STRATEGIC ENERGY MANAGEMENT PLAN FOR NORFOLK GENERAL HOSPITAL 2014

Norfolk GENERAL HOSPITAL

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INTRODUCTION

The overall purpose of Norfolk General Hospital's energy management plan and policies is to promote good stewardship of our environment and community resources. In keeping with our core values of Efficiency and Financial Responsibility, Norfolk General Hospital's energy management program will ultimately result in reduced operating costs and enable the Hospital to provide compassionate service to a greater number of persons in the community.

- Utility and energy related costs are a significant part of overall operating costs
    - Utility costs in the 2011/12 fiscal year were $964,570.00.
    - The Hospital's Energy Use Index (EUI) was 61.9 ekWh/ft2/yr
    - Facility related O&M costs are $1,420,000 annually
    - Facility capital project costs are projected at $2.5 million over 5 years

- With energy management an integral part of business decisions, Norfolk General Hospital can expect the following:
    - 3 % reduction in energy use, with an overall reduction of 10 % in utility use and costs
    - $140,000.00 plus in savings annually to the bottom line (1.4 million plus over 10 years), in addition to the existing annually achieved savings of $400,000 since 1992.
    - Energy investments will get a 10% internal rate of return (IRR)

- Recent activity associated with managing these costs include the following:
        - A recently completed Opportunity Assessment through the Healthcare Energy Leaders Ontario program. (Executive Summary attached)
        - OHA Hospital Scorecard Survey participation & benchmarking report.
        - 'saveONenergy' application for new lighting incentives
        - Interior lighting retrofits such as T5 lighting in Mechanical areas and LED's lighting retrofits in entrances.

- Reports on past activities in the area of energy and water conservation can be viewed through the following links:
  http://www.csaregistries.ca/challenge/cha_entity_e.cfm?No=3161

- To further strengthen and obtain full value from energy management activities, a strategic approach will be taken: the organization will 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.

Energy Management Vision

Norfolk General Hospital's mission statement is 'to relieve illness and suffering, and help people live healthier lives.'

Therefore, we consider our facilities a primary source of giving care and an integral part of the healing environment. Key to this equation is the ability to use our facilities efficiently and effectively. This results in Norfolk General Hospital being able to direct more resources toward patient care and the relief of illness and suffering. 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.

So Norfolk General Hospital's energy management vision is to eliminate energy waste, wherever possible, through infrastructure improvement, through policy and process changes, and through the embracing of best practice and technology changes.

Guiding Principles for Strategic Energy Management

Norfolk General Hospital's energy management plan will be guided by these principles:

Taking A Strategic Approach: While Norfolk General Hospital actively manages energy and utility costs by implementing opportunities as they are identified, by acting strategically, the Hospital can significantly improve its energy-related performance. Internalizing energy and utility 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 Norfolk General Hospital.

Supporting Mission-Critical Goals: Strategic energy management will directly support Norfolk General Hospital's mission-critical goals of caring for the environment and the community. It will also help the Hospital to optimize the healing and working environment; improve the hospital's financial bottom line by reducing unnecessary energy and utility costs; and optimize the capacity of existing energy systems to meet current and expanding operational needs. The impacts of Norfolk General Hospital's energy management efforts on those goals will be tracked and reported wherever possible.

Pursuing Long-Term Change to Core Business Practices: The core of a strategic approach is the consistent incorporation of energy and utility management into our organization's core 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 economic analysis and procurement practices.

Fostering Organizational Commitment and Involvement: Executive and organizational commitment and involvement is critical to successful strategic energy management. Upper management at Norfolk General Hospital 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 and utility management. Energy and utility 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 Norfolk General Hospital's expectations on Internal Rate of Return and Return on Investment. Norfolk General Hospital will apply consistent financial analysis methods that consider life-cycle costs that reduce total cost of facility ownership and operation.

Using Available Resources and Assistance: Norfolk General Hospital will use national, regional, and local sources of strategic, technical, and financial assistance to help achieve our energy management goals. These include programs through local distribution companies, the Ontario Power Authority, ENERGYSTAR, saveONenergy, the Canadian Coalition for Green Health Care, The Canadian Healthcare Engineering Society, and EnerCan.

The Business Case for Strategic Energy Management

Below are the central business arguments for Norfolk General Hospital's pursuit of strategic energy management. Section VI then 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, Norfolk General Hospital can provide leadership in promoting sustainable communities, efficient business practices, and environmental stewardship. 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, better indoor air quality, and lighting. By way of an example, recent research has found that daylight eases surgical pain and contributes to substantial savings in pharmaceutical costs.

Improved Financial Health and Operating Cost Reduction
Strategic energy management presents a highly leveraged opportunity to reduce operating costs and positively impact Norfolk General Hospital's bottom line. Dollars of operating cost savings directly improve the operating margin. Further, investments in energy projects typically have a lower risk of performance over time relative to other investments and savings from energy projects are easier to forecast reliably than savings or revenue increases expected from more variable types of investment.

Optimization of Capacity to Meet Current and Expanding Operational Needs
Energy efficiency optimizes overall equipment/system operation so that system capacity can be reclaimed for current and expanding operational needs. This "free capacity" can eliminate the need to add major new infrastructure is far less expensive.

Business Proposition

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

- Based on 2013 utility rates, this will result in $140,000 thousand in annual value to the bottom line, or a total $700,000 thousand 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, Norfolk General Hospital will invest in energy-related capital and operating improvements, meeting an Internal Rate of Return (IRR) that is acceptable to its Board of Directors and Executive Officers.

Energy Management Goals

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

- SEMP Approval, Resources to Implement
- Implement Financial Practices and Decision Making Processes; Establish Funding Resources
- Implement Strategic Energy Management Practices
    - Purchasing/Procurement Procedures and Specifications
    - Enhanced Design & Construction Practices
    - Enhanced Facility Operating Practices
    - Cost-Effective Facility Upgrades
    - Active Commodity Management
- Monitoring, Track, & Improve Performance

Goal: SEMP Approval, Resources to Implement

- Executive approval process adjustments and resource allocations to support initiatives.
- Support from key staff (financial management, purchasing/procurement, construction, 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 lowest cost
    - Internal rate of return (IRR) as "pre-approved" by the Hospital Board and Administration.
    - Train staff on Life Cycle Cost Analysis (LCCA) and financial requirements and decision making process.
- Decisions about energy management investments will be part of Norfolk General Hospital's 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).
- Establish efficiency standards for design and construction, and for building operations and maintenance services.

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

- Implement improved new construction practices in all 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 design 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 build projects; measure and improve over time.
  - Establish baseline for measuring performance goals (e.g. code, or national reference standards like ASHRAE 90.1).
  - Set targets.
  - 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, and facility comfort and safety.
  - Achieve reductions in utility related 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 61.9 ekWh/ft2/yr to 56.0ekWh/ft2/yr by 2019. The EUI will be adjusted for variances in patient days and IT intensity.
  - Reduce energy consumption by 120,000 kWh per year.
  - Improve ENERGYSTAR rating.

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 & Utility Commodities

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

Goal: Monitor, Track, and Reward Progress

- Track progress on Strategic Energy Master Plan
- Track energy reductions monthly and report annually.
- Reward staff for successes.

Baseline Energy Use

The baseline energy profile has been selected using the most recent full fiscal year with available utility data, which is 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 and costs; Exhibits 3, 4, and 5 present the data in graphic format.

Key Observations:

A review of the baseline energy cost profile reveals that:

The total annual utility costs for the site in 2012 were $1,028,543. Electricity represents the largest cost at 51% of total cost, natural gas costs were 21% of total cost, and water costs were 29% of total cost.

The annual electrical consumption is 4,626 MWh, and the annual gas consumption is 10,346 eMWh, resulting in a total site energy intensity of 61.9 ekWh/ft^2/yr. This places the Norfolk General Hospital 15% above the average of 53.7 ekWh/ft^2/yr based on an average of similar facilities in Ontario[1].

The natural gas consumption is the reason that the overall site energy intensity is higher than the benchmark. Natural gas use is 24% higher than the average.

The water use intensity is 445 L/ft^2, approximately twice as high as the average[2].

[1] Based on audits of 8 hospitals and long term care facilities in Ontario, 2009 to 2011.
[2] Based on audits of 7 hospitals and long term care facilities in Ontario, 2009 to 2011.

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Exhibit 1 Baseline Energy Consumption

2012	Electricity			Natural Gas			Water		Total		
	Usage [kWh]	Intensity [kWh/ft^2]	GHG Emissions [teCO_2]	Usage m^3	Intensity [ekWh/ft^2]	GHG Emissions [teCO_2]	Usage [m^3]	Intensity [L/ft^2]	Usage [ekWh]	Intensity [ekWh/ft^2]	GHG Emissions [teCO_2]
Jan	358,152	1.5	75.2	140,647	6.0	267.7	6,532	27.0	1,812,440	7.5	342.9
Feb	336,074	1.4	70.6	128,582	5.5	244.7	7,931	32.8	1,665,611	6.9	315.3
Mar	356,080	1.5	74.8	100,755	4.3	191.7	8,606	35.6	1,397,886	5.8	266.5
Apr	353,560	1.5	74.2	89,354	3.8	170.0	7,687	31.8	1,277,480	5.3	244.3
May	370,000	1.5	77.7	51,209	2.2	97.4	7,700	31.8	899,496	3.7	175.1
Jun	460,282	1.9	96.7	48,775	2.1	92.8	10,208	42.2	964,616	4.0	189.5
Jul	500,737	2.1	105.2	43,368	1.9	82.5	11,838	48.9	949,166	3.9	187.7
Aug	472,534	2.0	99.2	43,234	1.8	82.3	11,520	47.6	919,572	3.8	181.5
Sep	396,096	1.6	83.2	42,940	1.8	81.7	10,484	43.3	840,097	3.5	164.9
Oct	338,927	1.4	71.2	77,346	3.3	147.2	10,181	42.1	1,138,689	4.7	218.4
Nov	331,873	1.4	69.7	113,316	4.8	215.6	7,452	30.8	1,503,561	6.2	285.3
Dec	351,564	1.5	73.8	121,089	5.2	230.4	7,426	30.7	1,603,624	6.6	304.3
Total	**4,625,879**	**19.1**	**971.4**	**1,000,615**	**42.8**	**1,904.2**	**107,565**	**444.5**	**14,972,238**	**61.9**	**2,875.6**

Exhibit 2 shows the monthly electricity use profile. The majority of the electricity consumption is baseload, with a summer peak due to cooling, and a smaller winter extra that is the result of increased pumping energy associated with the heating system.

Exhibit 2 Baseline Electricity Use Profile

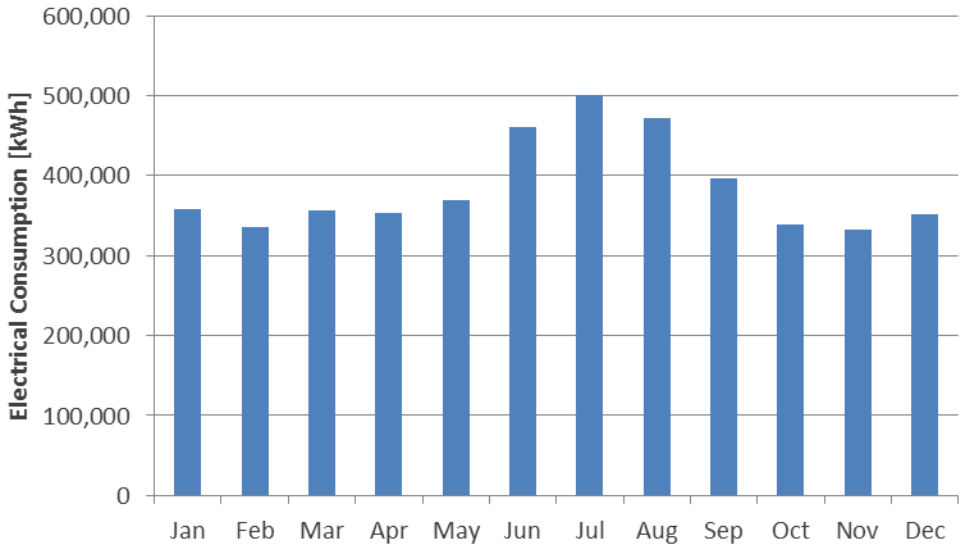


Exhibit 3 shows the monthly natural gas use profile. Approximately half of the gas is being used for the baseload, and there is a predictable winter increase that corresponds well with the heating demand.

Exhibit 3 Baseline Natural Gas Use Profile

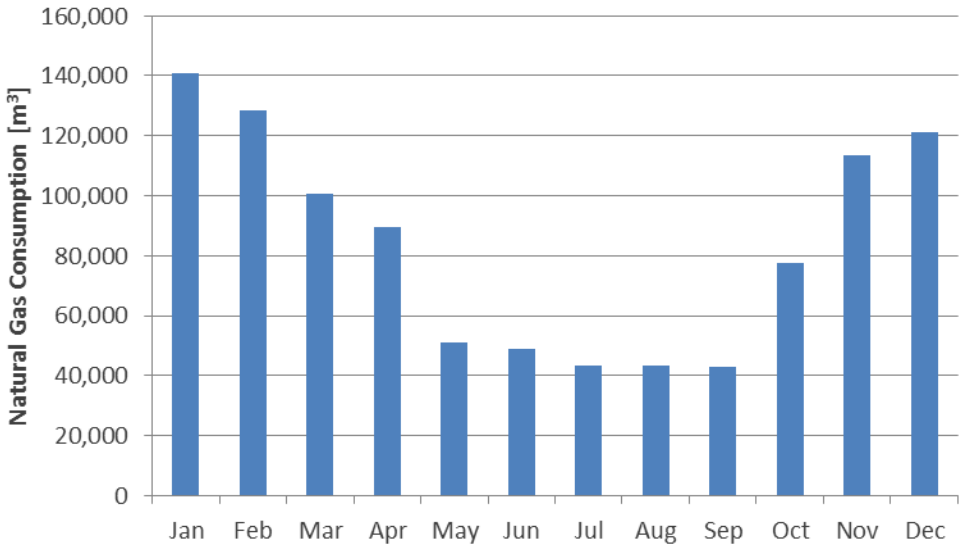
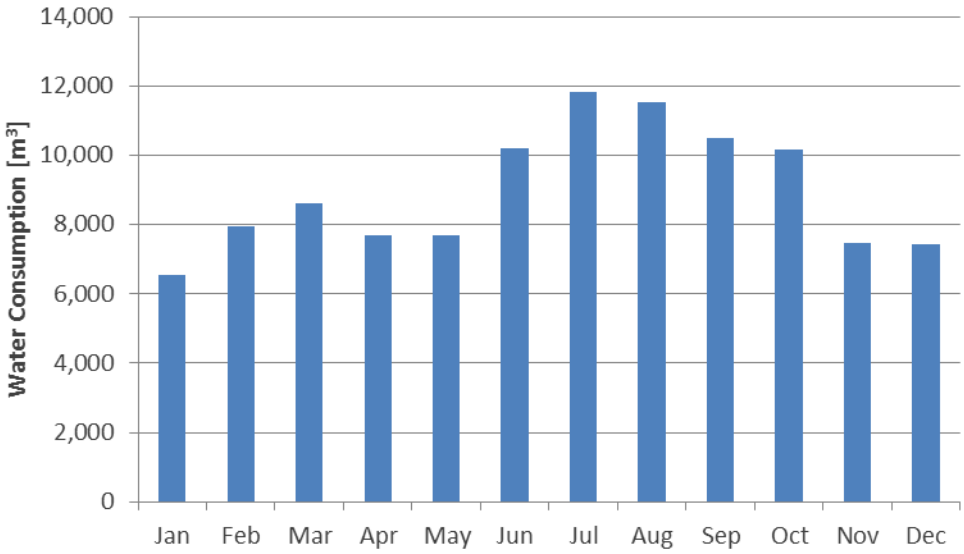


Exhibit 4 shows the monthly water use profile. The majority of the water consumption is baseload, but there is an increase in the summer due to cooling loads.

Exhibit 4 Baseline Water Use Profile



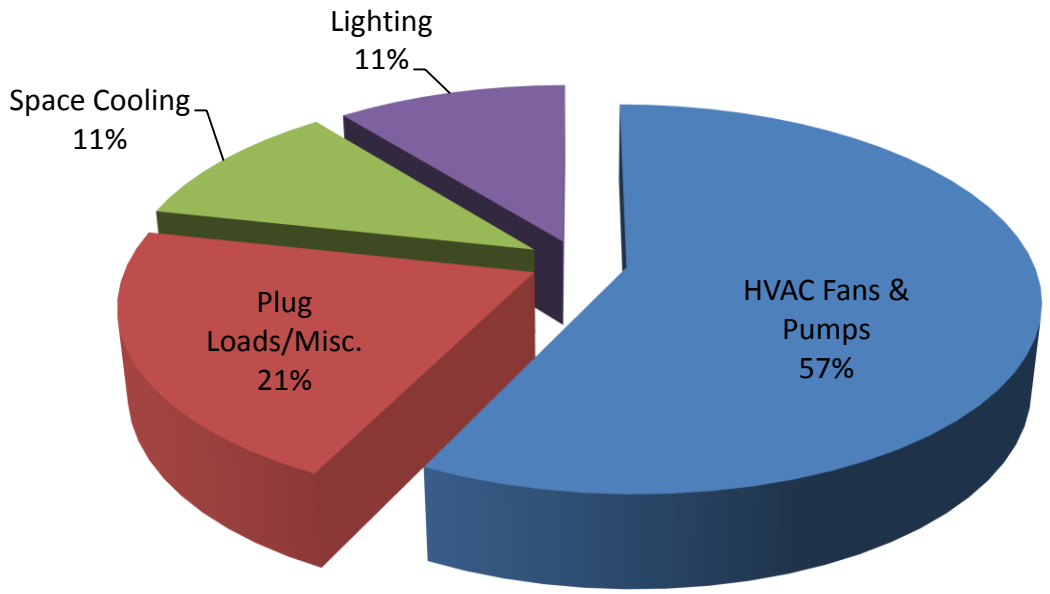
Energy End Use Breakdown

Energy end-use estimates were calculated using spreadsheet-based tools in conjunction with a review of utility profiles. Specific energy uses that may overlap several categories are explained in their respective sections.

Electricity

Exhibit 5 illustrates the electrical energy end-use distribution. The following end uses shown below were identified to have an electrical impact.

Exhibit 5 Electricity End-Use Breakdown



Observations on Electrical End-Use Breakdown:

HVAC Fans & Pumps: 57%

The energy consumption for HVAC equipment is higher than expected, but still reasonable given that the heating system is hydronic.

Plug Loads/Miscellaneous: 21%

Plug loads include IT equipment. The energy consumption is within the expected range.

Space Cooling: 11%

The cooling energy consumption is within the expected range.

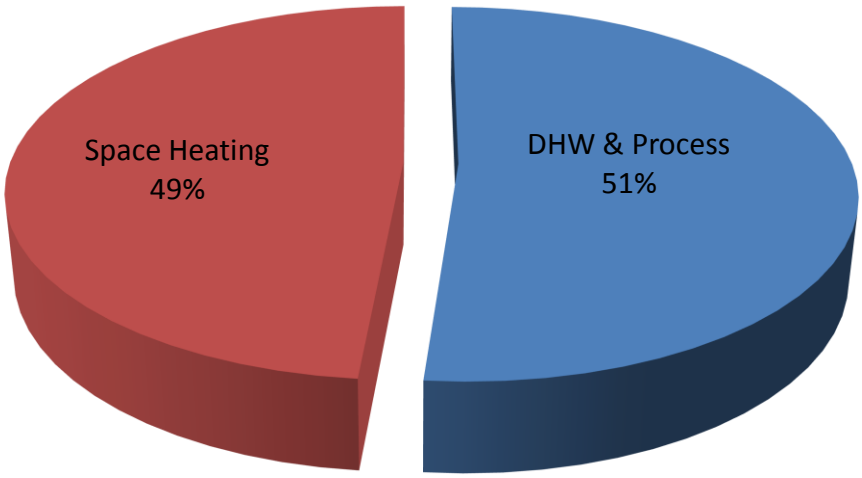
Lighting: 11%

The lighting energy consumption has been based on the lighting fixture count provided by the Norfolk General Hospital. The lighting power density of the facility based on this count is approximately half of what would be expected in a facility of this type. Consequently, the lighting energy consumption is probably twice as high, but this will need to be confirmed by a detailed lighting audit.

Natural Gas

Exhibit 6 illustrates the natural gas energy end-use distribution. The following end uses shown below were identified to impact natural gas use.

Exhibit 6 Natural Gas End-Use Breakdown



Observations on Natural Gas End-Use Breakdown:

Domestic Hot Water & Process: 51%

Process loads include steam consumption for humidification, sterilization, and cooking. The amount of energy used for the baseload DHW and steam supply is much higher than expected. Outside of the heating season, the overall efficiency of the boiler plant is likely very low.

Space Heating: 49%

The energy consumption for space heating is within the expected range.

Energy Savings Opportunity Report Executive Summary

The Ontario Power Authority retained ICF Marbek to conduct an opportunity assessment of hospitals throughout Ontario as part of the Commercial and Institutional Host Organizations program.

This report pertains to the Norfolk General Hospital, a full service hospital and long term care facility located in Simcoe, Ontario.

The objective of the assessment is to identify and assess potential energy retrofit opportunities including lighting, HVAC and building envelope as well as water, renewable energy, and other innovative measures. The results of this report will provide the Norfolk General Hospital with the basis for planning and implementing energy and water reduction improvements in their facility.

The results of the assessment indicate that there is a potential for the implementation of cost effective energy and water reduction measures in the areas of lighting, HVAC equipment, and water fixtures.

The total cost savings for the immediate implementation measures is estimated to result in a simple payback of 2.5 years, and the resulting GHG emissions reductions are 567.3 tonnes of eCO_2 per year. The total savings represent an 11% reduction in electricity and a 24% decrease in natural gas consumption. The implementation of these measures would decrease the energy intensity from the present baseline.

The combined heat and power measure would generate 3,162 MWh of electricity annually, equivalent to 68% of the baseline electricity consumption. The measure would lead to a net annual increase of 663,745 m^3 of natural gas and a net increase of 599 tonnes of eCO_2 per year.

It is estimated that the proposed measures would be eligible for incentives from the OPA's saveONenergy program, and would contribute 410 kW and 3,669 MWh of savings towards the OPA's DSM targets. Note that the savings potential is based on the preliminary opportunity assessment. A more accurate estimate of the savings will be available once the detailed assessments of the measures have been completed.

Energy Reduction Measure	Potential Incentives			
	Incentive Stream	[kW]	[kWh]	[$]
Lighting Retrofit	ERII Prescriptive	22.8	84,721	$7,618
Pump Retrofit	ERII Custom	7.1	62,116	$6,212
HVAC Recommissioning	ERII Custom	0.0	360,000	$36,000
Combined Heat & Power	PSUI	380.0	3,162,360	$456,146
Total		**409.9**	**3,669,197**	**$505,976**