public Works - Stores	26,163	25,980	30,750	34,854	33,602	23,500	45,371	59,265
Public Works - Traffic Shop	6,662	3,669	3,991	4,182	3,861	4,222	5,063	4,369
Public Works - Water & Sewer Shop	46,920	37,453	44,789	44,789	48,009	127,405	3,993	4,259
Sewage Pumping Station - 11th Street	20,101	865	1,609	248	28,304	32,800	33,329	29,329
Sewage Pumping Station - Harbour Road	6,662	5,560	3,988	5,552	5,867	10,015	11,875	10,875
Sewage Pumping Station - James Street	9,763	8,893	10,378	12,150	10,802	12,795	13,325	11,325
Sewage Pumping Station - Pitt Street	2,435	2,555	3,222	3,056	2,836	3,333	3,957	2,957
Sewage Pumping Station - Saunders Drive	9,198	9,156	12,317	17,242	26,872	23,249	25,119	25,119
Transit Station - Administration	19,658	18,965	18,869	18,335	16,800	17,283	17,999	17,856
Transit Station - Garage	340,582	328,570	326,913	317,665	291,070	299,439	301,110	298,443
Waste Water Treatment Plant - Pumping Station	1,444,229	1,322,924	1,445,889	1,481,700	1,249,939	1,509,900	1,749,600	1,614,192
Waste Water Treatment Plant	3,151,500	2,365,379	2,733,313	2,352,000	3,663,935	4,326,675	4,402,260	4,287,658
Water Purification Plant - Zebra Mussel Facility	40,028	45,959	46,655	53,058	55,812	56,012	64,996	64,855
Water Purification Plant	3,655,440	3,701,742	3,523,888	3,551,760	3,394,642	3,636,972	3,474,000	3,581,843
Wood House Museum	4,028	38,670	41,899	43,255	43,774	44,233	42,166	41,976
ANNUAL TOTALS:	20,243,939	19,637,820	20,644,914	20,055,871	20,535,716	21,568,185	22,509,586	22,745,694

FACILITY DESCRIPTION:	NATURAL GAS (m3)							
	2011	2012	2013	2014	2015	2016	2017	2018
Benson Centre		239,228	265,437	253,652	27,820	23,953	29,741	32,878
Benson Centre		3,885	29,493	28,184	250,383	215,575	267,667	295,905
Boundary Road Reservoir	11,197	9,371	11,768	12,947	14,071	10,549	12,253	14,075
Boys and Girls Club								
Champs Boxing Club								
City Hall								
Cornwall Band Shell								
Cornwall Civic Complex - Aquatic Centre	15,247	22,124	21,403	21,375	19,644	11,763	27,105	33,079
Cornwall Civic Complex - Arena	57,858	55,969	45,121	45,061	41,412	24,798	57,141	69,736
Cornwall Civic Complex - Finance	7,347	6,663	6,016	6,008	5,522	3,306	7,619	9,298
Cornwall Civic Complex - Salons	1,837	3,331	3,008	3,004	2,761	1,653	3,809	4,649
Elevated Storage Tank								
Emergency Medical Services (EMS) Station		78,265	77,572	61,621	65,274	54,146	49,460	46,714
Fire Station #1	17,915	22,210	25,964	25,696	26,578	17,794	22,339	25,526
Fire Station #2	41,579	28,159	15,877	15,305	19,000	26,266	25,130	24,216
Guindon Park - Maintenance Workshop								
Justice Building - Police Station	2,920	17,710	12,067	13,965	15,476	12,466	14,866	4,991
Justice Building - Social Services	1,003	6,915	4,808	4,796	5,315	4,281	5,105	1,714
Optimist Park Garage	9,188	8,374	9,858	11,118	9,187	8,231	10,926	11,629
Police Sub-Station	1,104	1,415	1,165	1,551	1,964	1,340	2,127	2,283
Public Library								
Public Works - Administration Building	5,733	3,643	4,209	4,485	3,216	3,943	4,063	4,702
Public Works - Carpenter Shop	884	592	684	729	522	640	660	764
Public Works - Municipal Works Garage	22,379	27,160	36,197	40,703	35,777	14,828	23,133	37,876
Public Works - Purchasing	385	441	438	459	492	422	710	480
Public Works - Road Shop	5,314	4,116	7,264	8,563	6,637	6,259	7,699	3,969
Public Works - Stores	3,439	6,084	6,039	6,339	6,789	5,817	9,793	6,623
Public Works - Traffic Shop	3,440	3,989	5,149	6,175	4,988	4,443	4,745	5,264
Public Works - Water & Sewer Shop	11,581	11,749	12,972	12,428	10,422	12,089	11,171	13,514
Sewage Pumping Station - 11th Street								
Sewage Pumping Station - Harbour Road								
Sewage Pumping Station - James Street								
Sewage Pumping Station - Pitt Street								
Sewage Pumping Station - Saunders Drive								
Transit Station - Administration	4,481	4,064	3,792	4,614	5,937	4,495	4,518	4,503
Transit Station - Garage	77,641	70,404	65,705	79,935	102,857	77,880	78,284	78,016
Waste Water Treatment Plant - Pumping Station	7,958	6,095	7,346	5,450	5,187	8,024	8,740	9,096
Waste Water Treatment Plant	51,375	31,227	44,977	19,889	48,711	33,345	56,808	80,697
Water Purification Plant - Zebra Mussel Facility								
Water Purification Plant	125,988	87,694	117,696	114,688	117,113	90,455	127,114	128,086
Wood House Museum		47	158	158	158	212	210	212
ANNUAL TOTALS:	487,793	760,925	842,185	808,896	853,215	678,972	872,939	950,495

Appendix C – UPDATE ONGOING/FUTURE INITIATIVES

Projected Time Frame	Building/ Department	Action	Status	Reason (s)	Cost	Expected Annual Energy Savings	Payback Period
2012 - 2014	Municipal Works Admin Building	Replace T12 with T8 fixtures	Completed	Better lighting (need fewer lights), requires less energy (save up to 50%), greater lifespan (10-15 times longer)	\$6700	\$4800	1.4 years
2013 - 2015	Municipal Works Garage	Replace T12 with T5 fixtures	Completed	Better lighting (need fewer lights), requires less energy (save up to 50%), greater lifespan (10-15 times longer))	\$5000	\$300	16 years
2013 - 2014	Boys and Girls Club	Install Windows	Completed	Windows will allow for natural light into the building reducing lighting and A/C costs	\$11,000	N/A	N/A
2010 - 2020	City Wide	Replacement of old windows (some that open)	Most windows at City Hall and Municipal Works open	More efficient, users can open reducing A/C costs, increased comfort	\$40K Annually	Minimal	N/A
2011	Cornwall Civic Complex	The plate and frame chiller used in the Ice Plant upgraded to a new high efficiency model	Completed	Provides better heat transfer and lowers electrical operating expenses. The compressors used for cooling the ice surface are also cycled by the operators depending on the season in order to reduce the total amperage drawn.	Unknown	Unknown	Unknown
Ongoing	As needed Basis	Replace T12 with T8 or T5 fixtures –	Most fixtures in most Public Property Buildings have been changed to T5 fixtures.	Better lighting (need fewer lights), requires less energy (save up to 50%), greater lifespan (10-15 times longer)	N/A	Up to 50% on lighting costs	N/A
Ongoing	As needed Basis	Replace burned out 15W bulbs on exit signs with 5W lamps	Ongoing	Requires less energy (2/3 reduction)	\$2 per bulb	\$1 per bulb	2 years on an individual sign basis

Projected Time Frame	Building/ Department	Action	Status	Reason (s)	Cost	Expected Annual Energy Savings	Payback Period
2011	Benson Centre, Cornwall Civic Complex	motion sensors installed in bathrooms	Completed	Ensure lights are turned off when not in use Reduce wasted consumption	\$40 per sensor	Minimal	5 years
Ongoing	As needed Basis	Replace old failing EXIT signs with new LED EXIT signs	Ongoing	Lower wattage requires less energy to run LED lifespan is 25 times greater Cost effective	\$55 per sign (including labor costs)	\$9 per sign	3.7 years on an individual sign basis
Ongoing	City Wide	Replace all 45W flood lights with 23W models -	Ongoing	Requires less energy (1/2 reduction)	\$15-25 per bulb	\$2 per bulb	7.5-12.5 years
Ongoing	City Wide	Installation of photoelectric sensors to external lighting	Ongoing	Activate external lighting only once conditions justify doing so, or programmable timers that activate and deactivate the external lighting at regularly scheduled intervals.	\$15 per sensor	Minimal	N/A
2013 - 2014	Fire Hall #2	Replace HVAC units with new high efficiency models	Completed	Lifespan of HVAC has been reached. Reduce electrical operating expenses	\$260k	Minimal	N/A
Ongoing	As needed Basis	Replace old electric Hot Water Tanks with more efficient Natural Gas Units (if equipped) or with smaller more efficient electrical units	Ongoing	More efficient tanks.	N/A	5-10%	N/A
2019	Infrastructure & Municipal Works Division	Investigate the installation of a high efficiency heating, ventilation and air conditioning (HVAC) system in the Municipal Works Administration Building	Building scheduled to be demolished within 2 years.	Current units are not efficient.	TBD	TBD	TBD

Projected Time Frame	Building/ Department	Action	Status	Reason (s)	Cost	Expected Annual Energy Savings	Payback Period
Start: 2011 Completion: TBD	Infrastructure & Municipal Works Division	Replace street lighting throughout the City with LED type lights	Ongoing	Better lighting (need fewer lights) Requires less energy (save up to 70%) Greater lifespan (10-15 times longer)	\$3.5m	70%	6 years
Start: 2013 Completion: TBD	Water Purification Plant	Obtain and implement feasible initiatives as given by the specialized energy consulting firm	Completed	Waiting on results of an energy consulting firm, and will apply the initiatives based on factors including: associated energy savings, initial cost, annual savings, payback period, and budget.	Unknown	Unknown	Unknown
2015	Cornwall Public Library	Perform an assessment of heating requirements	Completed – now on natural gas	Determine the short and long term financial and environmental benefit to the City (if any) of renewing the contract with CDH in comparison to the installation of new or alternative heating systems	Unknown	Unknown	Unknown
Ongoing	Future Buildings	Future buildings will be built taking the LEED standard into consideration	Ongoing	Taking the LEED standard into consideration will ensure that energy conservation and saving will be taken into consideration with the development of any new infrastructure.	N/A	Large	N/A
Ongoing	All Buildings / Departments	Turn off all unnecessary lighting in City operated facilities once building has been, or will be, completely vacated of all personnel for an extended period. (whenever feasible)	Ongoing	Lights not wasting unnecessary energy, reducing consumption.	Free	Minimal	N/A

Projected Time Frame	Building/ Department	Action	Status	Reason (s)	Cost (\$)	Expected Annual Energy Savings	Payback Period
Ongoing	City Wide	Installation of water metering devices in all residences, industries, commercial, and institutional facilities which consume water produced by the City of Cornwall	Ongoing	Reducing the overall water consumption would benefit the City by lowering the operational cost associated with the large volume of chemicals and electrical energy used in the treatment and pumping of drinking water, and the additional cost associated with the pumping and treatment of the sewage generated by the City.	\$500 per residence \$500-\$1500 per other building/facility	Minimal	Length of project (budgeted from water taxes each year)
2011-2013	Information Technology & Telecommunications Department	Used virtualization technologies on the Corporate data centre	Completed	Reduce the amount of physical data servers required to operate the City's complex information technology infrastructure. Reduce the electrical expenses Reduce future equipment replacement costs and new purchases Less technical waste	104,000	27,900	3.73 years
2014	All Buildings	Current system for assigning facility utility bills be reviewed in order to ensure utility expenses are assigned to the proper department or division	Ongoing	Ensure that there are no discrepancies in the consumption values given for each building. Ensure consumption values are allotted to the proper buildings	Free	Minimal	N/A
Ongoing	Infrastructure & Municipal Works Department	Developing an Asset Management Program	Completed	Will allow for a systematic approach to the maintenance, upgrading and operation of the City of Cornwall's physical assets in a cost effective manner.	Free	Minimal	N/A