5 Year STRATEGIC ENERGY MANAGEMENT PLAN 2014 - 2019

THE OTTAWA HOSPITAL – GENERAL CAMPUS

Hard copy of this plan is available at Engineering & Operations, please call x14281 to get a copy

STRATEGIC ENERGY MANAGEMENT PLAN (SEMP) FOR 2014 TO 2019

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Commitment and senior management approval:

The Ottawa Hospital – General campus (OGH) will allocate the necessary resources to develop and implement an Energy Conservation and Demand Management Plan as required under Regulation 397/11 of the Green Energy Act. Energy management planning helps avoiding cost increases, improve service delivery, and support local industry while protecting human health and the environment. Our Energy Conservation and Demand Management Plan will reduce our energy consumption and its related environmental impact as outlined in our overall target. Senior management will support Engineering and Operations, and other departments in any recommended work towards achieving the objectives presented in this plan and that progress towards those objectives is monitored on an ongoing basis. The plan will be updated as required under Regulation 397/11 of the Green Energy Act or any subsequent legislation.

We will strive to continually reduce our total energy consumption and associated greenhouse gases (GHGs) through wise and efficient use of energy and resources, while still maintaining an efficient and effective level of service for our patients, stakeholders and the general public. This will involve a collaborative effort to increase the education, awareness, and understanding of energy management within the hospital. Total energy consumption includes electricity, natural gas, and oil. While commitment from Senior Management is crucial, everyone has a role in the wise use of energy and to showcase appropriate leadership within corporate facilities and operation.

OGH will work towards including energy efficiency as a main criteria into all areas of our activity including our organizational and human resources management procedures, procurement practices, financial management and investment decisions, and facility operations and maintenance. As a major component of the operating costs of municipal facilities and equipment, energy costs will be factored into the lifecycle cost analysis and asset management analyses and policies of the hospital.

OGH Energy Conservation and Demand Management Plan was completed to reduce our overall energy consumption by 10% from 2014 (based on baseline data) to 2019 with the following goals:

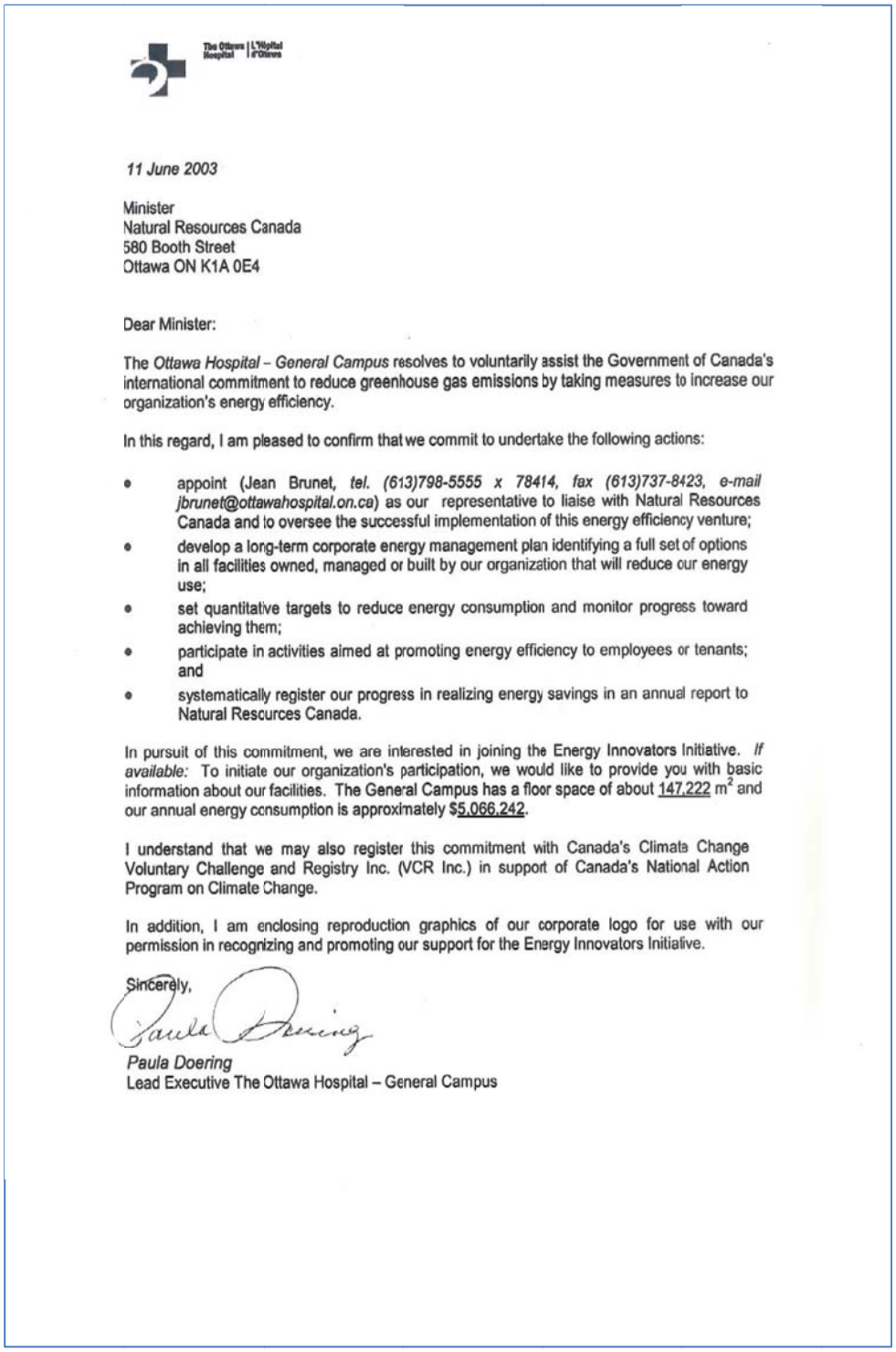
1. Maximize fiscal resources and avoid cost increases through direct and indirect energy savings.
2. Reduce the impact on the environment.
3. Increase the comfort and safety of staff and stakeholders.
4. To create a culture of conservation within the hospital.
5. To improve the reliability of the equipment and reduce maintenance.

Signature: 

Name: Cameron Love
Title: Chief Operating Officer
Date: 20 June 2014

Previous Letter of Commitment:

The Ottawa Hospital- General campus provided the minister of Natural Resources Canada with the commitment letter below to show our dedication to the environment on June 11, 2003.



The Ottawa Hospital | L'Hôpital d'Ottawa

11 June 2003

Minister
Natural Resources Canada
580 Booth Street
Ottawa ON K1A 0E4

Dear Minister:

The *Ottawa Hospital – General Campus* resolves to voluntarily assist the Government of Canada's international commitment to reduce greenhouse gas emissions by taking measures to increase our organization's energy efficiency.

In this regard, I am pleased to confirm that we commit to undertake the following actions:

- appoint (Jean Brunet, *tel. (613)798-5555 x 78414, fax (613)737-8423, e-mail jbrunet@ottawahospital.on.ca*) as our representative to liaise with Natural Resources Canada and to oversee the successful implementation of this energy efficiency venture;
- develop a long-term corporate energy management plan identifying a full set of options in all facilities owned, managed or built by our organization that will reduce our energy use;
- set quantitative targets to reduce energy consumption and monitor progress toward achieving them;
- participate in activities aimed at promoting energy efficiency to employees or tenants; and
- systematically register our progress in realizing energy savings in an annual report to Natural Resources Canada.

In pursuit of this commitment, we are interested in joining the Energy Innovators Initiative. *If available:* To initiate our organization's participation, we would like to provide you with basic information about our facilities. The General Campus has a floor space of about 147,222 m^2 and our annual energy consumption is approximately $5,066,242.

I understand that we may also register this commitment with Canada's Climate Change Voluntary Challenge and Registry Inc. (VCR Inc.) in support of Canada's National Action Program on Climate Change.

In addition, I am enclosing reproduction graphics of our corporate logo for use with our permission in recognizing and promoting our support for the Energy Innovators Initiative.

Sincerely,

Paula Doering
Lead Executive The Ottawa Hospital – General Campus

Introduction

The purpose of OGH's energy management plan and policies is to promote responsible stewardship of our environment and community resources. In keeping with our core values of Efficiency and Financial Responsibility, OGH's energy management program will reduce operating costs and enable us to provide quality service to a greater number of persons in the community in addition to complying with the recent regulation 397/11.

- Utility and energy related costs are a significant part of overall operating costs.
    - Utility costs in 2013/14 were approx. $8.1 M.
    - The Hospital's Energy Use Index (EUI) was 2.44 eGJ/m2 (678 ekWh/ft^2).
    - Facility related O&M costs are $13.6 M annually.
    - Facility capital project costs are projected at $24M over 5 years.

- With energy management an integral part of business decisions, OGH can expect the following results:

    - 2% reduction in annual energy use with total of 10% over 5 years.
    - $180,000 annually to the bottom line ($900,000 over 5 years).
    - Energy investments will get a 15% internal rate of return (IRR).

- Recent activity associated with managing these costs include the following among many:
    - Converting 100% Outside Air AHU to Return air system at Critical care Wing in 2010.
    - Replacing 330 Exit signs to LED in 2011.
    - Installing free cooling CRAC unit for the Data center in 2012.
    - Installing free cooling Roof top unit for the elevator room in 2013.
    - Switching A19, PAR lights, MR16 to LED.
    - Applying for the 'saveONenergy' incentive program for all of the above.

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

- Active management of energy related costs and risks in this manner will provide a significant economic return to the organization and will support other key organizational objectives.

The Ottawa Hospital values related to Energy Management

The Ottawa Hospital (TOH) has the following vision, mission and core values:

Vision

To provide each patient with the world-class care, exceptional service and compassion we would want for our loved ones.

Mission

- The Ottawa Hospital is a compassionate provider of patient-centered care with an emphasis on tertiary-level and specialty care, primarily for residents of Eastern Ontario.
- The Ottawa Hospital educates future health-care professionals in partnership with the University of Ottawa and other affiliated universities, community colleges and training organizations.
- The Ottawa Hospital develops, shares and applies new knowledge and technology in the delivery of patient care through world-leading research programs in partnership with the Ottawa Hospital Research Institute (OHRI).

The Ottawa Hospital also plays an active role in promoting and improving health within our community. The Ottawa Hospital collaborates with a wide range of partners to address the needs of the community and to build a strong, integrated system for regional health-care delivery.

The Ottawa Hospital functions in English and French while striving to meet the needs of the culturally diverse community we serve.

Core Values

- Compassion
- A Commitment to Quality
- Working Together
- Respect for the Individual

The above statements for vision, mission and core values targets a world class care also to develop, share and apply new technologies to deliver patient care. Since our facilities are a primary source of providing care and an integral part of the healing environment, we should be able to use our facilities efficiently and effectively. This results in TOH being able to direct more resources toward patient care. Not only that, but by reducing our environmental footprint, we are also doing our part to create a healthier environment. Something that is essential to the people we serve and that which helps them to lead healthier lives.

TOH started investing in energy reduction projects in 2003 when an RFP was posted to retain the services of ESCO. Our goal was to reduce the energy consumption through HVAC and lighting upgrades, building envelope upgrades and water conservation.

Reducing energy waste through infrastructure improvement, policy and process changes, and embracing best practice and cutting- edge technology align well with TOH’s vision, mission and core values.

Guiding Principles for Strategic Energy Management

OGH's energy management plan will be guided by these principles:

Taking A Strategic Approach: OGH actively manages energy costs by implementing opportunities as they are identified. By acting strategically, OGH can significantly improve its energy-related performance. Integrating energy management into our organization's every-day decision-making, policies, and operating procedures will help assure substantial and long-lasting reductions in energy use throughout the campus.

Supporting Mission-Critical Goals: Strategic energy management will directly support OGH's mission-critical goals of caring for the environment and the community, optimizing the healing and working environment, improving the hospital's financial bottom line by reducing unnecessary energy costs, and optimizing the capacity of existing energy systems to meet current and expanding operational needs. The impacts of OGH's energy management efforts will be tracked and reported wherever possible.

Pursuing Long-Term Change to Core Business Practices: The core of our strategic approach is the consistent incorporation of energy management into our organization's practices and decision making such as the strategic planning and budgeting processes. Change in energy-related business practice will cover all applications of energy management – new construction and major renovations, existing facility operations and upgrades, and the economic analysis and procurement practices underlying these practices.

Fostering Organizational Commitment and Involvement: Executive and organizational commitment and involvement is critical to successful strategic energy management. Management at OGH will work with facility managers and other key staff to ensure that adequate organizational support and resources are provided to maximize the benefits of energy management to OGH. Energy management will be integrated into the strategic planning and capital budgeting processes.

Obtaining Solid Economic Returns: Energy management investments will yield solid economic returns that meet OGH's standard [Internal Rate of Return][Return on Investment] requirements applied through the hospital's capital budgeting process. OGH will apply consistent financial analysis methods that consider life-cycle costing to reduce total cost of facility ownership and operation.

Using Available Resources and Assistance: Use national, regional, and local sources of strategic, technical, and financial assistance to help achieve our energy management goals. These include utilities and the 3 levels of government.

The Business Case for Strategic Energy Management

Below are the central business arguments for OGH's pursuit of strategic energy management. The next section presents the business proposition – the results of analysis of the energy efficiency opportunities and their associated costs and internal rate of return.

Strengthened Community Leadership and Environmental Stewardship
Energy management is a visible, public commitment to the community and environment. Through aggressive energy management, OGH can provide leadership in promoting sustainable communities, efficient business practices, and environmental stewardship. Faced with a tough market that has forced cut backs on hospital support staff, this is an excellent opportunity to provide leadership and reduce costs at the same time.

Enhanced Healing and Working Environment
In existing facilities, efficient operating practices improve patient as well as employee comfort with more stable air temperature, and better indoor air quality and lighting. In new facilities that meet new codes, more daylight and smarter control of occupant comfort contribute to a healing and patient-focused environment and an improved working environment. Recent research has found that daylight eases surgical pain and contributes to substantial savings in pharmacy costs.

Improved Financial Health and Operating Cost Reduction
Strategic energy management presents a highly leveraged opportunity to reduce operating costs and positively impact OGH's bottom line. Further, investments in energy projects typically have a lower risk of performance over time relative to other investments. Savings from energy projects are easier to forecast reliably than savings or revenue increases expected from more uncertain types of investments.

Optimization of Capacity to Meet Current and Expanding Operational Needs
Energy efficiency / retro commissioning and Energy audits optimize inefficient or poorly designed and operated equipment /systems. The increased system capacity due to working in optimum working parameters can be reclaimed to avoid expanding operational needs. This "free capacity" can eliminate the need to add major new energy capacity and be much less expensive.

Business Proposition

- If energy management considerations are integral to relevant business practices, policies, procedures, and decision-making processes, OGH's energy-related costs can be reduced by an additional 10% over a 5-year period.

- Based on 2013 utility rates, this will result in $180,000 in annual value to the bottom line based, or a total $900,000 over a 5-year period. Integration of energy management into organizational decision making and business practices will continue to produce value annually for a much longer period of time.

- To support the achievement of these financial benefits, OGH will invest up to $24 million in energy-related capital and operating improvements, meeting an Internal Rate of Return (IRR) of 15% or better over the 5-year period (2014-2019).

Energy Management Goals

The following outlines some of the energy management goals that will be adopted by OGH. They include, but are not limited to, the following:

- SEMP Approval, Resources to Implement
- Implement Financial Practices and Decision Making Processes
- Establish Purchasing Specifications for Energy Efficient Equipment and Services
- Goal: Implement Enhanced Design & Construction (D&C) Practices
- Goal: Improve Building Operating Performance
- Goal: Implement Cost-Effective Facility Upgrades
- Goal: Actively Manage Energy Commodity
- Goal: Monitor, Track, and Reward Progress

Goal: SEMP Approval, Resources to Implement

- Executive approval process adjustments and resource allocations to support initiatives
- Support from key staff (financial management, purchasing/procurement, capital renewal, building operations, etc.)
- Creation of mechanisms/processes to make resources available
- Clarification and communication of staff roles and responsibilities, performance goals, and energy management reporting

Goal: 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 over lower costs
  - Internal rate of return (IRR) as "pre-approved" by the Hospital administration or board
  - Train staff on life cycle cost analysis and financial requirements and decision making process
- Decisions about energy management investments will be part of OGH' high-level, long range process of budgeting for capital and operations

Goal: Establish Purchasing Specifications for Energy Efficient Equipment and Services

- Establish and consistently use purchasing specifications that minimize life-cycle costs for energy efficient equipment and services
  - Establish efficiency specifications for standard equipment routinely replaced (e.g. lights, motors, and unitary HVAC equipment)
  - Establish efficiency guidelines that apply LCCA for custom equipment purchases (e.g. chillers)
  - Increase the awareness of purchasing staff to work with Engineering to apply for available incentives by the utilities to be included when doing the LCCA
  - Establish efficiency standards for design and construction, and for building operations and maintenance services

Goal: Implement Enhanced Design & Construction (D&C) Practices

- Implement improved construction practices in all large capital 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 support decisions
  - Apply established purchasing procedures and specifications
  - Include incentives and tax credits wherever available
  - Educate all owner's project managers or construction managers and contractors on integrated design and their respective roles in master planning pre-design, design, construction, testing, commissioning, and monitoring

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

- Establish baseline for measuring performance goals (e.g. CSA code, or national reference standards like ASHRAE 90.1)
- Set target to implement energy efficiency measures to achieve at least by stimulation more efficient building compared to a standard reference like MNEC for buildings
- Measure performance and improve over time

- Specify commissioning as a standard procedure.
  - Retain the services of an independent third-party commissioning agent
  - 100 percent of fundamental building systems and elements will be designed, installed, and calibrated to operate as designed
  - Design team, commissioning agent, and building operators will work closely throughout the design process and occupancy to ensure good transition

Goal: Improve Building Operating Performance

- Equipment tune-up and improved operations and maintenance (O&M) will achieve the following results while supporting patient care, facility comfort and safety
  - Achieve reductions in operating costs for existing facilities by an average of 10% over 5 years and continue to improve by 1% per year for 5 years thereafter
  - Reduce the system-wide EUI from 2.44 eGJ/m^2 to 2.30 eGJ/m^2 by 2019. The EUI will be adjusted for variances in patient days and IT intensity in addition to the other projects that are implemented during the 5 year term that would change the energy consumption at the hospital. International Protocols for Measurement & verification will be used to estimate the EUI at 2019
  - Reduce energy consumption by 1,000,000 kWh per year.
  - Consider ENERGYSTAR as TOH is an active Energy Star participant and so far it is the only hospital in Ontario that is participating

Goal: Implement Cost-Effective Facility Upgrades

- Implement equipment and system upgrades where justified by life-cycle cost analysis
- Expand use of qualified service providers as needed. Develop standard RFP documents, contract terms, and reporting standards

Goal: Actively Manage Energy Commodity

- Minimize utility costs and exposure to market risks. Utility costs include natural gas, electricity, oil, water, and sewer
- Participate in the energy/utility regulatory process

Goal: Monitor, Track, and Reward Progress

- Track progress on SEMP
- Track energy reductions [quarterly][annually]
- Reward staff for successes

Previous Energy savings projects:

The following table (1) shows the previous energy savings projects and the ones under construction with the estimated utilities savings and the year it was implemented.

Table (1) Previous energy savings projects at OGH

Year	Project / Program	kWh saved	m^3 gas saved
2003	ESCO contract	3,170,574	146,563
2004	Steam trap repairs		201,280
2008	Steam traps repairs		62,250
2010	Steam traps repairs		29,516
2010	100% TO 30% CCW AHU	160,000	442,522
2010	330 LED Exit signs upgrade	72,270	-
2011	Free cooling CRAC unit - data center	126,612	
2011	Lab Vac & Lab Air liquid ring to Air cooled	14,920	
2011	2 x 3 HP Autoclave fans on VFD from 24x7	23,798	12,255
2012	Executive meeting room lighting upgrades	5,391	
2012	250 occupancy sensors installation	125,000	
2012	Steam traps repairs		29,980
2012	Upgrade 2 fridges to Energy Star	6,030	
2012*	OGH- Hwl Phase 2	2,016,713	
2012	Data center isle containment upgrades	417,925	
2013	The Rehab Center steam piping insulation		60,720
2013	Steam traps repairs		99,583
2013	Elevator room HVAC upgrade	45,258	
2013	ORCC New Line Accelerator (medical equipment)	30,827	
2013*	600 A19, 300 PAR20 & 300 PAR38 to LED	161,865	
2013*	200 A19 to LED	42,924	
	TOTAL	**6,420,108**	**1,084,669**

Project under construction

Baseline Energy Use

The baseline energy profile has been selected using the calendar year utility data 2012. This baseline was used to calibrate energy end-use estimates and as the reference case for calculating energy savings. Exhibit 1 presents the baseline energy use; Exhibits 3, 4, and 5 present the data in graphic format.

Key Observations:

A review of the baseline energy profile reveals that:

The annual electrical consumption is 57,079 MWh
The annual gas consumption is 2,532,839 m3 gas
The annual steam imported from Transalta Cogen is 51,414 GJ steam
The annual MTHW imported from Transalta Cogen is 42,457 GJ steam
The total site energy intensity is at 2.44 GJ/m2 (659 ekWh/m2 yr).

RET screen uses 709 ekWh/m2 as an average for ON acute care hospitals.
OHA scorecard uses approx. 2.5 eGJ/m2 yr (694 ekWh/m2 yr) as an average for ON hospitals who contributed to the scorecard survey.
Enerlife Consulting Inc. analyzed 2011 acute care ministry of Energy submission for 69 ON acute care hospitals and concluded that the median is at 66.2 ekWh/ft2 (713 ekWh/m2 yr or 2.57 eGJ / m2 yr)

Using the lowest energy intensity as a reference (OHA scorecard at 694 ekWh / m2 yr), this places The Ottawa Hospital – General campus leading other pears by approx. 5%.

The water use intensity is 1.4 m3 / m2 yr, approximately much lower than the 2.2 m3 / m2 yr average ON acute care hospitals as reported in the OHA scorecard for 2012 data.

Factors affecting Energy consumption changes / growth:

1. The weather: Each year is different in terms of Heating Degree days, Cooling Degree days, rain precipitation, etc. The weather has major impact on the HVAC loads in order to provide the required inside air conditions like temperature and relative humidity.

Figure (1) Changes in Heating Degree Days from 2003 – 2013

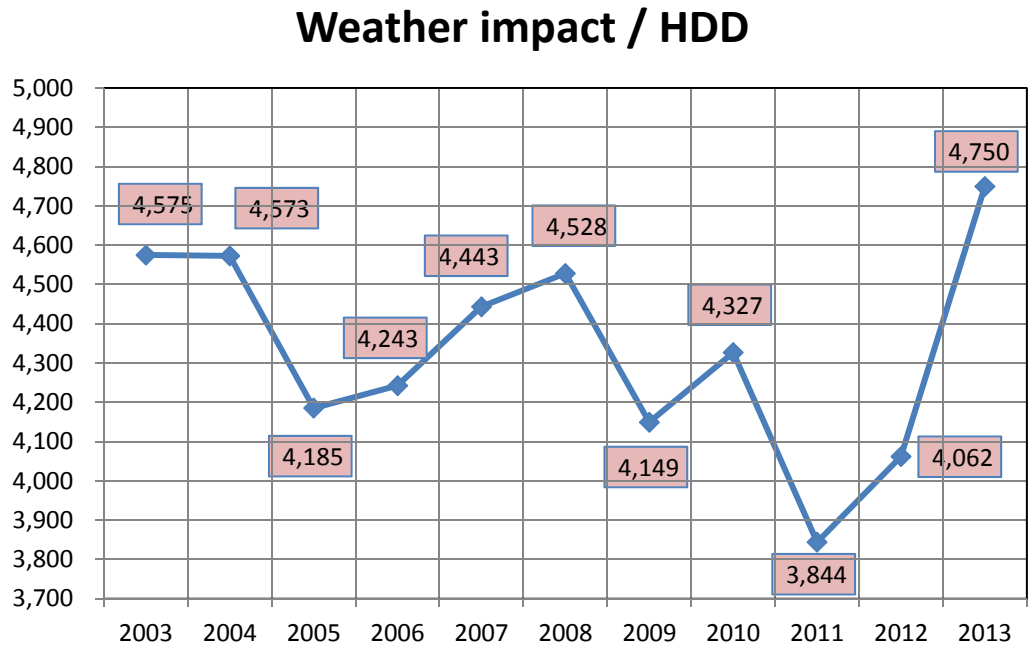
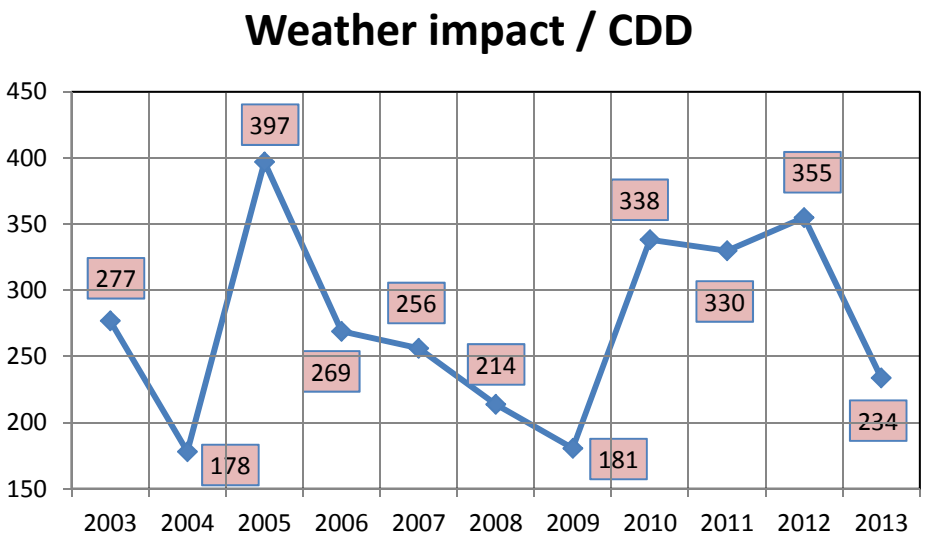
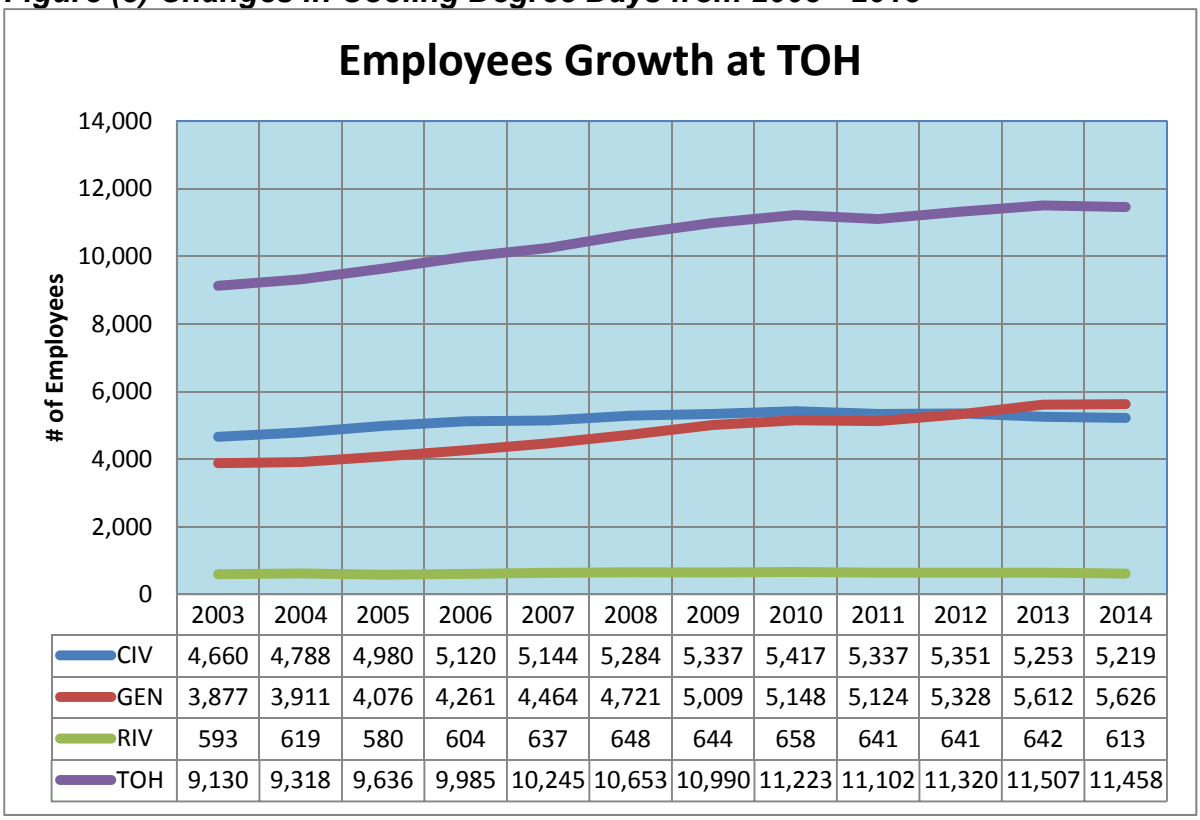


Figure (2) Changes in Cooling Degree Days from 2003 - 2013



2. Growth of staff: TOH staff increased from 9,130 to approx. 11,458 in 10 years. This requires growth in utilities such as providing new space for accommodation, lighting and IT equipment.

Figure (3) Changes in Cooling Degree Days from 2003 - 2013



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CIV	4,660	4,788	4,980	5,120	5,144	5,284	5,337	5,417	5,337	5,351	5,253	5,219
GEN	3,877	3,911	4,076	4,261	4,464	4,721	5,009	5,148	5,124	5,328	5,612	5,626
RIV	593	619	580	604	637	648	644	658	641	641	642	613
TOH	9,130	9,318	9,636	9,985	10,245	10,653	10,990	11,223	11,102	11,320	11,507	11,458

1. Growth and upgrades in medical equipment. There are approximately 22,000 pieces of medical equipment available on inventory this year.

2. Increased deficiencies in equipment due to aging. HVAC equipment like motors, fans, boilers, chillers, heat exchange surfaces, and many others degrade with time. Engineering and Operations do proper maintenance on the available equipment but gaining is still an important factor for increasing energy consumption.

Exhibit 1A Site Baseline Energy consumption / Energy and water consumption history / GHG emissions from 2003(GJ/m2 units)

Year	kWh	Demand (kW)	m3 gas	Curt. Oil (l)	Steam (GJ)	MTHW (GJ)	m3 water	Area (m2)	m3 water / m2	Total eGJ/m2	kGHG
2003	41,626,560	73,878		-	52,126	39,753	428,456	134,838	3.18	1.79	9,446,082
2004	43,584,960	77,454		-	52,528	38,413	342,452	134,838	2.54	1.84	9,578,545
2005	43,910,400	76,492		-	52,622	38,843	305,825	134,838	2.27	1.85	9,640,858
2006	42,560,619	76,666	948,707	-	49,679	44,063	294,251	134,838	2.18	2.10	11,439,885
2007	50,794,017	90,101	1,412,607	-	55,084	45,023	285,504	134,838	2.12	2.50	13,485,139
2008	51,039,785	90,638	1,782,771	-	53,868	50,661	254,109	151,980	1.67	2.35	14,470,794
2009	51,332,608	90,651	1,736,119	-	55,181	43,388	221,347	151,980	1.46	2.30	14,057,338
2010	55,682,900	99,557	2,143,475	26,000	64,458	44,023	172,325	157,490	1.09	2.49	15,904,178
2011	57,791,571	102,498	2,209,094	-	53,657	40,907	190,635	162,885	1.17	2.38	15,334,358
2012	**57,079,330**	**102,601**	**2,532,839**	**35,000**	**51,414**	**42,457**	**212,408**	**162,885**	**1.30**	**2.44**	**15,932,672**

Exhibit 1B Site Baseline Energy consumption / Energy and water consumption history / GHG emissions from 2003(kWh/m2 units)

Year	kWh	Demand (kW)	m3 gas	Curt. Oil (l)	Steam (GJ)	MTHW (GJ)	m3 water	Area (m2)	m3 water / m2	OGH kWh / m2	Notes
2003	41,626,560	73,878		-	52,126	39,753	428,456	134,838	3.18	498	Only OGH, ORCC
2004	43,584,960	77,454		-	52,528	38,413	342,452	134,838	2.54	511	OGH, ORCC and TRC
2005	43,910,400	76,492		-	52,622	38,843	305,825	134,838	2.27	514	
2006	42,560,619	76,666	948,707	-	49,679	44,063	294,251	134,838	2.18	584	CCW added
2007	50,794,017	90,101	1,412,607	-	55,084	45,023	285,504	134,838	2.12	694	
2008	51,039,785	90,638	1,782,771	-	53,868	50,661	254,109	151,980	1.67	652	
2009	51,332,608	90,651	1,736,119	-	55,181	43,388	221,347	151,980	1.46	639	New ORCC added
2010	55,682,900	99,557	2,143,475	26,000	64,458	44,023	172,325	157,490	1.09	691	New CEP, ER Garage
2011	57,791,571	102,498	2,209,094	-	53,657	40,907	190,635	162,885	1.17	660	New Garage2
2012	**57,079,330**	**102,601**	**2,532,839**	**35,000**	**51,414**	**42,457**	**212,408**	**162,885**	**1.30**	**678**	

Exhibit 2 History of Energy intensity starting 2003 compared to average ON acute care hospitals (709 ekWh/m2 yr RET SCREEN)

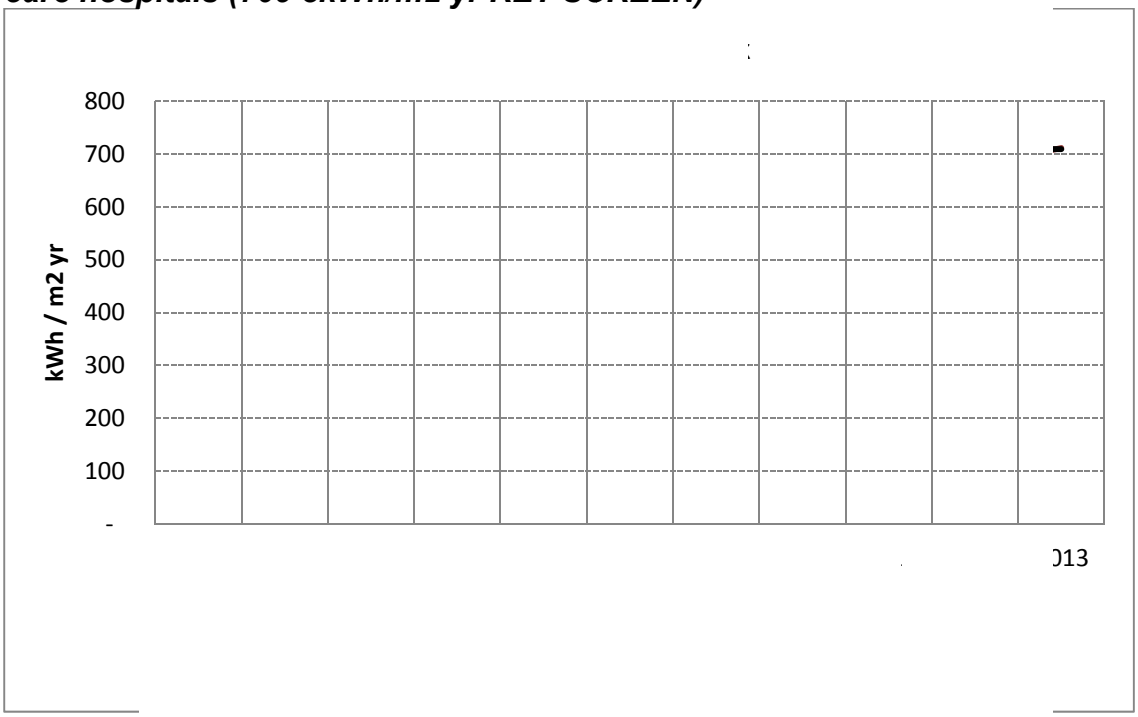
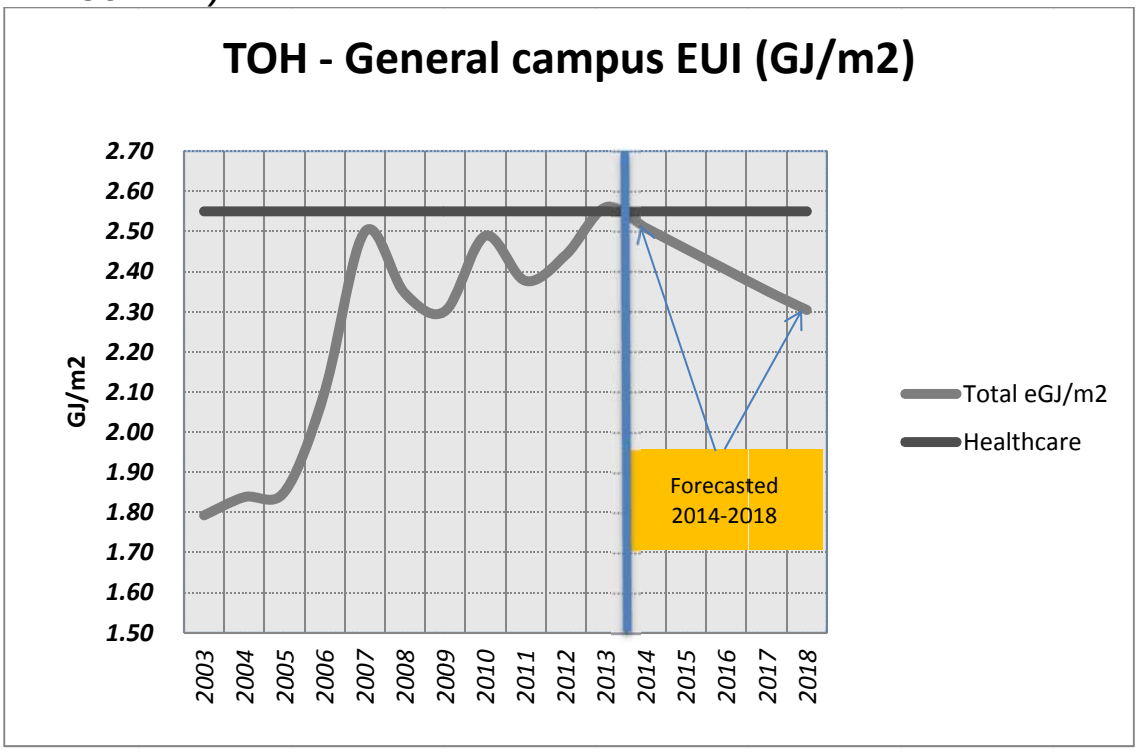


Exhibit 3 Estimated Energy intensity at the end of 2018 (end of 5 year energy management plan) compared to average ON acute care hospitals (709 ekWh/m2 yr RET SCREEN)



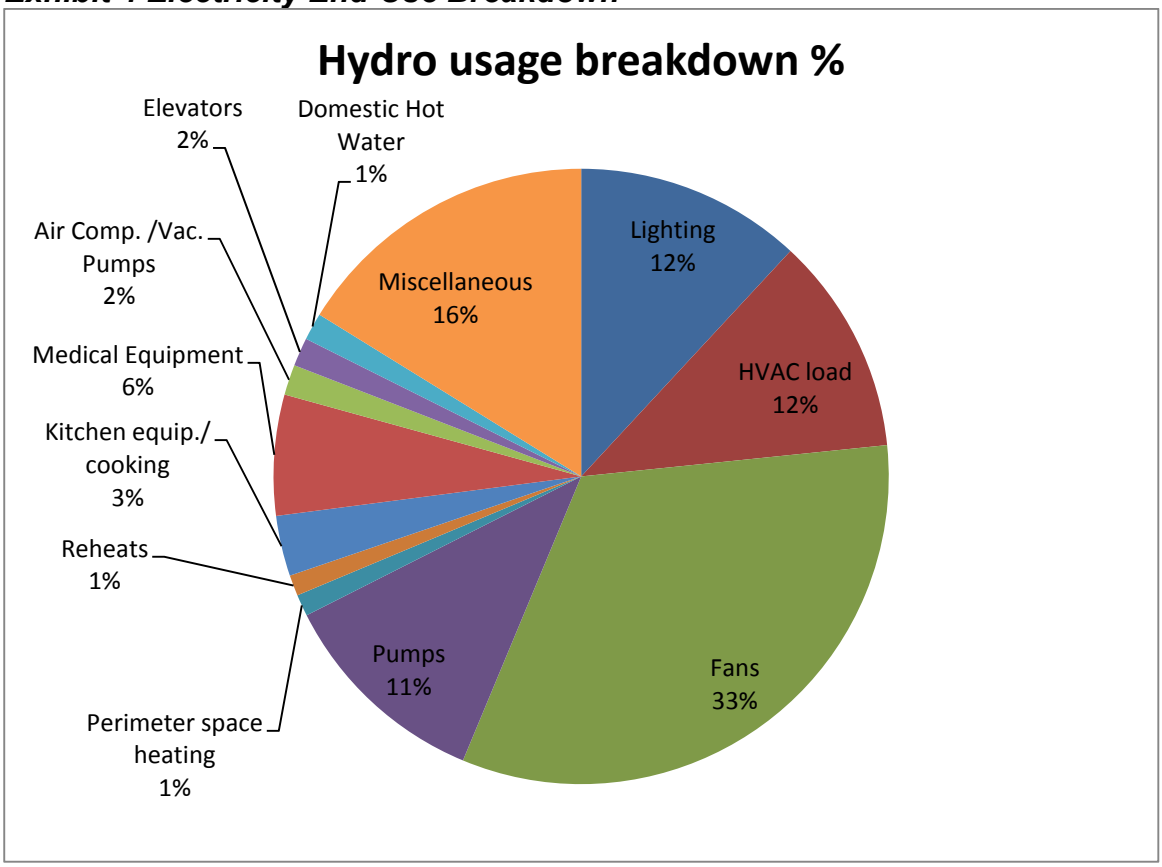
Energy End Use Breakdown

Energy end-use estimates are based on an ESCO project report that was implemented from 2003-2005. Specific energy uses that may overlap several categories are explained in their respective sections.

Electricity

Exhibit 4 illustrates the electricity end-use estimated % usage by category. The following end uses shown below were identified to have an electrical impact.

Exhibit 4 Electricity End-Use Breakdown



Observations on Electrical End-Use Breakdown:

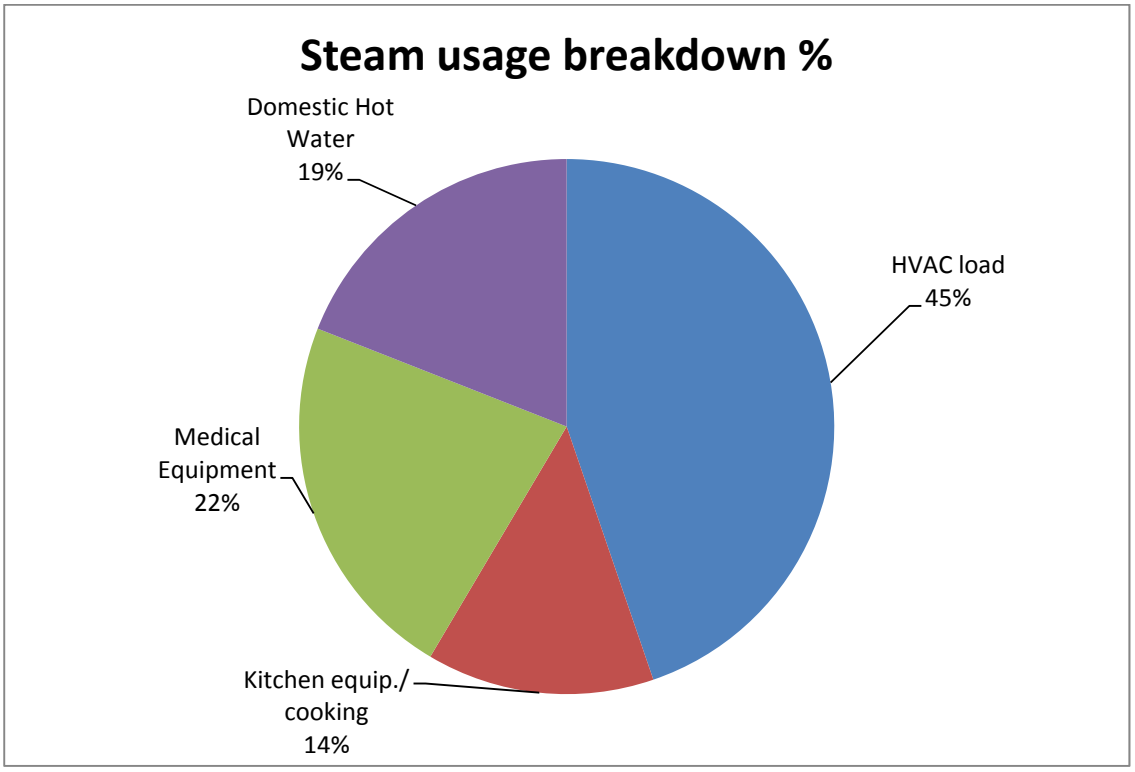
The highest 4 contributors to the hydro consumption are as follows:

1. HVAC Fans & Pumps: 44%
2. Plug Loads/Miscellaneous: 22%
3. Lighting: 12%
4. HVAC space Cooling: 12%

Steam

Exhibit 5 illustrates the steam end-use distribution. The following end uses shown below were identified to impact steam use.

Exhibit 5A Steam End-Use Breakdown



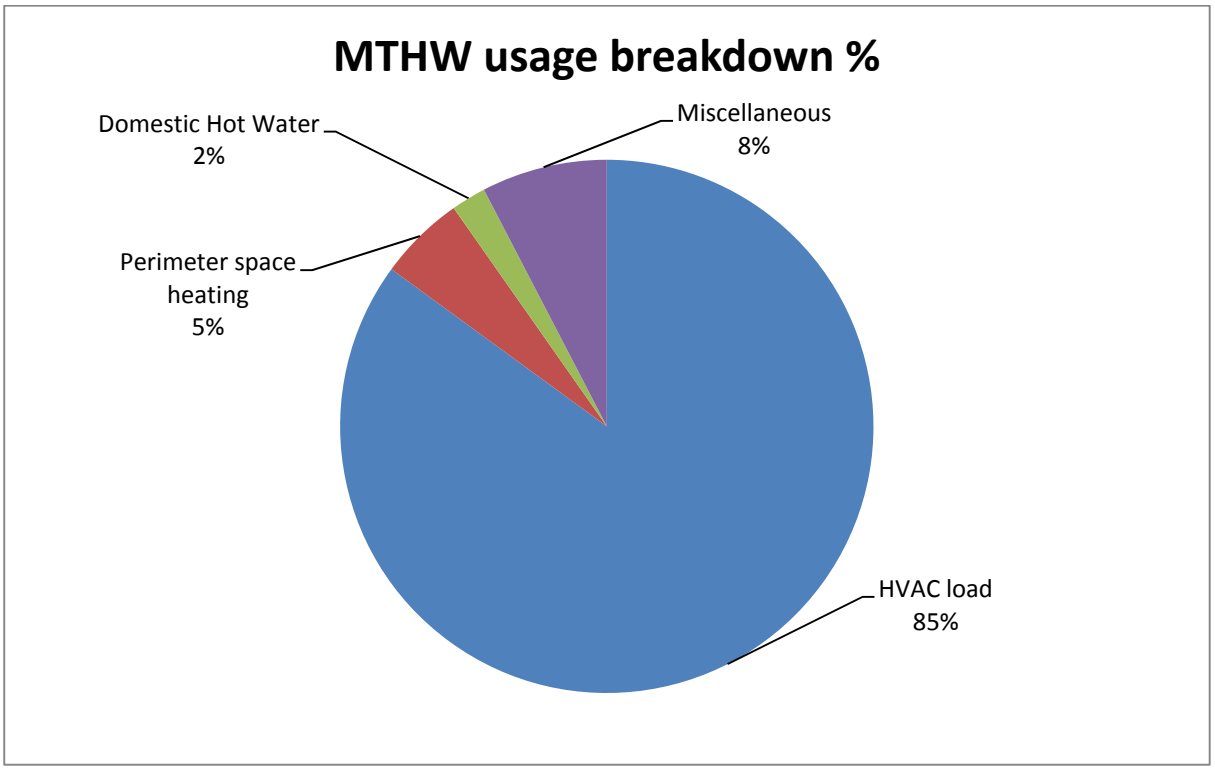
Observations on Steam End-Use Breakdown:

Domestic Hot Water & Process: 55%
Process loads include steam consumption for medical equipment, sterilization, and cooking.
Space HVAC (Heating): 45%

Medium Temperature Hot Water (MTHW)

Exhibit 5B illustrates the MTHW end-use distribution. The following end uses shown below were identified to impact MTHW use.

Exhibit 5B Steam End-Use Breakdown



Observations on MTHW End-Use Breakdown:

Domestic Hot Water & Process: 10%
Space HVAC (Heating): 90%

Total Energy

Exhibit 6 illustrates the total energy (hydro and thermal) end-use distribution. Electricity represents 64% of the site energy while thermal (steam and MTHW) is 36%. Exhibit 7 illustrates the total energy end-use distribution.

Exhibit 6 Total utility breakdown % by type of utility

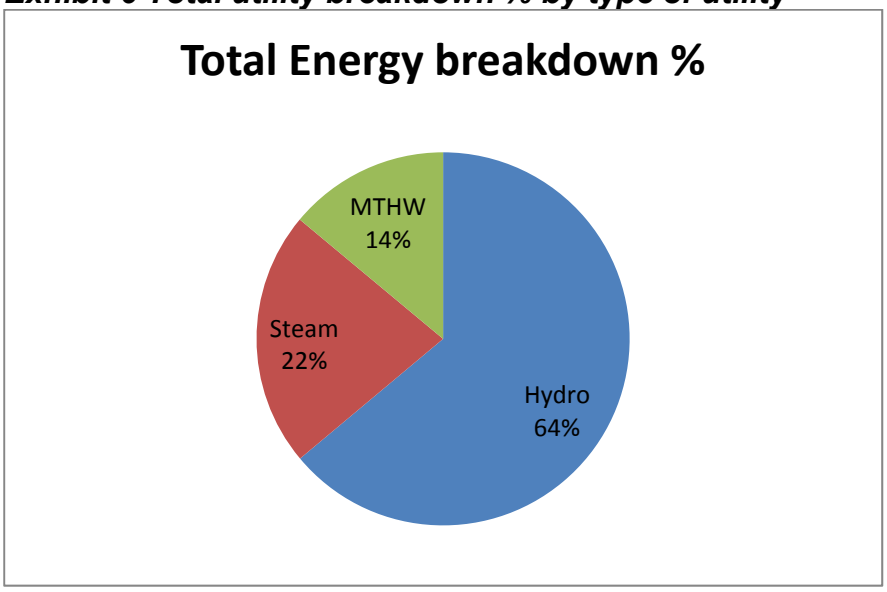
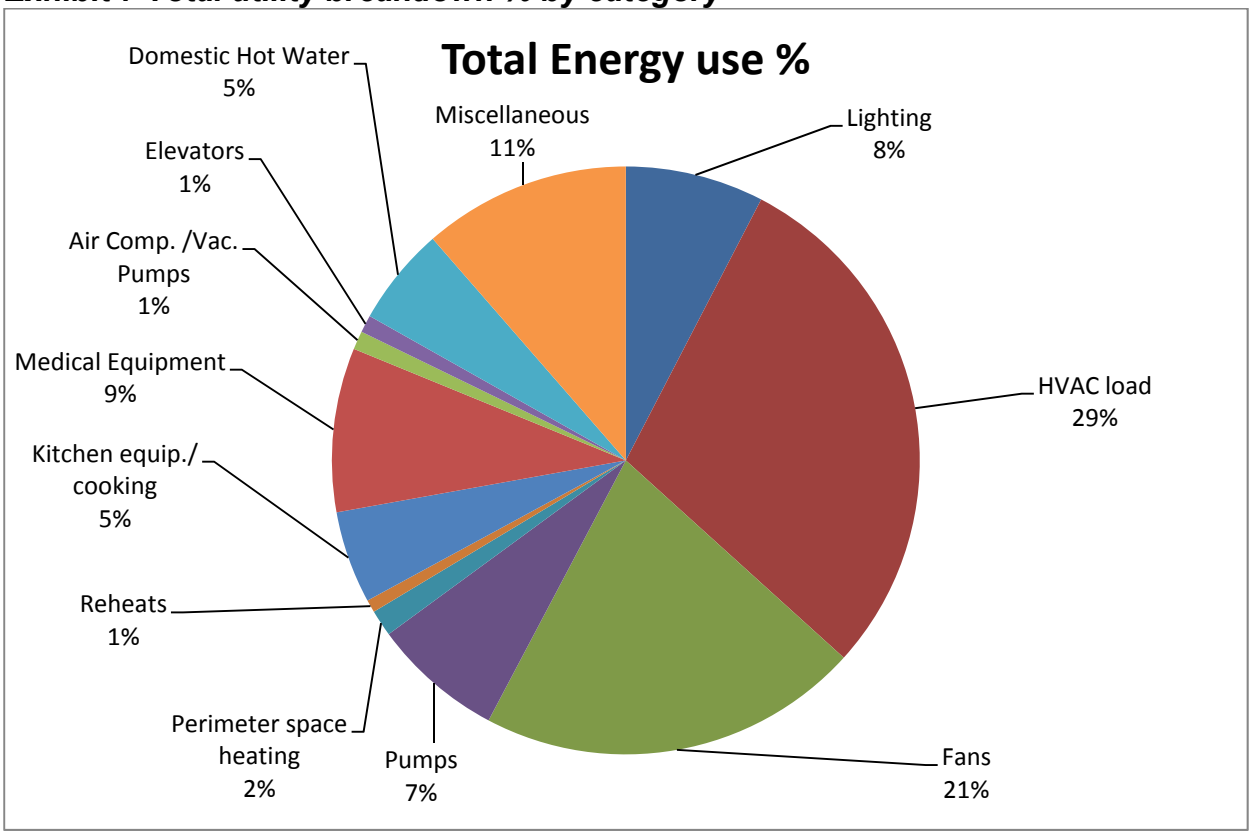


Exhibit 7 Total utility breakdown % by category



TOH energy savings streams to achieve plan targets:

The Ottawa Hospital started implementing energy savings measures from 1991 when a heat recovery heat exchanger was installed at the Civic campus to capture a good portion of the flue gases energy from the steam boilers serving the site. Projects continued to reduce the foot print of the sites with 2003 marking a $17 million project with an ESCO to save approx. $2.7 million in utilities. The project included HVAC upgrades, lighting upgrades, water conservation and building envelope improvements.

The Ottawa Hospital continued upgrading and improving the systems efficiency after the ESCO project is done. The projects that were implemented at the Riverside campus were shown in Table (1).

The benchmarking result for OGH shows that the site is approx. 5% less than the average acute care ON hospitals, however, we are planning to reduce it further by considering energy efficiency to be an essential criteria in our capital projects and when the financial analysis is within the specified Internal rate of return (IRR) or simple payback limits mentioned earlier.

The main categories that we expect to invest in order to reduce our Energy Use Intensity (EUI) with good IRR or payback are in the areas of lighting, HVAC equipment and medical equipment.

The projects to be implemented in the future would rely on the following streams:

1. Steam traps audit and repairs to avoid steam loss.
2. High pressure steam traps monitoring for early detection of failures.
3. Monitoring the boiler plant efficiency and upgrade when possible.
4. Working with capital projects to implement energy efficiency.
5. Retro commissioning and commissioning the projects properly to achieve optimum performance during operation.
6. Maintaining the insulation for HVAC and steam / HW pipes in good condition.
7. Sub meter and monitor on phases the critical loads at the sites.
8. Lighting upgrades when feasible.
9. Building envelope improvements.
10. Staff involvement and awareness increase to help save energy.
11. Water conservation in spite of being the only utility that is not incented so far, but due to the high increase in the unit cost (doubled since 2002 rates), we will continue our efforts to save water and sewer. TOH received the OHA water conservation award in 2013.

12. Chiller plant monitoring and optimization on the supply side, at the same time optimize the demand side by minimizing the Air handling Units running time through precise schedules at the Building Control Center (BCC) and to optimize the operating parameters such as the static pressure and motor speed.
13. Working jointly with other departments to implement energy efficiency like Medical Equipment upgrades (Biomedical Engineering), new buildings and renovations at the sites (Capital & Renewal), efficient new equipment based on life cycle costing (Purchasing department).
14. Energy Star equipment specification when available as TOH is the only Energy Star participant.
15. Train and refresh the training for the stationary engineers operating the equipment.
16. Apply for the available incentives programs like OPA's saveONenergy program, Enbridge gas conservation program and others if available to improve the feasibility of the energy conservation project so that it is approved for implementation faster.
17. Plan for better contribution in the Demand Side management Programs in order to reduce the demand during ON peak hours and reduce the Global adjustment charge.