CORNWALL COMMUNITY HOSPITAL

HÔPITAL COMMUNAUTAIRE DE CORNWALL

CONSERVATION AND DEMAND MANAGEMENT PLAN

July 1, 2019

Cornwall Community Hospital
840 McConnell Ave
Cornwall, Ontario
K6H 5S5

RE: RENEWAL OF 5-YEAR CONSERVATION AND DEMAND MANAGEMENT (CDM) PLAN

July 2019

Cornwall Community Hospital would like to put forward the enclosed five-year Energy Conservation and Demand Management (CDM) plan as the next chapter in our strategic pursuit to reduce our overall energy intensity and carbon footprint. This plan renews our 2014 CDM plan while providing an update on our successes and outlines possible opportunities for future conservation.

You will note, our organization has continued to grow to meet the evolving needs of our community while implementing best practices when it comes to energy management. The sum of these efforts has not only made us more energy efficient but improved patient and staff experience and safety.

In line with our initial CDM Plan in 2014, this document will act as a blueprint to focus and guide our efforts and actions toward furthering our energy vision over the coming years.

We look forward to providing an update on our efforts via our annual reporting and 2024 CDM Plan.

Sincerely,

Jeanette Despatie
President and Chief Executive Officer
Cornwall Community Hospital

TABLE OF CONTENTS

CORNWALL COMMUNITY HOSPITAL

The City of Cornwall is nested along the north bank of the St. Lawrence River. The Cornwall Community Hospital is centrally located on McConnell Avenue, just south of Ninth Street and within proximity of the downtown. The site has good access to major city thoroughfares as well as to the highway 401 directly to the north providing access to the remainder of the region.

Cornwall Community Hospital (CCH) is a 150-bed acute care facility operating in the City of Cornwall. In addition, CCH operates several community mental health programs onsite, within the City of Cornwall, and counties of Stormont, Dundas and Glengarry. With a staff of 1,100 employees, CCH serves acute, in-patient, out-patient and community-based clients through a wide range of medical specialties. On an annual basis CCH typically sees 52,000 visits to the emergency department, performs 9,000 surgeries and conducts over 200,000 diagnostic/therapeutic exams.

In 2013 CCH opened its new West Wing addition, which saw 95,000 square feet being added to the hospital to house the new Emergency Department, Diagnostic Imaging Centre and Surgical Suites. Following this, CCH completed a major redevelopment project in 2014 and the construction of the Addiction and Mental Health Centre at the end of 2016. This consolidated all acute care and community services at one address, allowing CCH to better serve the community.

Our Mission

Our health care team collaborates to provide exceptional patient centered care.

Our Vision

Exceptional Care. Always.

Our I.C.A.R.E. Values

Integrity. Compassion. Accountability. Respect. Engagement.

ABOUT THE PLAN

In 2014 CCH developed a five-year conservation and demand management (CDM) plan to actively work towards decreasing our overall energy consumption and greenhouse gas (GHG) emissions. The plan outlined goals that our hospital wished to achieve over the five years and listed several initiatives that we had planned on taking to achieve these goals. This plan, completed in 2019, is a reflection on our results over the past five years and a renewal of our commitment to reducing our environmental impact.

CCH is proud of the accomplishments we have made, including a 21% decrease in total electricity consumption and a 12% drop in both natural gas and district heating usage; this represents a total of 1,043,262 kgCO_2e or 22% decrease in our GHG emissions. A comparison of our total utility demands, GHG emissions and Energy Use Intensity (EUI) from 2013 (before the 2014 Plan) and 2018 has been included below. Note that while CHC's total square footage decreased, our overall capacity for care was centralized at our main location which has contributed to a 1% increase in energy intensity per square foot.

	Electricity [kWh]	Natural Gas [m^3]	District Heating [GJ]	GHG [kg CO_2e]	Energy Use Intensity [ekWh/ft^2]
2013	12,092,030	769,821	38,850	4,678,339	71.63
2018	9,576,000	674,231	34,066	3,635,077	72.39
2013 vs. 2018	-21%	-12%	-12%	-22%	+1%

CCH's 1,516,000 kWh drop in electricity consumption and similarly steep drop in natural gas and district heating is due in part to the amalgamation of our service addresses. Over the past five years we have added 95,000 ft^2 to our main hospital and decommissioned the 168,440 ft^2 secondary location. The following chart outlines the changes in utility demand for both sites.

	840 McConnell Avenue				510 2nd Street			
	Electricity [kWh]	Natural Gas [m^3]	District Heat [GJ]	EUI [ekWh/ft^2]	Electricity [kWh]	Natural Gas [m^3]	District Heat [GJ]	EUI [ekWh/ft^2]
2013	7,406,356	471,515	29,617	75.53	4,685,673	298,306	11,311	65.46
2018	9,576,000	674,231	34,066	72.36	0	0	0	0
2013 vs. 2018	+29%	+43%	+24%	-4%	-100%	-100%	-100%	-100%

By 2024, CCH can expect the following results if we obtain the funding and resources to implement all of our proposed future projects highlighted in this plan.

- 14% reduction in total equivalent energy use.
- 270,259-kilogram reduction in CO_2e.
- $133,134 annually to the bottom line ($665,670 over 5 years).

To further strengthen and obtain full value from energy management activities, a strategic approach will be taken: the organization will continue to fully integrate energy management into its business decision-making, policies, and operating procedures.

A REFLECTION ON CCH'S 2014 ENERGY EFFICIENCY VISION

In 2014 CCH made a commitment to reducing its energy usage to decrease our greenhouse gas emissions and electrical/natural gas demand. CCH created an energy efficiency vision that it set out to achieve by 2018.

Cornwall Community Hospital's 2014 Energy Efficiency Vision

In 2018, Cornwall Community Hospital will have an energy wise culture and will be viewed by others as a leader in energy efficiency initiative. It will have reached its goal to be recognized within the top 25th percentile of energy efficiency hospitals in Ontario through innovation and continuous improvement initiatives. In addition, the carbon footprint and greenhouse gas emissions form the hospital will be reduced providing overall financial savings and improved patient comfort. The CCH Board of Directors, staff, patients, suppliers and community stakeholders will be committed to playing an active role in these initiatives and the hospital will strive to share its knowledge and experience gained with others.

Along with its energy efficiency vision, CCH also set a target of reducing its energy consumption from the baseline value in 2013 by 2018. Both CCH's vision and target put a focus on reducing the Hospital's carbon footprint and greenhouse gas emissions to realize overall financial savings and improved patient comfort.

VISION: Be in the top 25th percentile of energy efficiency hospitals in Ontario.
RESULT: Although CCH did not hit this goal, we still managed to substantially decrease all annual utility consumption values and will renew this vision for the next five-year period.

TARGET: Reduce energy consumption from the baseline year of 2013 by 25%.
RESULT: Over the past five years CCH has successfully reduced its total equivalent energy consumption by **17% (3,524,504 ekWh)**, just 8% short of its original goal!

GOAL: Reduce CCH's carbon footprint and greenhouse gas emissions to provide overall financial savings and improved patient comfort.
RESULT: Since 2014, CCH has decreased its greenhouse gas emissions and thereby its carbon footprint by a total of 1,043,262 kg CO_2e which represents a **22%** overall reduction.

HOW WE WILL ACHIEVE SUCCESS

From our success over the past five years, CCH will continue to apply our original guiding principles for energy management that were outlined in our 2014 report. These have been slightly revised to better match CCH's energy management vision.

A Whole Building, Integrated Systems Approach:

In 2014, CCH placed a focus on a comprehensive and integrated whole building approach for energy management solutions that would consider the connection between conservation opportunities. This has proved to be a successful principle to follow, one that CCH will continue going forward. Recognizing the many benefits that come with energy conservation measures, CCH will continue to integrate CDM measures into our everyday decision-making processes. This will include looking for greener and more efficient models when replacing equipment, introducing new processes to reduce consumption, and consistently looking for new opportunities to improve the hospital.

Community Engagement:

Building off the 2014 principle of engaging facilities stakeholders, including staff and patients, in the development and active implementation, measuring and reporting process, CCH will continue to work with all hospital members to implement CDM initiatives. While large scale projects are extremely effective in decreasing utility demand, changing human behaviour and habits can be just as effective. CCH will place a new focus on educating staff, patients, and visitors on what they can do to reduce their own demand, such as turning off lights when they leave a room and unplugging/powering off equipment when not in use. This patient and staff engagement will benefit both CCH and the Cornwall Community as a whole.

Sustainability

CCH will continue to look beyond energy to consider other resources such as water and materials to further the benefits seen through costs and savings initiatives streaming from efficiency and proper management. While CCH is proud of the accomplishments we have achieved over the past five years, we will continue to place a focus on sustainability of the organization and linking initiatives to see benefits beyond just electricity and natural gas demand reduction. CCH will continue to expand the scope of financial analyses to include co-benefits and the opportunity costs of managing risk more effectively over the next five years.

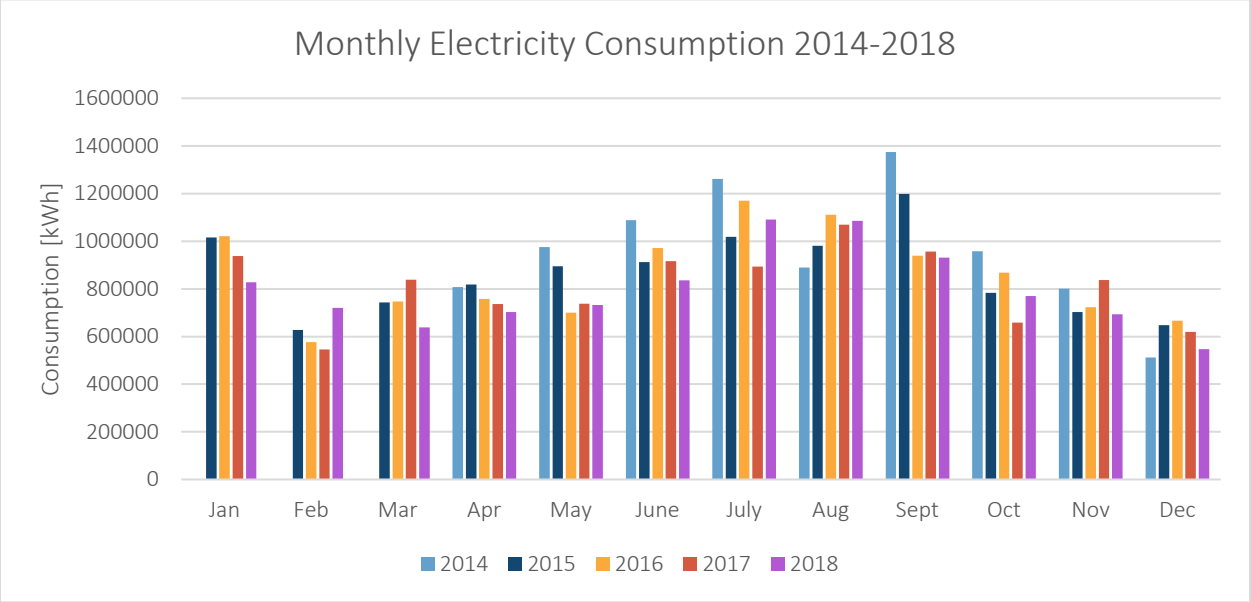
By applying these principles, CCH will continue to work towards decreasing our overall utility consumption and thereby our annual greenhouse gas emissions. CCH's effective energy management will also lead to additional benefits, including an enhanced healing and work environment, improved financial health and operating cost reduction, and a strengthened community leadership.

ANNUAL REPORTING UNDER ONTARIO REGULATION 507/18

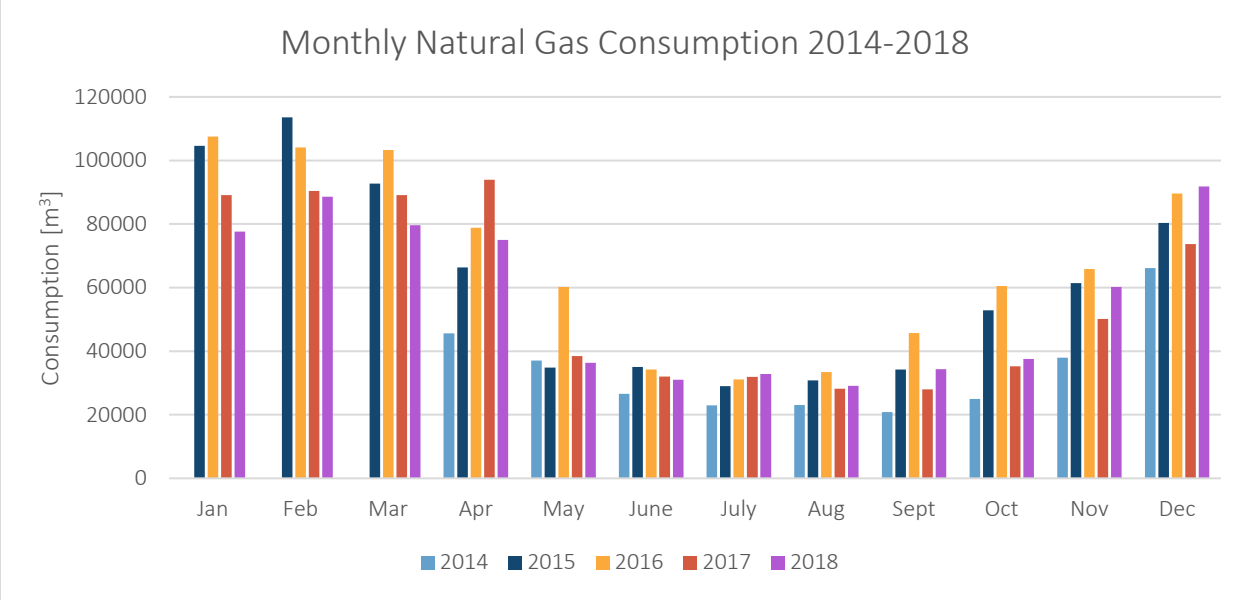
As part of Ontario Regulation 507/18 under the Electricity Act, 1998, CCH publishes and makes available to the public its annual energy consumption and resulting greenhouse gas (GHG) production. In addition, CCH actively tracks our monthly electricity, natural gas and thermal capacity (district heating) to help monitor our progress towards our energy management goals. Note that CCH's total floor area increased in 2014 when the 95,000 ft^2 addition was reported, then decreased by over 160,000 ft^2 when CCH's two locations[1] were consolidated.

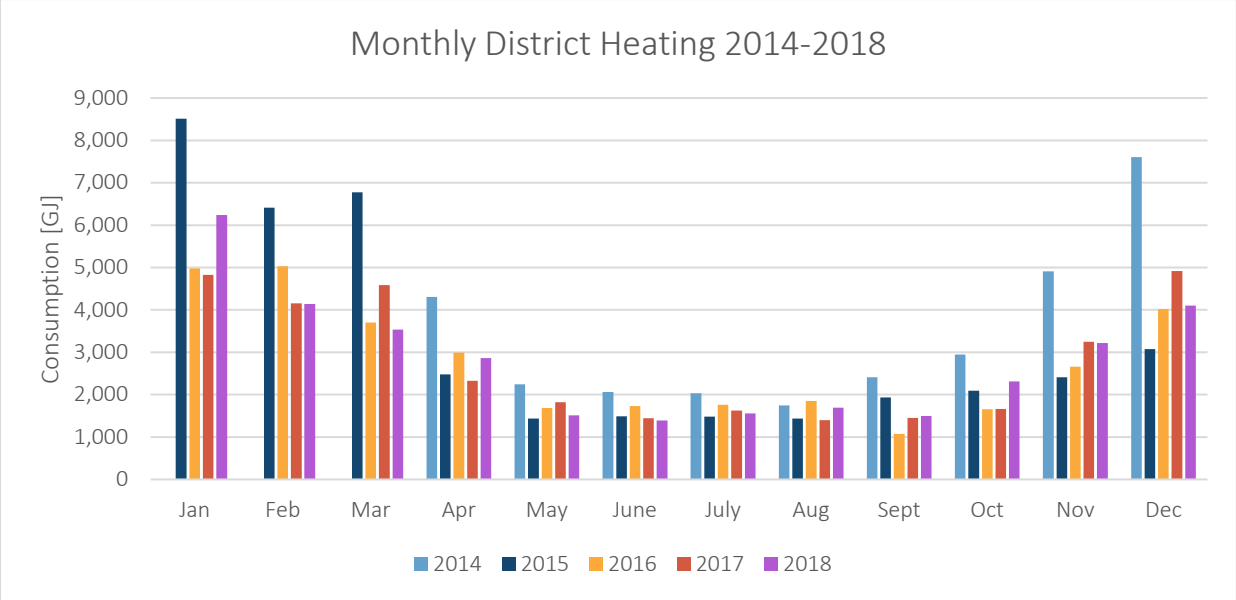
Year	Total Floor Area (ft^2)	Electricity (kWh)	Natural Gas (m^3)	District Heating (GJ)	GHG Emissions (tCO_2e)	Energy Use Intensity ($ekWh/ft^2$)
2013	434,688	12,092,030	769,821	38,850	4,678,339	71.63
2014	529,688	11,498,169	762,137	43,808	4,498,748	60.09
2015	361,249	10,344,000	735,751	39,536	3,744,629	80.85
2016	361,249	10,252,500	814,463	33,145	3,865,499	77.89
2017	361,249	9,748,500	680,126	33,457	3,616,249	72.57
2018	361,249	9,576,000	674,231	34,066	3,635,077	72.39

CCH's total monthly electricity, natural gas and district heating consumption was plotted from 2014-2018. Overall, CCH's consumption in each case decreased over the five years.



[1] The reported values for the two locations have been broken apart in the Appendices.


Monthly Natural Gas Consumption 2014-2018
Consumption [m3]
120000
100000
80000
60000
40000
20000
0
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec
2014
2015
2016
2017
2018


Monthly District Heating 2014-2018
Consumption [GJ]
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec
2014
2015
2016
2017
2018

CONSERVATION AND DEMAND INITIATIVES UNDERTAKEN SINCE 2014

The following projects were completed between 2014 and 2019 to reduce CCH's energy consumption, greenhouse gas emissions, as well as improve staff and patient comfort and hospital infrastructure.

Project Name	Description	Electricity [kWh]	Natural Gas [m^3]	GHG Emissions [kg CO_2e]	Annual Savings [$/year]
Boiler Replacement	Building was decommissioned two years ago, and boilers were removed and sold.	-	-	-	-
JMP[2] lower roof replacement	More than doubled the thermal insulation value of the roof (R-value).	10,733	6,354	12,394	$1,843
Passenger elevators modernization	Upgraded to a geared traction system.	8,694	-	390	$1,130
LED Retrofit	CCH continuously replaces bulbs as they burn out with LED alternatives	51,266	-	1,820	$6,665
Motion Sensors	Motion sensors were installed in 25 bathrooms	6,793	-	241	$883
Power Transformer	Upgraded old transformer to a 3-phase electric power transformer	8,618	-	306	$1,120
Elevator Modernization	Upgraded cabs 5 & 6 to regenerative geared traction.	20,532	-	940	$2,669
Elevator Modernization 7	Upgraded cab 7 to a geared traction system.	8,694	-	390	$1,130
JMP Isolation Room - Ventilation	Upgraded ventilation system to include exhaust fans with VFD and Bag In Bag Out HEPA Filter	1,924	-	68	$250
	TOTAL	**117,254**	**6,354**	**16,549**	**$15,690**

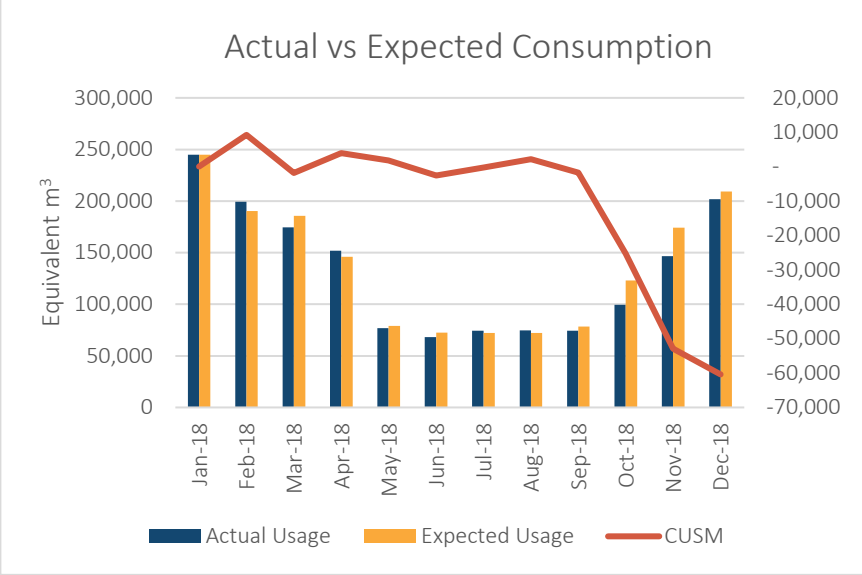
One of the bigger projects CCH has undergone over the past five years has been our Building Automation System (BAS) retrofit. Prior to the retrofit, CCH had a pneumatic system which used compressed air to control the hospital's HVAC systems. The system was replaced with a Direct Digital Control (DDC) system which sees several benefits for the hospital. Quantifying the energy savings of the retrofit is difficult, but some of the key benefits include:

- Increased patient and staff comfort due to the accuracy of the thermal control.
- Decreased operating costs and faster response time from the ability to remotely control and troubleshoot HVAC systems.

[2] JMP – Janet McDonnell Pavilion

- Optimize control sequences including optimum start/stop modes to realize energy savings.

CCH also installed a Pressure Relief Valve (PRV) Station in January 2018 to help reduce steam pressure, which in turn saves fuel consumed by our steam system. It is difficult to quantify the overall savings of the system installation due to the multitude of variables. To identify the savings of the PRV Station, CCH's monthly consumption was weather normalized to compare the projects effect on natural gas and district heating (steam) while accounting for how cold/warm it was outside. Weather normalizing uses Heating Degree Days (HDD) a measure of how cold it was for 2017 graphed against the hospital's 2017 equivalent m^3 consumed to obtain an equation. This equation is then used to estimate what the hospital would have used in 2018 if the PRV project was never implemented. To the right is the Weather Normalization and the resulting differences in consumption.



In total, CCH used 60,396 m^3 less in 2018 than what would have been expected given what we consumed in 2017, with the only big difference being the PRV Station. While we cannot contribute the full decrease in energy to the Station, the weather normalized data shows that it did have a significant impact on CCH's annual consumption.

In addition to the energy savings and reduced emissions of our past initiatives, the following projects also helped improve patient experience.

- Increasing the thermal insulation of the roof offers more stable inside temperature control.
- The elevator modernizations increase the efficiency and speed of the elevators while decreasing patient wait time and providing a smoother ride.
- Replacing fixtures with LED reduces the hazard of heat emission while producing virtually zero UV emissions: LEDs are a safe and reliable lighting source which enhance patient safety and comfort.

GOING FORWARD – OUR REVISED OBJECTIVES AND PROPOSED MEASURES

In 2014 CCH developed an extensive list of objectives that we wished to achieve over our initial five-year CDM Plan. Moving forward, CCH would like to renew these efforts to include both old and new measures. These objectives and proposed measures are set to be implemented for, at minimum, the five years that this plan covers but most will be in place well beyond 2024.

Establish Staff Commitment

- The Senior Team at CCH has approved this CDM Plan and continues supports our efforts to conserve energy and reduce our overall impact to the environment.
- Engaging key staff (Purchasing/Procurement, Construction, Building Operations, etc.) via communication, education, and recognition for their efforts to reduce energy use are will be critical to the success of our objectives and measures.

Initiate Low Cost No Cost Actions

Implement Cost-Effective Facility Upgrades

- Replace equipment and supplies at end of lifecycle with energy efficient equivalents.
- Implement equipment and system upgrades where justified by life-cycle cost analysis.
- Continue to deliver proper Preventative Maintenance Programs.
- Expand use of qualified service providers as needed. Utilize standard RFP documents, contract terms, and reporting standards.

Actively Manage Energy Commodity

- Minimize utility costs and exposure to market risks. Utility costs include natural gas, electricity, water, district energy, and sewer.
- Participate and keep abreast of energy/utility regulatory process.

Improve Building Operating Performance

- Equipment tune-up and improved Operations and Maintenance (O&M) will optimize performance while supporting patient care, and facility comfort and safety.
- Optimize Building Systems (BAS) between current and expanded facility to ensure synchronisation.

Determine New Capital Requirements

Implement Financial Practices and Decision-Making Processes

- Money spent to achieve energy efficiency is viewed as an investment, not a cost.
- Financial decision makers consistently use Life Cycle Cost Analysis (LCCA) on all new construction, major renovations, and equipment replacements.

- Decisions about energy management investments will be part of CCH's high-level, long range process of budgeting for capital and operations.
- To support the achievement of our energy conservation measures, CCH requires investment in energy-related capital and operating improvements, via municipal, provincial and federal sources.

Determine Finance and Budget Requirements and Opportunities

- Recognizing that many of the most effective energy conservation and demand initiatives are expensive, CCH will continue to work with national, regional and local sources for strategic, technical and financial assistance to help achieve our goals. For example, leveraging the use of such programs as The Ministry of Health and Long-Term Care's Hospital Infrastructure Renewal Fund (HIRF) to help implement projects which complement our energy management values.
- Apply established purchasing procedures and specifications and include incentives and tax credits wherever available.
- Consider a prudent return on investment

Manage Accountability and Responsibility

- Track and report on energy use by department to illustrate opportunities to conserve and engage staff.
- Install sub-meters for the main hospital departments to allow detailed tracking of energy use and benchmarking for each zone.
- Participate in Union Gas' Strategic Energy Management incentive program for sub-metering funding which will provide process data and justification for business case requirements for future capital investments.

Develop EE Policy and Document Operating Procedures and Standards

Purchasing Specifications for Energy Efficient Equipment & Services

- Consistently use purchasing specifications that minimize life-cycle costs for energy efficient equipment and services.
- Utilize efficiency specifications for standard equipment routinely replaced (e.g. lights, motors, and unitary HVAC equipment).
- Enforce efficiency guidelines that apply LCCA for custom equipment purchases (e.g. chillers).
- Continue to use a Green purchasing Policy that includes energy efficiency that will be a key consideration of future procurement of goods and services at CCH.
- Have suppliers provide reporting on the impact energy for all projects/purchases.

Efficiency standards for design and construction, and for building operations and maintenance

- Implement Enhanced Design & Construction (D&C) Practices

- Implement improved new construction practices in all projects that specify early team collaboration and “Integrated Design” (ID).
- Integrated design required for funding.
- RFPs, contract terms & conditions, & fee structures will support ID.
- Apply LCCA and financial hurdle rates described above to design decisions.

- Use LEED or LEED shadow standards for future construction and retrofit projects.

Establish Necessary Partnerships

- CCH will continue to collaborate with industry groups and partners such as: Cornwall Electric, Union Gas, Other suppliers of equipment and expertise, City of Cornwall, HealthPRO, etc.

Measure and Report on Results

- Make energy management a line item during general staff meetings to track and report progress.
- Report energy reductions and unexpected increases to senior management.
- Involve and inform staff and the Board regularly on status of the Plan, savings, and return on investment, etc.
- Learn from setbacks.

Set and meet clear energy performance targets for buildings; measure and improve over time.

- Establish baseline for measuring performance goals (e.g. code, or national reference standards like ASHRAE 90.1).
- Target each building at less than MNEC for buildings.

Future Projects

In addition to the above objectives, CCH has several projects that we hope to complete within the next five years that will not only improve the hospital environment for both patients and staff, but also further improve the hospitals energy efficiency and performance. The following table summarizes these projects. The below projects, which are technical based, will be in place until the end of their service life, which is dependent on the make and model that we install (funding permitted).

Initiative	Electricity (kWh)	Natural Gas (m^3)	GHG Emissions (kg CO2e)	Annual Savings ($/year)
Replacement Boiler with Economizers, Linkageless & VFDs	-	11,000	20,797	$1,430
Install 2 Variable Speed Fan Drive Chillers	1,019,188	-	36,181	$96,822
Steam Trap Replacement		31,501	58,940	$9,135
Replace Fan in ICU Isolation Room with 2 VFD Fans	2,511	-	89	$326
Insulate Exposed Piping	-	34	64	$10
Engage in an Audit of Humidification System then replace Conventional Direct Steam Injection Humidifier	TBD	TBD	TBD	TBD
TOTAL	**1,021,699**	**42,535**	**116,071**	**$107,723**

CCH has plans to engage in a complete analysis of our humidification system to identify areas of possible improvement and obtain recommendations on what to replace our direct steam injection system with. Upgrading our humidification system would further improve the hospitals efficiency; the audit would provide energy savings estimates.

BUSINESS PROPOSITION

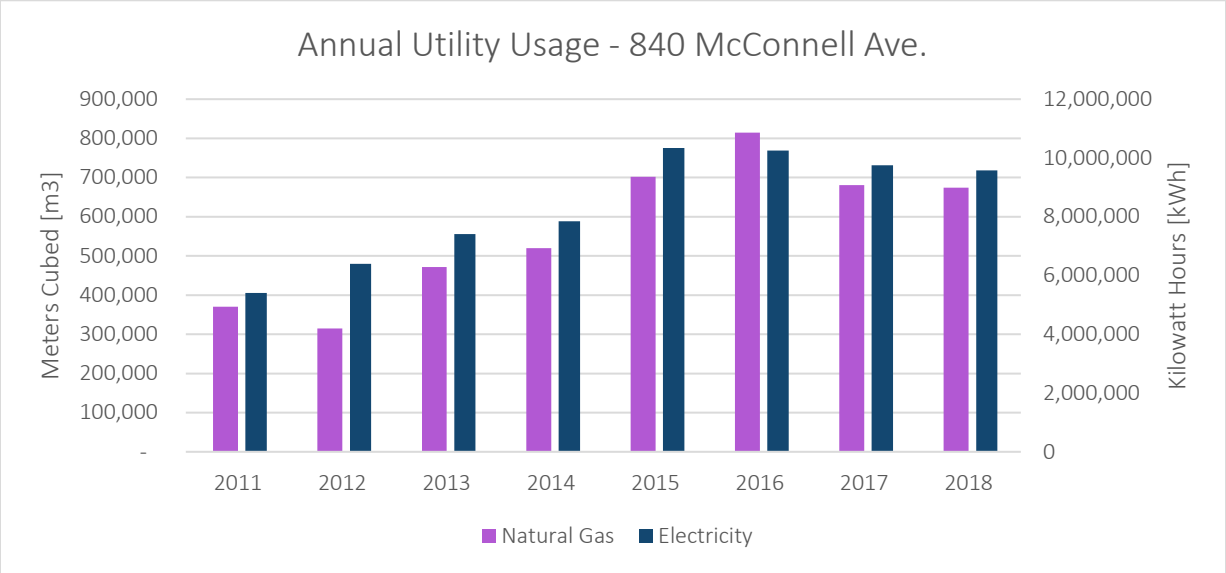
The following are considerations to be included in CCH's business philosophy and budgetary process. The business proposition is as follows:

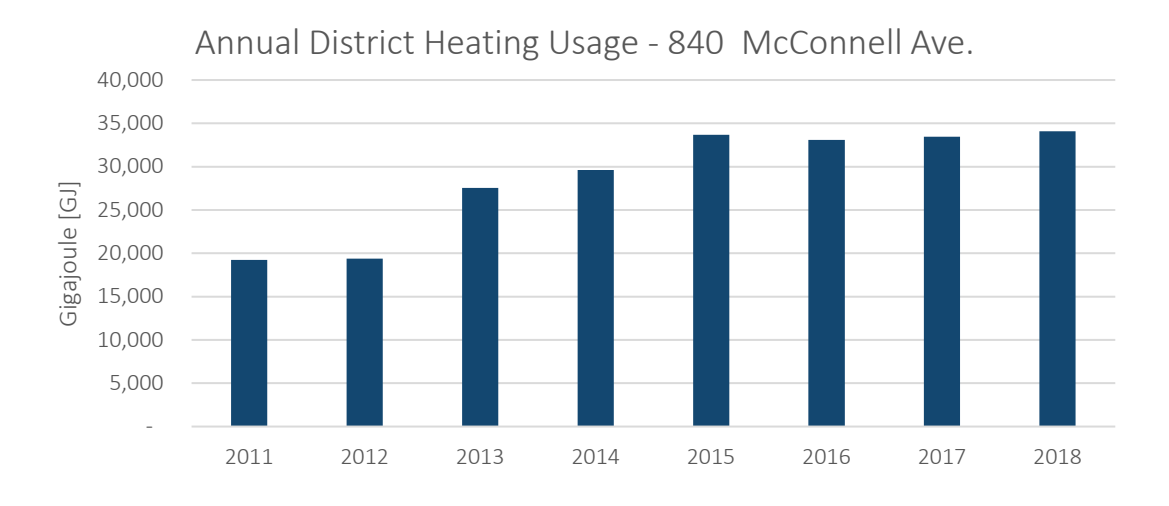
- If energy management considerations are integral to relevant business practices, policies, procedures, and decision-making processes, CCH's energy-related costs can be mitigated further over the coming 5-year period.
- Considering the future CDM projects for 2019-2024 outlined above, CCH can expect to see the following reductions/avoidances in utility usage:
  - 42,535 m^3 reduction in natural gas;
  - 1,021,699 kWh reduction in electricity; and
  - 116,071 kg CO_2e reduction in greenhouse gas emissions.
- Based on 2019 utility rates, this will result in $107,723 in annual value to the bottom line, or a total of $538,615 over a 5-year period.

APPENDIX

840 McCONNELL AVENUE

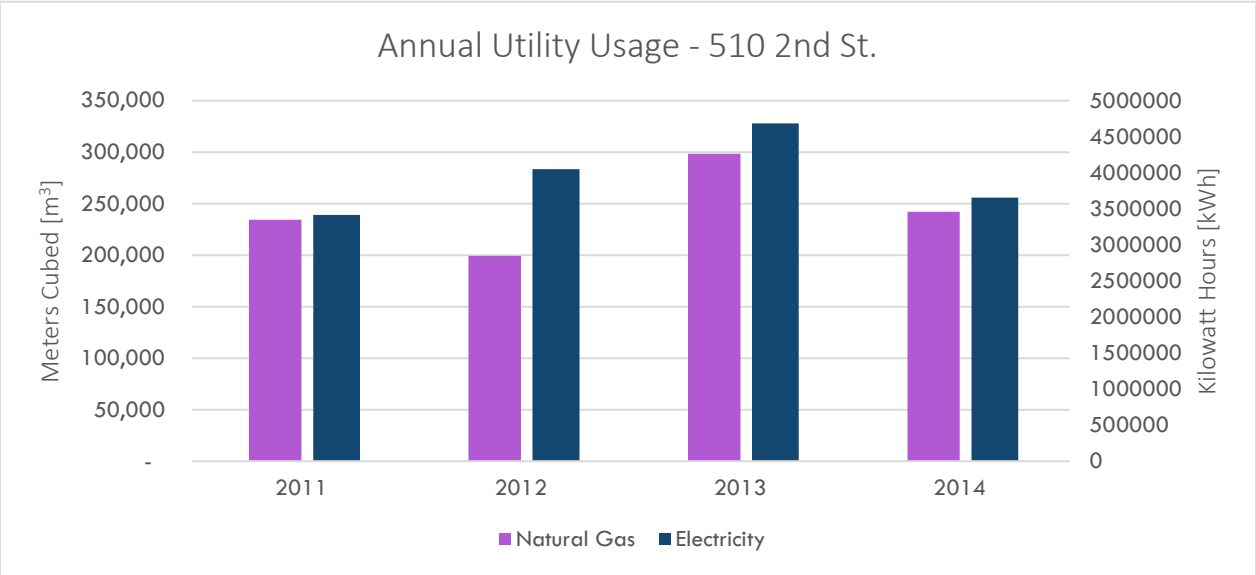
Year	Total Floor Area (ft^2)	Electricity (kWh)	Natural Gas (m^3)	District Heating (GJ)	GHG Emissions (tCO_2e)	Energy intensity ($ekWh/ft^2$)
2011	266,246	5,400,308	370,336	19,229	2,374,044	55.26
2012	266,246	6,401,799	315,090	19,387	2,360,183	56.96
2013	266,246	7,406,356	471,515	27,539	3,087,435	75.53
2014	361,249	7,841,725	519,776	29,617	3,052,719	59.91
2015	361,249	10,344,000	702,154	33,689	3,744,628	75.36
2016	361,249	10,252,501	814,445	33,074	3,865,499	77.60
2017	361,249	9,748,500	680,126	33,457	3,616,249	72.78
2018	361,249	9,576,000	674,231	34,066	3,635,077	72.39

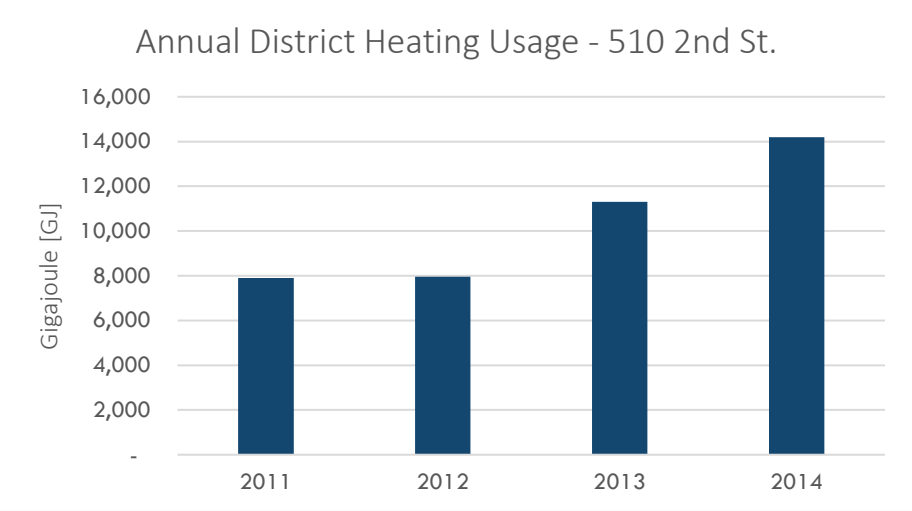




510 2nd STREET

Year	Total Floor Area (ft^2)	Electricity (kWh)	Natural Gas (m^3)	District Heating (GJ)	GHG Emissions (tCO_2e)	Energy intensity ($ekWh/ft^2$)
2011	168,442	3,416,535	234,295	7,898	1,247,986	48.22
2012	168,442	4,050,133	199,344	7,963	1,238,068	49.86
2013	168,442	4,685,673	298,306	11,311	1,590,904	65.46
2014	168,442	3,656,444	242,361	14,191	1,446,029	60.53





Cornwall Community Hospital
Hôpital communautaire de Cornwall