



2017 Green Hospital Scorecard

Project Report

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Created for the Canadian Coalition for Green Health Care



The Canadian Coalition for Green Health Care
Coalition canadienne pour un système de santé écologique

<http://greenhealthcare.ca>

Executive Summary

The Green Hospital Scorecard (GHS) Final Project report is a public report profiling the 2017 GHS program, which reports on environmental hospital data for the 2016 calendar year. The purpose of this report is to provide a sector-wide view of participating hospital's environmental performance. It is comprised of a general introduction and profile of the current six sector reports based on the six sections of the GHS survey (General Information, Energy, Water, Waste, Pollution Prevention, and Corporate Leadership, Planning and Management), using de-identified information on environmental initiatives from program participants.

The 2017 GHS identified the top environmental performers of primarily Canadian health care hospital participants. The highest overall score was awarded to St Michael's Hospital, the highest energy score went to Parkwood Institute, the highest water score was for St Joseph's Health Care, London, and the highest waste score was given to Muskoka Algonquin Healthcare.

Highlights from the 2017 GHS include the total energy use across all participants (110 hospitals) to be 15,963,580 GJ. The total average energy use intensity (EUI) across all hospitals was calculated to be 2.5 GJ/m²/year. While participants used 12,960,512 cubic metres of water in the 2016 calendar year with a total average water use intensity of (WUI) of 2.0 m³/m²/year. Hospitals generated a total of 86,892 Metric Tonnes (MT) of waste, of which, 26,200.7 MT of recyclables and other forms of non-disposable waste were diverted from landfill. The 2017 GHS participants had a total waste diversion rate of 30.2% and an average waste intensity of 3.355 MT/bed.

The 2017 GHS also focused on qualitative data as well, including energy conservation, water reduction efforts, and waste management initiatives, pollution prevention strategies and corporate leadership, planning and management. Many hospitals are increasing their green initiatives through preferable purchasing, toxins management, sustainable construction/ renovation, energy conservation, water conservation and waste management policies, targets and action plans.

The 2017 GHS program would like to give a warm thank you to our wonderful sponsors. The energy awards were sponsored by the SaveONEnergy program. The water awards were sponsored by the Ontario chapter of the Canadian Healthcare Engineering Society (CHES). While the waste awards were sponsored by the Recycling Council of Ontario (RCO).



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This document is available for download at <http://greenhealthcare.ca/ghs>

List of Abbreviations

AHU: Air handling unit	HVAC: Heating Ventilation and Air Conditioning
CaGBC: Canadian Green Building Council	KPI: Key Performance Indicator
CAHO: Council of Academic Hospitals of Ontario	LEED: Leadership in Energy and Environmental Design
CCC: Complex Continuing Care	NHS: National Health Service
CCGHC: The Canadian Coalition for Green Health Care	O ₃ : Ozone
CHES: Canadian Healthcare Engineering Society	OHA: Ontario Hospital Association
CO ₂ : Carbon dioxide	OHHA: Ontario Healthcare Housekeeping Association
CO ₂ e: Carbon dioxide equivalents	RFP: Request for Proposal
EPI: Environmental Performance Indicator	SAO: Stabilized aqueous ozone
ESCO: Energy Service Company	The Coalition: The Canadian Coalition for Green Health Care
EUI: Energy Use Intensity	VFD: Variable frequency drive
GHG: Greenhouse Gas	VOC: Volatile organic compounds
GHS: Green Hospital Scorecard	WUI: Water Use Intensity
GJ: Gigajoules (one billion Joules, or 1 x 10 ⁹ Joules)	

- Throughout this report, the term Metric Tonnes (MT) refers to one (1) Metric Tonne, which is equal to 1,000 kilograms (kg).

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Introduction

Background

In 2013, the Ontario Hospital Association (OHA) developed and administered the GHS through the Green Hospital Champion Fund and supportive funding from the Ministry of Consumer and Government Services. Once the OHA program ended in 2016, The Canadian Coalition for Green Health Care (The Coalition) was chosen to continue the delivery of the GHS program. The Coalition has been a historic collaborator with the OHA on the development of the GHS since its inception. For example, the Coalition has been involved with the OHA's Green Health Care Awards for the past 15 years, and has a long history of effectively promoting environmental sustainability in health care. The 2017 GHS program is the fifth year that the GHS program has been offered.

Green Hospital Scorecard

The Green Hospital Scorecard (GHS) is a benchmarking and recognition tool, measuring hospital's energy conservation, water conservation, waste management, pollution prevention, and corporate leadership, planning and management. Participating hospitals report on their environmental and sustainability initiatives through the online GHS survey, receive a scorecard summarizing their environmental performance, and receive a Gold, Silver or Bronze rating, relative to their peers. The program allows for enhancement of existing benchmarking data, refinement of collection methodologies and the creation of meaningful reporting data to inform the hospitals and its executives. The intent of the scorecard is to raise the hospital's awareness, motivate change for future conservation efforts, and incite improvements in the environmental initiatives by recognizing each hospital's achievements. The GHS also:

- Provides detailed analysis of the organization's environmental performance against a backdrop of de-identified peer data;
- Helps identify potential areas for improvement for environmental performance and operational efficiency;
- Creates a benchmarking platform for hospitals to compare efficiencies;
- Offers the opportunity to be individually recognized through annual Gold, Silver and Bronze level achievements; and
- Encourages excellence in environmental performance by honouring select participating organizations with annual Green Health Awards.

For clarification, the GHS uses the following conventions when referring to different years of the program:

- 2017 GHS Program will report on data for the 2016 calendar year; and
- 2016 GHS Program reports on data for the 2015 calendar year, etc.



Methodology

The methodology for arriving at the 2017 GHS participant's data started with survey design, distribution, response and analysis.

Survey design

The analysis for this report was done based on the GHS survey, which was distributed to participants prior to compiling the data and reporting. The survey included a total of 36 questions organized into six different sections (see Appendix A for the questionnaire). The first section, General Information, contained 11 questions designed to collect general information about the hospital site and contact information. The Energy section contained 4 questions related to energy consumption, type of energy usage, conservation initiatives and their benefits. The Water section included 4 questions on water consumption, both for buildings and ground maintenance, billing information, conservation initiatives and their benefits. The Waste section was comprised of 4 questions regarding type of waste, recycling, disposal methods, as well as, waste reduction initiatives and their benefits. The Pollution Prevention section had 5 questions on policy, targets, action plans and initiatives and their benefits. Lastly, the Corporate Leadership, Planning and Management involved 8 questions about policies, action plans and outreach programs.

Distribution

The survey is set up on the web-based platform, Cognito Forms and was available in both English and French. The survey was promoted via direct email invitations to past participants of the program, as well as potential participants that had expressed interest in previous scorecards but were not a past participant. The survey was also promoted through the Coalition's newsletter, The Green Digest, direct email to other Coalition program participants, and social media channels, including Twitter and Facebook. In addition, Coalition partners and supporters such as the Ontario Hospital Association (OHA), the Canadian Healthcare Engineering Society (CHES) and the Ontario Healthcare Housekeeping Association (OHHA) also promoted participation in the GHS to their networks.

Analysis

The analysis in this report is based on a descriptive analysis of the survey data, including a content analysis of the free-text answers. The quantitative questions were analyzed using descriptive statistics and visualized using Excel. The qualitative questions were analyzed using content analysis, frequently mentioned themes and other content were derived and tabulated. The information presented in this report was compiled and interpreted exclusively for the purpose of this GHS document. The Coalition exercised reasonable skill, care and diligence to assess the information acquired during the preparation of the report but makes no warranties as to the accuracy or completeness of the information. The information contained in this report is based upon information provided by the GHS participants, which is expected to be accurate but cannot be fully guaranteed.

2017 GHS Top Performers

The 2017 GHS program recognizes the following top performers in each category and peer group:



Highest Overall Scores

- Academic: Sinai Health System, Mount Sinai Hospital, Toronto, ON
- Community: Toronto East General Hospital, Michael Garron Hospital, Toronto, ON
- Non-Acute: Providence Health Care, Toronto, ON
- Small: Strathroy Middlesex General Hospital, Strathroy, ON

Highest Energy Scores

- Academic: Sinai Health System, Mount Sinai Hospital, Toronto, ON
- Community: Toronto East General Hospital, Michael Garron Hospital, Toronto, ON
- Non-Acute: Providence Healthcare, Toronto, ON
- Small: Strathroy Middlesex General Hospital, Strathroy, ON

Highest Water Scores

- Academic: Sinai Health System, Mount Sinai Hospital, 60 Murray Street, Toronto, ON
- Community: Muskoka Algonquin Healthcare, South Muskoka Memorial Hospital, Bracebridge, ON
- Non-Acute: St. Joseph's Health Centre, London, Southwest Centre for Forensic Mental Health, St Thomas, ON
- Small: Four Counties Health Services, Newbury, ON

Highest Waste Scores

- Academic: Trillium Health Partners, Queensway Health Centre, Etobicoke, ON
- Community: Muskoka Algonquin Healthcare, South Muskoka Memorial Hospital, Bracebridge, ON
- Non-Acute: Parkwood Institute, Mental Health Care Building, London, ON
- Small: Kemptville District Hospital, Kemptville, ON

Program Details

Over the five years of the GHS program, the survey has been constantly growing and evolving. The 2017 GHS marks the second year that health care facilities were encouraged to submit separate surveys for each individual site, with the purpose of highlighting the top performers and better identifying areas of improvement for each individual location.

In the 2017 GHS, 110 hospital sites participated in the survey, with the majority of participants from Ontario, with some from other Canadian Provinces (Nova Scotia, Quebec, Manitoba, and British Columbia) and the USA (North Carolina). The goal of the program is to encourage facilities from across the country, and outside of Canada, to participate. The following figures depict the program details under various scenarios. Figure 1 shows the number of new vs returning participants.

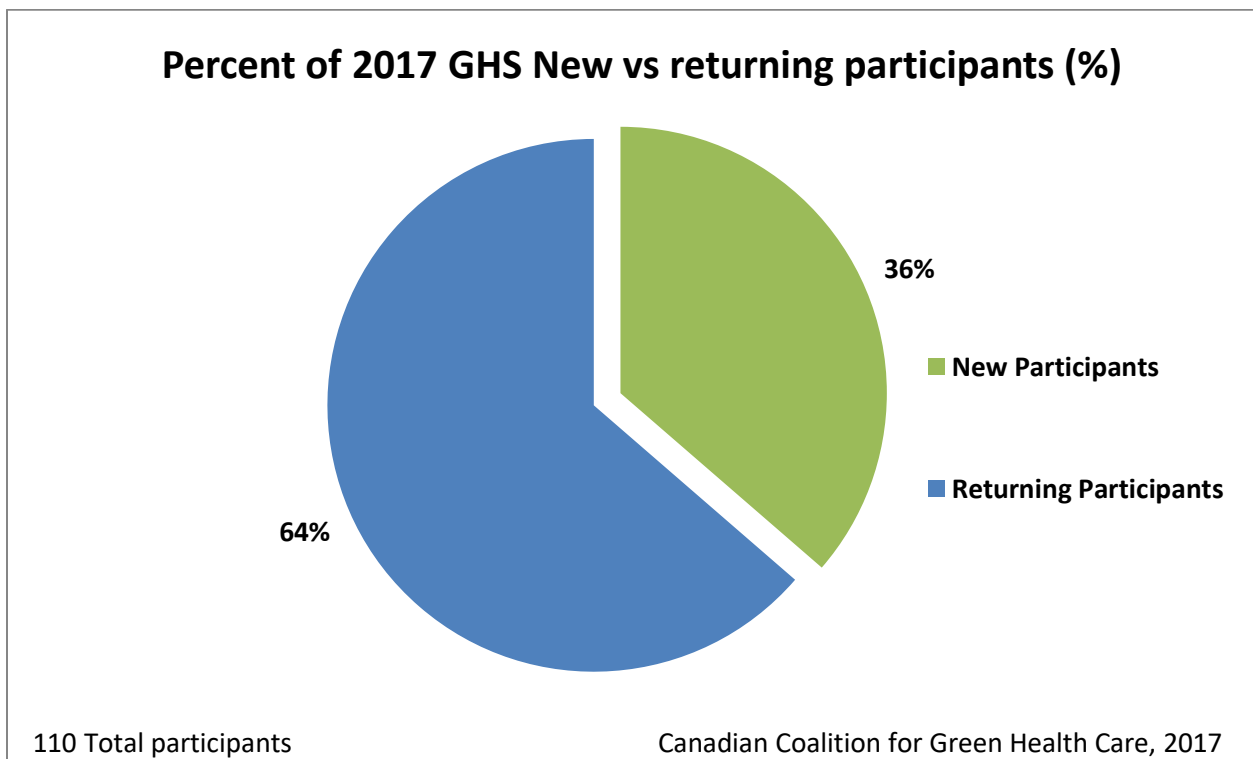


Figure 1 2017 GHS New vs returning participants

Peer Groups

Each year, GHS participants are asked to identify as one of four peer groups:

1. Academic Hospitals: All acute general and pediatric hospitals that are members of the Council of Academic Hospitals of Ontario (CAHO).
2. Community Hospitals: Acute care hospitals that do not fit the definition of a small or academic (teaching) hospital.
3. Non-Acute Hospitals: Complex Continuing Care (CCC), rehabilitation, and mental health hospitals. Have standalone CCC or Rehabilitation beds. They may or may not be members of CAHO.
4. Small Hospitals: Provides less than 3,500 weighted cases, have a referral population of less than 20,000, and is the only hospital in the community.

Presently, the program contains academic, community, non-acute and small hospitals, as well as outpatient clinics, mental health facilities and more. Figure 2 shows the percent of participants in each peer group.

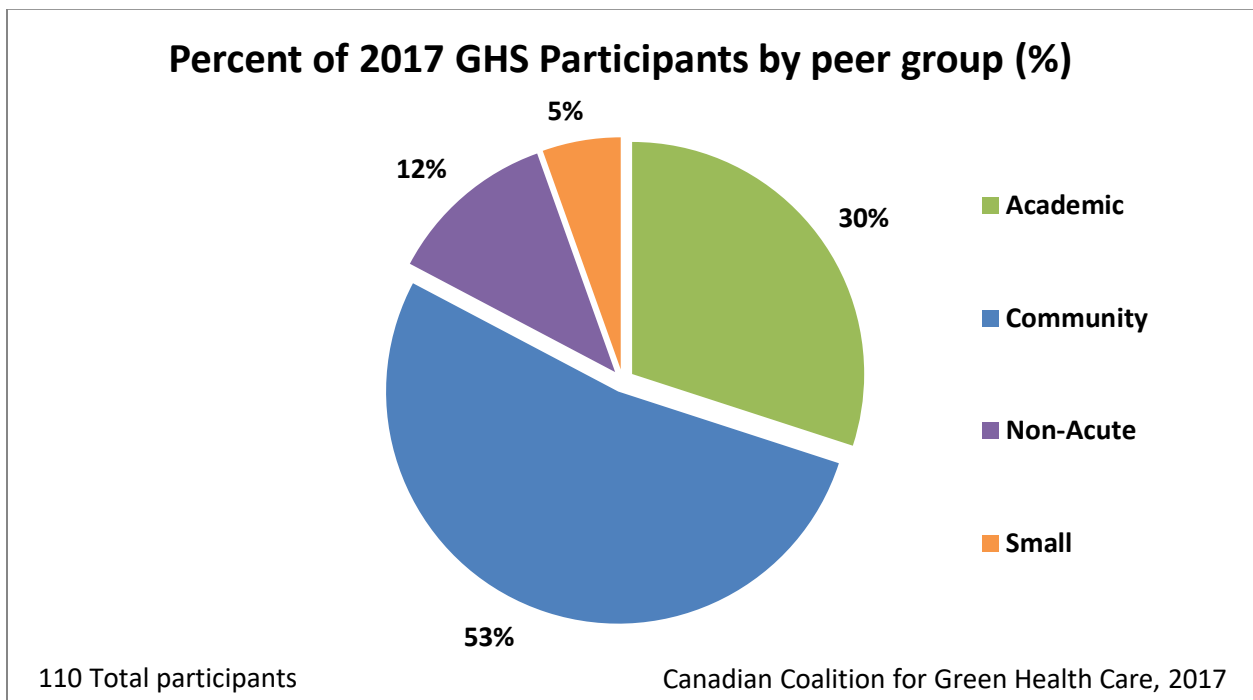


Figure 2 2017 GHS Participants by peer group

Number of Beds

Each year the participants are asked to provide the number of beds at each hospital. Sites that had a bed count of zero (0) indicate that it is an outpatient clinic or administration building.

Figure 3 shows the percent of 2017 GHS participants by number of beds.

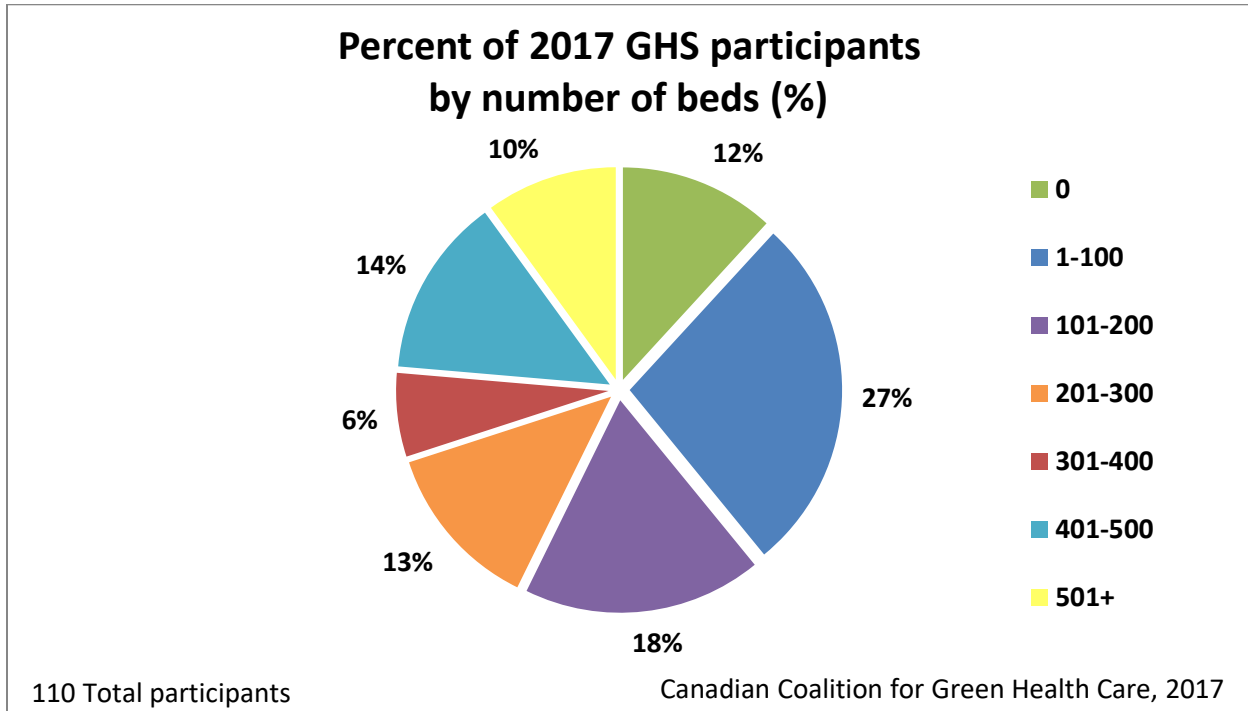


Figure 3 Percent of 2017 GHS participants by number of beds

Hospital Participation over Previous Years

Over the previous five years, the hospital participation for the GHS had an increasing trend with minor variance from year to year. More hospitals from outside of Ontario and even Canada have participated in the survey allowing for a broader spectrum of benchmarking comparisons. Figure 4 shows the number of GHS participants over the last five years by peer group.

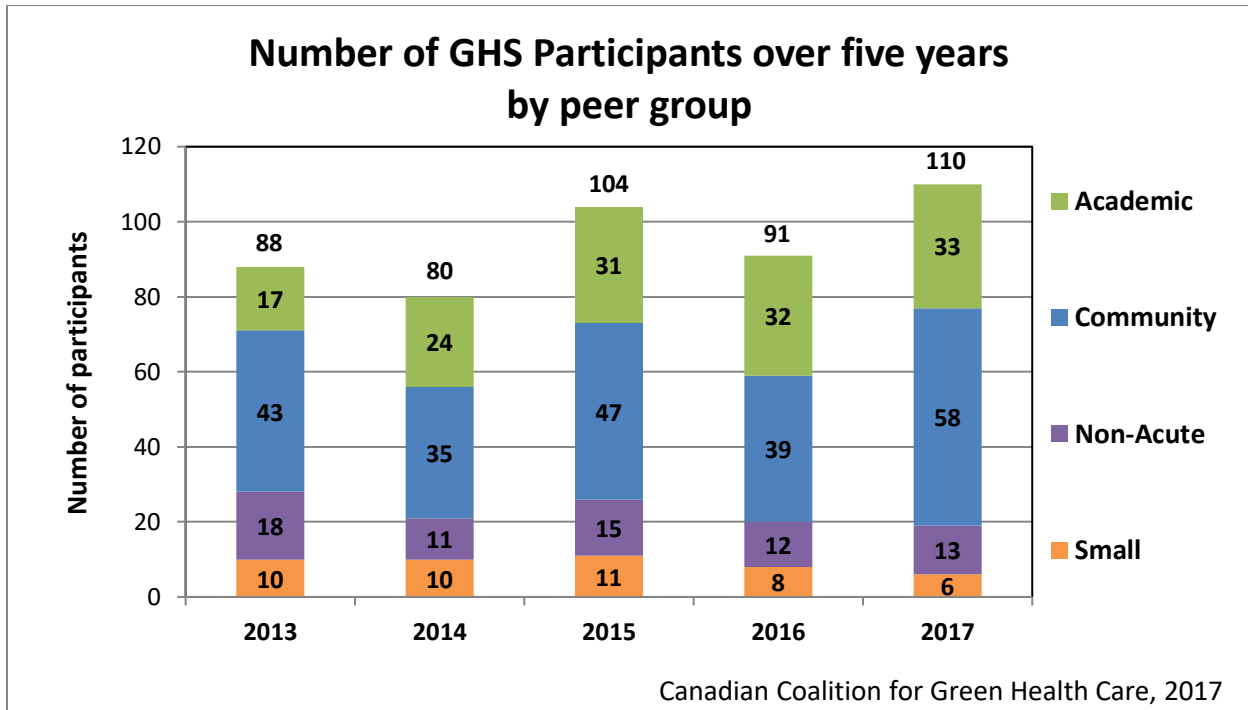


Figure 4 GHS Participants over five years by peer group

General Information and Sector Summaries

General Information

The General Information section of the survey collects data on the hospital site, its area, number of beds, inpatient days, outpatient visits and contact information. Each hospital provides data throughout the various sectors highlighted in the scorecard consistently with these figures and only inclusive of conditioned buildings at the site. Similar to the previous scorecard, organizations with multiple hospital sites were required to generate a unique survey for each site.

Within the general information category there were several questions pertaining to the following five listed areas, as shown in Table 1.

General Information	Summary
Conditioned floor area	Conditioned floor area is restricted to climate controlled areas excluding underground parking and other large, maintained areas that are not common to all hospitals. Area includes all medical buildings as well as non-medical buildings if data for these buildings were reported throughout the survey.
Number of beds	Each hospital provides the number of beds in place during 2016. For those hospitals that had a bed count of zero (0) it indicates that it is an outpatient clinic or administration building.
Inpatient days	The days during which services are provided to an inpatient where the day of admission is counted as an inpatient day but the day of separation is not. When the service recipient is admitted and separated on the same day, one inpatient day is counted.
Outpatient visits	A patient who is not hospitalized overnight but who visits a hospital, clinic, or associated facility for diagnosis or treatment. It includes ambulatory visits (ER), day surgeries or surgical cases and any face to face visits.
Contact information	First and last name, email address, phone number and title.

Table 1 General information from GHS survey

Sector Summaries

GHS sector reports provide a view of hospital's environmental performance and are comprised of the five main sections of the GHS survey: Energy, Water, Waste, Pollution Prevention, and Corporate Leadership, Planning, and Management. Sector data entries are collected, analysed and presented annually and by peer groups (Academic, Non-Acute, Community, and Small), and represent the averages for the hospital sites that participated in the GHS. The sector and peer group averages might show an increase or decrease from one year to the next as the organizations participating in the program may differ slightly each year. Table 2 provides an overview of each of the sector summaries.

Sector Summary	Content/Purpose
Energy	Summarizes participant's energy use and sources, and considers the greenhouse gas implication of participant's energy use.
Water	Summarizes water use and management.
Waste	Summarizes waste management activities.
Pollution prevention	Summarizes organization's commitments to purchase less toxic and more environmentally preferred materials for use within the hospital, and consideration of the impacts of building construction on the environment and within the hospital.
Corporate leadership, planning and management	Summarizes measures that capture hospital's corporate commitment to an environmentally sustainable culture and integration of green objectives into corporate planning and regular business.

Table 2 Sector summaries overview

Energy

The 2017 GHS program showed the total energy use across all 110 participants to be 15,963,580 GJ. The heating and cooling load requirements for each site attributes to a large portion of this energy consumption, especially when taking into account the seasonal temperature variation in Canada. For Canada, and especially Ontario, 2017 was an exciting time for energy savings. New programs and incentives such as the Hospital Energy Efficiency program, to reduce Green House Gas (GHG) emissions, was to fund 180 energy efficiency projects at 98 hospitals across the province. This program was an initiative of the Climate Change Action Plan (“Ontario reducing carbon footprint, boosting care at hospitals”, 2017). Canada’s GHG emissions currently represent about 1.6% of the global total (Booth & Boudreault, 2016). Of that, 23% are emitted by Ontario (Environment and Climate Change Canada, 2014). The health care sector is an area of great potential as Canada takes action to meet its international GHG reduction commitments in the coming decades. By reducing hospital’s GHG emissions, the health care sector will be incorporating a more global vision of health and sustainability and reduce the increased risks of respiratory and cardiovascular problems and certain types of cancers that come with higher GHG levels (Environment Canada, 2013).

Hospital areas reported in the 2017 GHS range from several thousand meters squared (m^2) up to greater than 250,000 m^2 , creating a need for efficient building envelopes to further reduce energy loss from heating and cooling. Since hospitals contain a great deal of medical equipment and other essential plug loads, a significant source of energy use cannot be avoided, however through efficient use it can be reduced. Furthermore, hospitals are required to operate 24 hours a day, 7 days a week, 365 days a year so it comes as no surprise that energy consumption is such a significant contributor to the health care system’s GHG emissions. This proves as an opportunity for the sector to reduce its GHG emissions significantly by implementing energy conservation strategies, clean energy projects and other green initiatives. An easily attainable energy conservation measure that all hospitals should pursue is retrofitting outdated lighting systems, as efficient lighting can create vast energy savings and is essential for a productive and safe hospital. There are often government incentives available for hospitals to participate in to lower project costs and increase payback periods.

One way hospitals can benefit is by assisting in the decision making of equipment purchasing and may coincide with current rating systems (i.e. ENERGY STAR). Other readily available resources, such as National Resources Canada’s (NRCan) online energy tools (i.e. Portfolio Manager and RETScreen), can assist in identifying and meeting energy reduction targets.

Energy Use by Type

Energy consumption data from 2016 was provided for the 2017 GHS in several categories: electricity, natural gas, propane, fuel oil, district heat, district cooling and exported energy. Figure 5 shows 2017 GHS participants energy use by type and Figure 6 shows this information with a logarithmic scale. Furthermore, Figure 7 shows the energy use by type across each peer group.

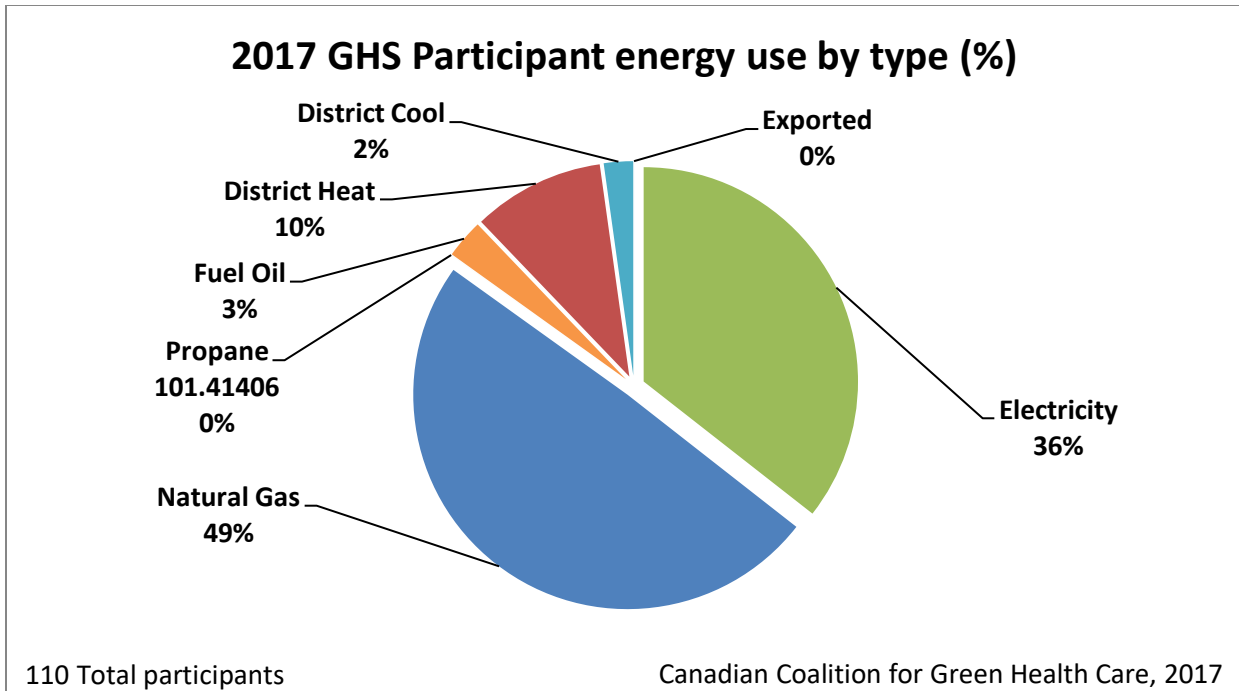


Figure 5 2017 GHS Participant energy use by type

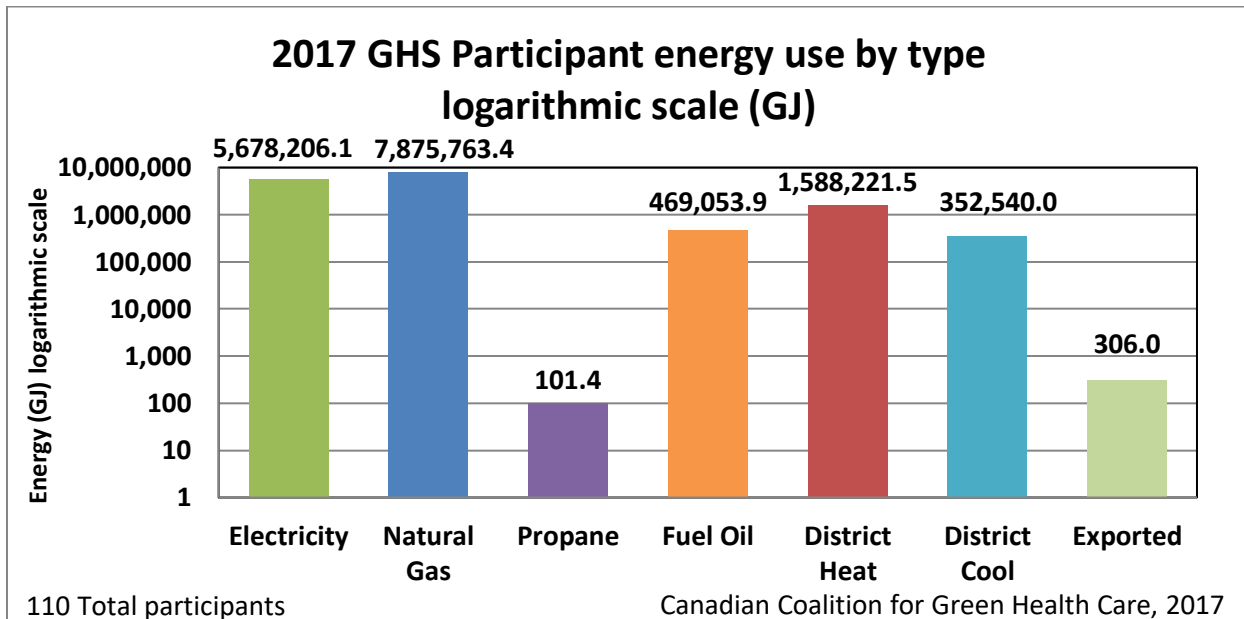


Figure 6 2017 GHS Participant energy use by type logarithmic scale

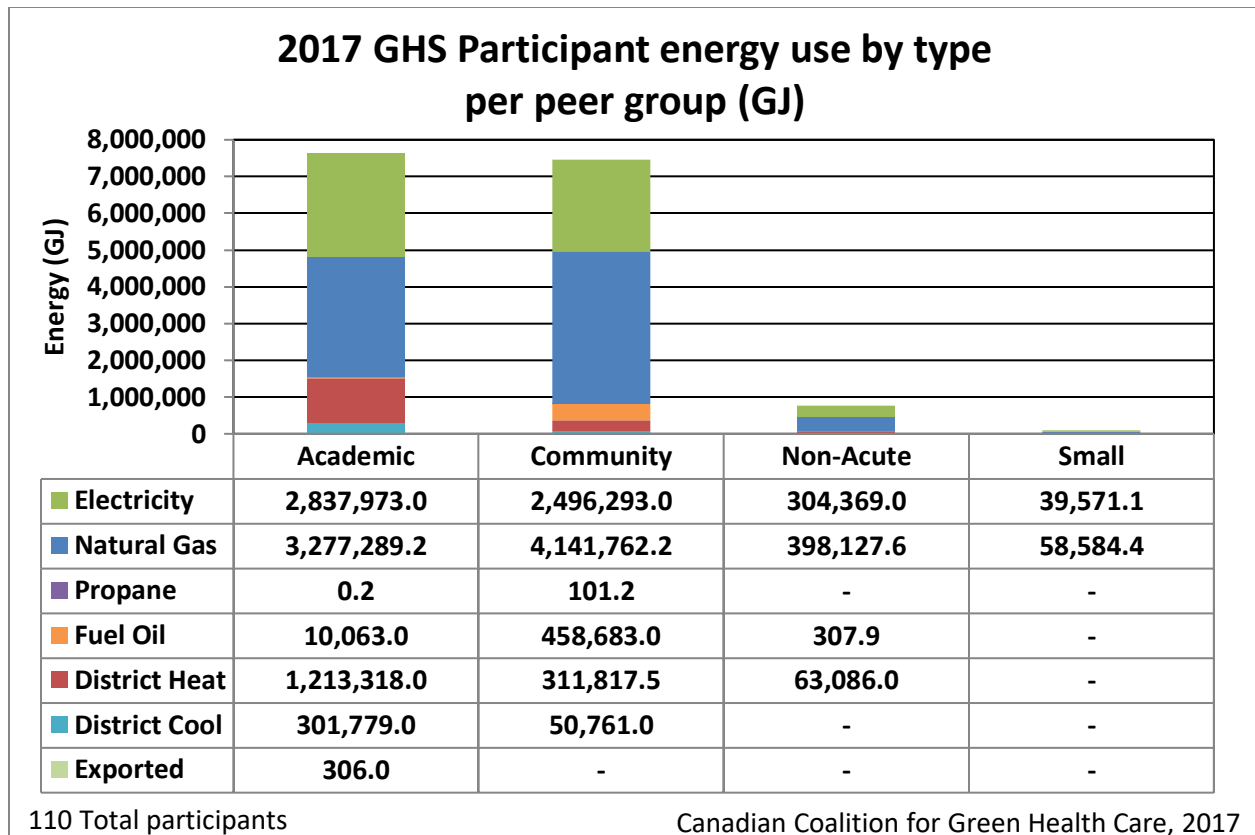


Figure 7 2017 GHS Participant energy use by type per peer group

Energy Use CO₂ Equivalencies

A comparison can be made between energy use and how it can be expressed in CO₂ equivalencies (CO₂e) within other sectors, such as, transportation, other forms of energy and housing. A calculation was made determining that 2017 GHS participants emitted 653,039 Metric Tonnes (MT) of CO₂e during the 2016 data collection year. Figure 8 depicts this amount in other forms through use of the NRCan GHG calculator referenced below.

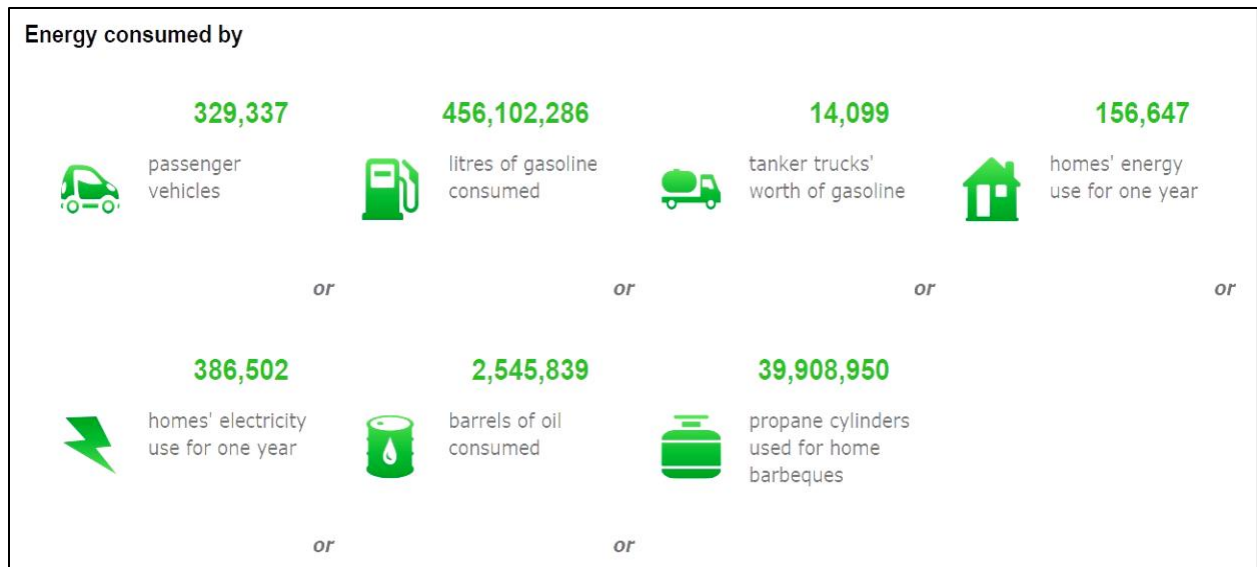


Figure 8 Energy CO₂E's

<http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/calculator/ghg-calculator.cfm>

Energy Use Intensity

Energy use intensity (EUI) captures a building's annual energy use as a function of its size. It is a measure that determines the building's energy performance and is useful for benchmarking and setting targets. EUI's are Environmental Performance Indicators (EPI) that hospitals can compare on an annual basis to see improvements. All participants in the 2017 GHS provided their 2016 energy data which was then converted to GJ so various energy types could be compiled and then divided by the reported floor area (m²) to calculate a final EUI (GJ/m²). The total average EUI across all hospitals was calculated to be 2.5 GJ/m²/year. These participants have also identified as one of four peer groups, therefore, the calculated EUI is best represented through comparing similar peer groups. Each hospital within a certain peer group would likely have similar facilities and medical services allowing this comparison.

Figure 9 captures the 2017 GHS participant average EUI by peer group (based on 2016 data), while Figure 10 shows the EUIs of participants over the last four years.

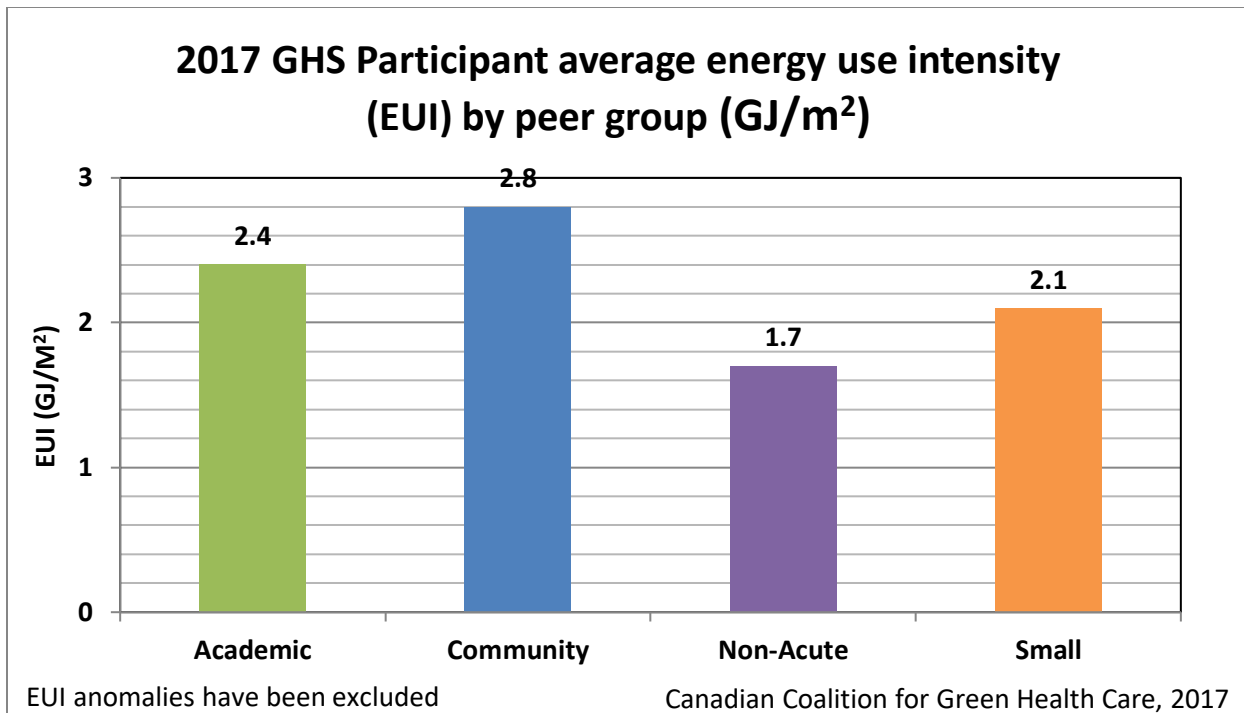


Figure 9 2017 GHS Participant average energy use intensity (EUI) by peer group (GJ/m²)

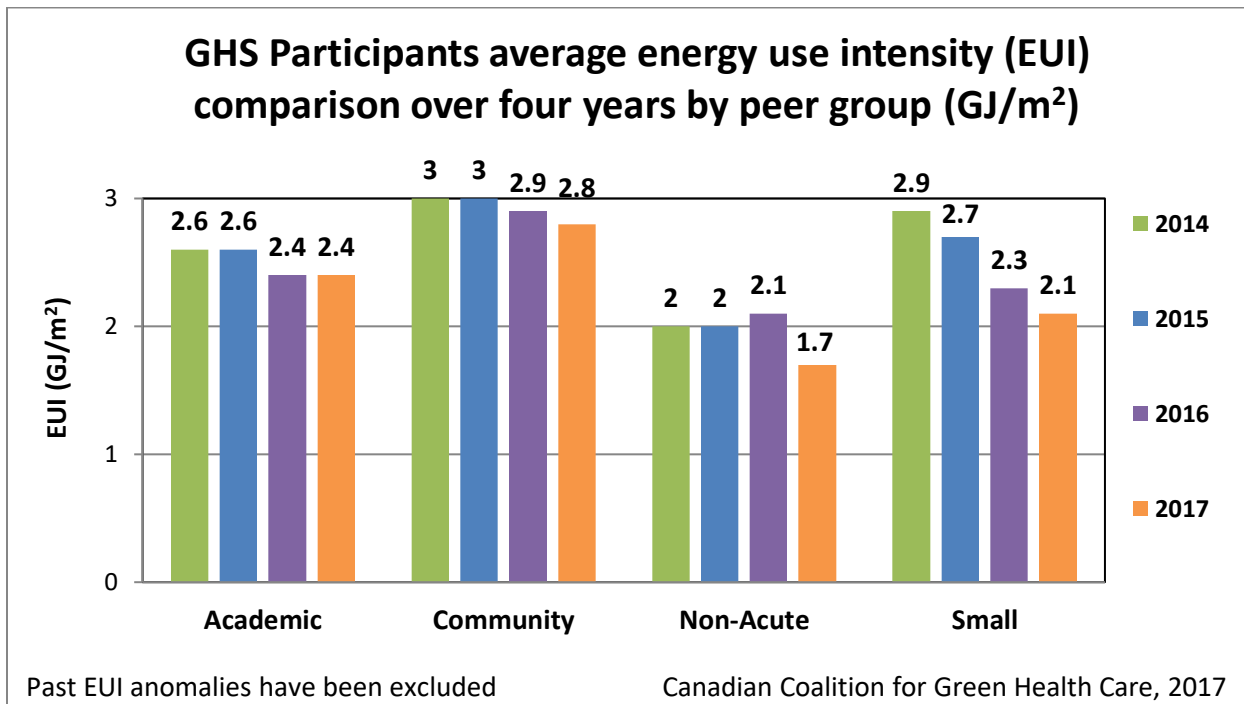


Figure 10 EUI comparisons over previous four years by peer group

Energy Initiatives and Innovations

There are numerous ways hospitals can incorporate energy conservation measures at their site, ranging from sustainable energy technologies to building automation. Below are some examples of what hospitals implemented in 2016. There has been an increasing trend of hospitals participating in the FIT and Micro FIT programs to utilize their vacant roof top space and install solar PV arrays. See below for other examples of initiatives hospitals have taken:

- Seven hospitals reported having rooftop solar arrays and are exporting electricity to local utilities to generate additional revenue.
- Two hospitals reported having wood chip biomass power generation onsite.
- One hospital reported having an onsite cogeneration plant consisting of two 7.5 MW turbines that are used primarily for peak shaving to lower global adjustment costs. It is also used as a backup for the site's electrical and steam systems.
- One hospital reported that they export excess steam and electricity to other neighboring sites and to the grid.
- One hospital utilized a variable air volume (VAV) system depending on occupancy as well as proximity sensors for their lighting.

Water

2017 GHS participants used 12,960,512 cubic metres of water in the 2016 calendar year across 110 hospitals, excluding any water volume used for grounds maintenance. For every unit of water used in a hospital, there is an energy requirement for pumping, treating and heating the water; thus, water conservation strategies directly improve environmental issues such as GHG emissions and water shortages, as well as economic issues such as expansion of water and wastewater infrastructures (Environment Canada, 2011). In the health care context, rigorous water conservation measures are often overlooked or viewed as unfeasible. In particular, the need to prioritize infection control and comply with relevant regulations can limit the use of water-efficient practices and technologies. As a result, health care facilities are often highly intensive water users (Hospital News, 2015).

The use of water in hospital facilities can be attributed to several sources pertaining to the building operation, amenities, hospital processes and services. Typically, the greatest consumption of water in hospitals is by amenities, plumbing fixtures and restrooms. Many solutions are available for more efficient fixtures, aerators, and low flow alternatives but are often not considered due to the high initial cost and relatively long payback period. Building side equipment also accounts for a great deal of water consumption such as cooling towers, boilers, and chillers. These large Heating Ventilation and Air Conditioning (HVAC) units are very costly, however do provide significant water and energy reduction when upgraded to higher efficiency. Aside from building requirements, within hospitals there are many water intensive processes and procedures such as cleaning and sterilization of medical equipment. Water reuse can be one strategy to mitigate water wastage from processes, utilizing grey water in other areas of the facility, where feasible. When looking at non-medical processes, some hospitals have their own laundry equipment onsite which often requires large amounts of water and energy to operate. Similarly, hospitals have kitchens which contain dishwashers and sinks, requiring large volumes of water annually. Housekeeping uses water to maintain floors and surface areas throughout the hospitals. Vehicle washing also utilizes large amounts of water. Lastly, some hospitals have irrigation systems that can consume various quantities of water seasonally.

Figure 11 illustrates the total water use by peer group of 2017 GHS participants based on 2016 data.

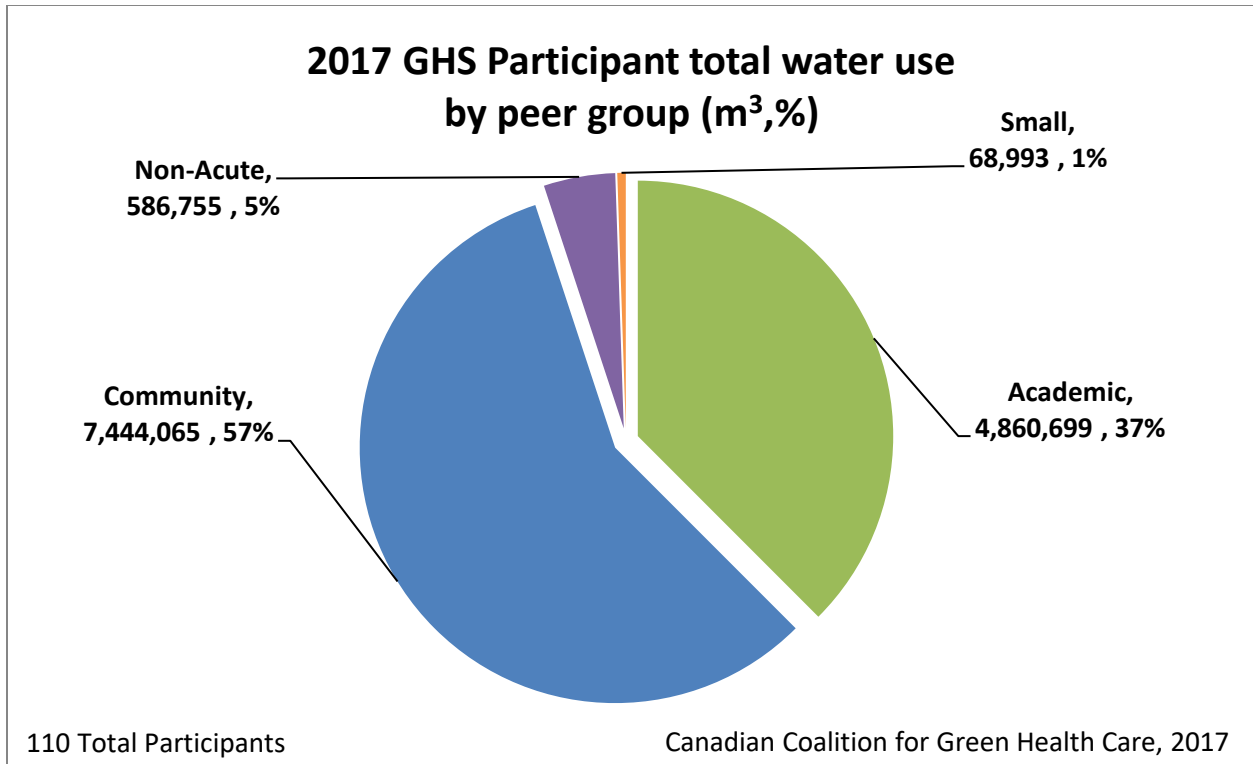


Figure 11 2017 GHS Participant total water use by per peer group

Water Use Intensity (WUI)

WUI is expressed as the hospital's annual water use as a function of its size. Like EUI, WUI is a measure that is used to determine the building's water performance and is useful for benchmarking and setting targets. WUI's are Environmental Performance Indicators that hospitals can compare on an annual basis to see improvements. All participants in the 2017 GHS provided their 2016 water data which was then converted to cubic metres and divided by the reported floor area (m²) to calculate a final WUI (m³/m²). The total average WUI across all hospitals was calculated to be 2.0 m³/m²/year. These participants have also identified as one of four peer groups, therefore, the calculated WUI is best represented through comparing similar peer groups. Each hospital within a certain peer group would likely have similar facilities and medical services allowing this comparison. Figure 12 highlights the average WUI's for each peer group for 2017 GHS participants based on 2016 data. Figure 13 shows the average WUI over the last four years by peer group.

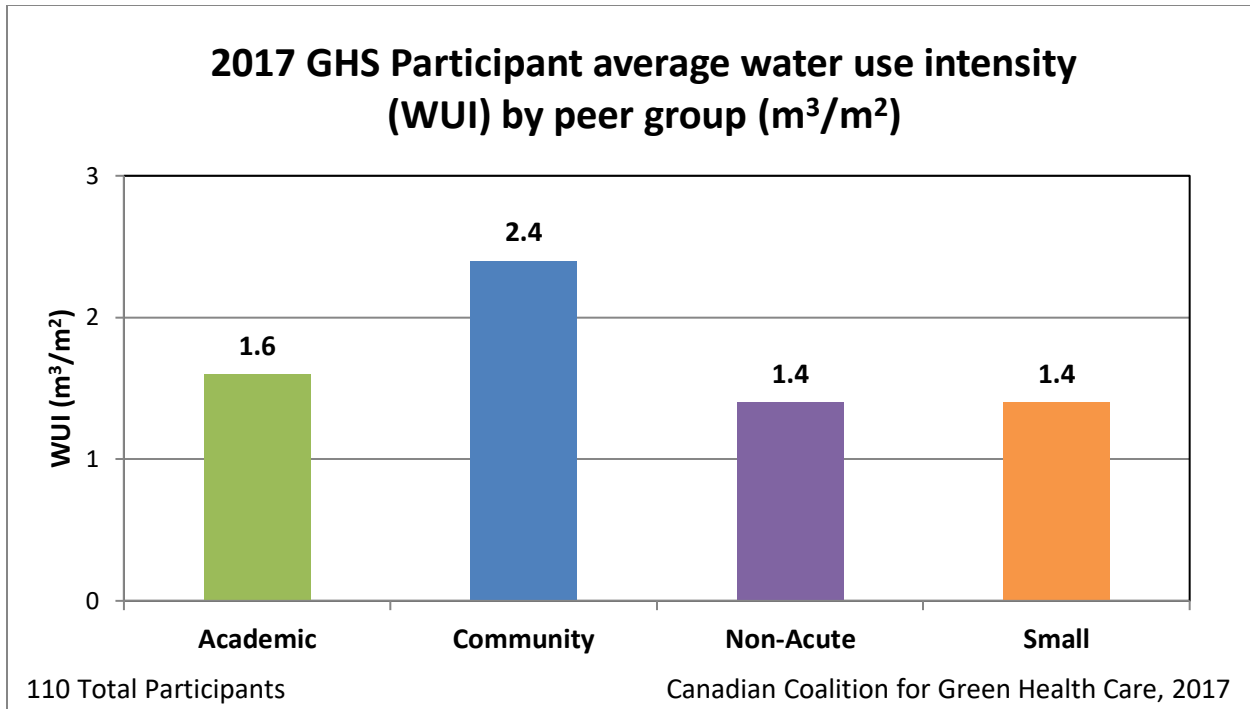


Figure 12 2017 GHS Participant average water use intensity by peer group

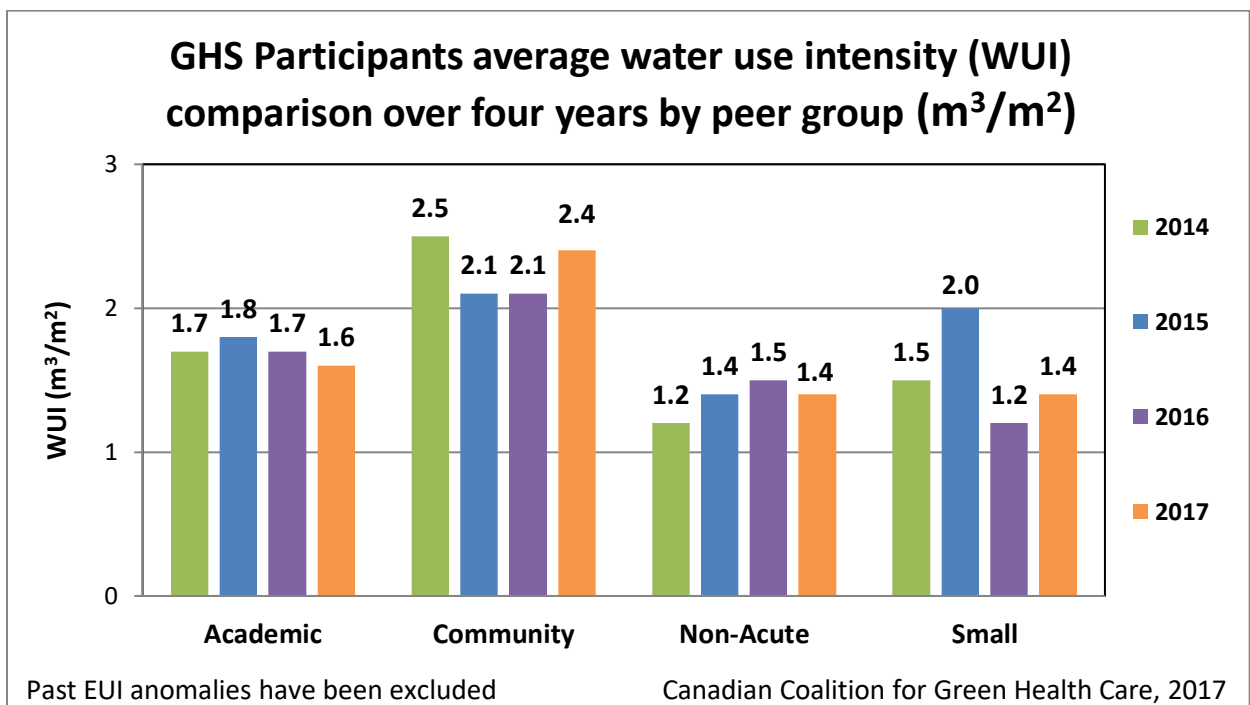


Figure 13 Average WUI per peer group over last four years

Water Conservation Measures, Initiatives and Innovations

Canada is widely seen as a nation rich in water resources, accounting for 8% of the world's renewable freshwater resources (McKittrick et al., 2018). A comparison of total annual water renewal rates versus total annual demand puts Canada in the top tier of countries whose gross renewable supplies far exceed its water-use demands. The perception of abundance masks other realities concerning the availability of these resources and discounts the significance of the mounting list of situations where sustainable-use concerns exist at the local and regional levels.

Hospitals are often the largest water users in a community. Inefficient and non-productive uses of water continue to drive avoidable expenditures and debt accumulation for the construction, expansion, operation and rehabilitation of municipal and private water infrastructure. They also result in excessive energy consumption and contribute to the inefficient use of other resources (Canadian Coalition for Green Health Care, 2019).

Presently, there are many viable solutions when it comes to water conservation in hospitals, which provide significant water saving potential and reasonable payback periods. To reduce water wastage in more hospitals across Canada, water conservation measures, initiatives and innovations need to be adopted. Unfortunately, no hospitals reported any information on any water efficiency improvements for the 2017 GHS. Some key examples of water conservation initiatives that can be applied to healthcare facilities are as follows:

- Toilet replacement, where low flow toilets can account for a great deal of water use reduction as they contain smaller volume tanks so less water is wasted with each use. A typical commercial toilet retrofit could consist of replacing a 13 L/flush fixture with a 6 L/flush fixture.
- Faucets replacement such as, low flow faucets, can account for a great deal of water use reduction as well, utilizing aerators that minimise the Liters/minute (Lpm).
- Motion sensors can eliminate the user interaction with the fixture and regulate usage. They are also a more sanitary option as there is no contact with a handle or tap.
- Low flow shower heads can dramatically reduce the amount of water being used while still providing adequate water flow. These are especially beneficial as hot water wastage has more embodied energy.
- Grey water if captured can be reused. There are many forms of water use within hospitals that generate fairly clean waste water that can be reused if diverted or captured. Grey water can be used in toilets to reduce the demand of fresh water as well as the amount of water going to the drain for treatment.

Waste

This section of the report outlines how conventional, non-hazardous waste, biomedical waste, and recyclable materials are managed through disposal, autoclave, recycling, green bin and other methods. 2017 GHS participants generated a total of 86,892 Metric Tonnes (MT) of waste in the 2016 calendar year across 110 hospitals. Of those participants, Ontario represented 84 hospitals, contributing 67,649 MT to the total waste shown above. The primary Environmental Performance Indicator (EPI) for waste is the waste diversion rate. Collectively, all GHS participants diverted 26,200.7 MT of recyclables and other forms of non-disposable waste from landfill allowing for a waste diversion rate of 30.2%. This indicator shows that recycling within GHS hospitals is working but needs to be greatly improved and further implemented to prevent more unnecessary recyclable materials from entering the landfill.

According to the waste management hierarchy, there should be an effort made towards avoidance of producing waste initially. If the waste must be generated then the three R's (Reduce, Reuse, Recycle) would take precedence, where reduction strategies should be targeted to lessen the amount being reused, recycled and disposed of. An example of a reduction strategy would be double sided printing or going paper less and relying on electronic documentation. Furthermore, hospitals should try to increase their reuse rate, such as reusing sharps containers or wood pallets. Lastly, recycling should occur to divert the waste from landfill, where hospital staff should have proper training on what goes into labeled recycling bins.

Waste Generation by Type

For all 2017 GHS participants, general non-hazardous waste amounted to 52,325 MT, and biomedical waste amounted to 8,367 MT, totaling 60,692 MT of waste that was sent to landfill or energy from waste (EFW) facilities for the 2016 data collection year. Collectively, all GHS participants diverted 26,200.7 MT of recyclables and other forms of non-disposable waste from landfill. Figure 14 displays the three primary waste categories (Non-hazardous, Biomedical, and Recycling) as a percent of the total waste generated. As mentioned in the Program Details section, the GHS participants were classified under Academic, Community, Non-Acute and Small peer groups. Figure 15 shows the total waste quantity divided between each peer group for the primary waste categories.

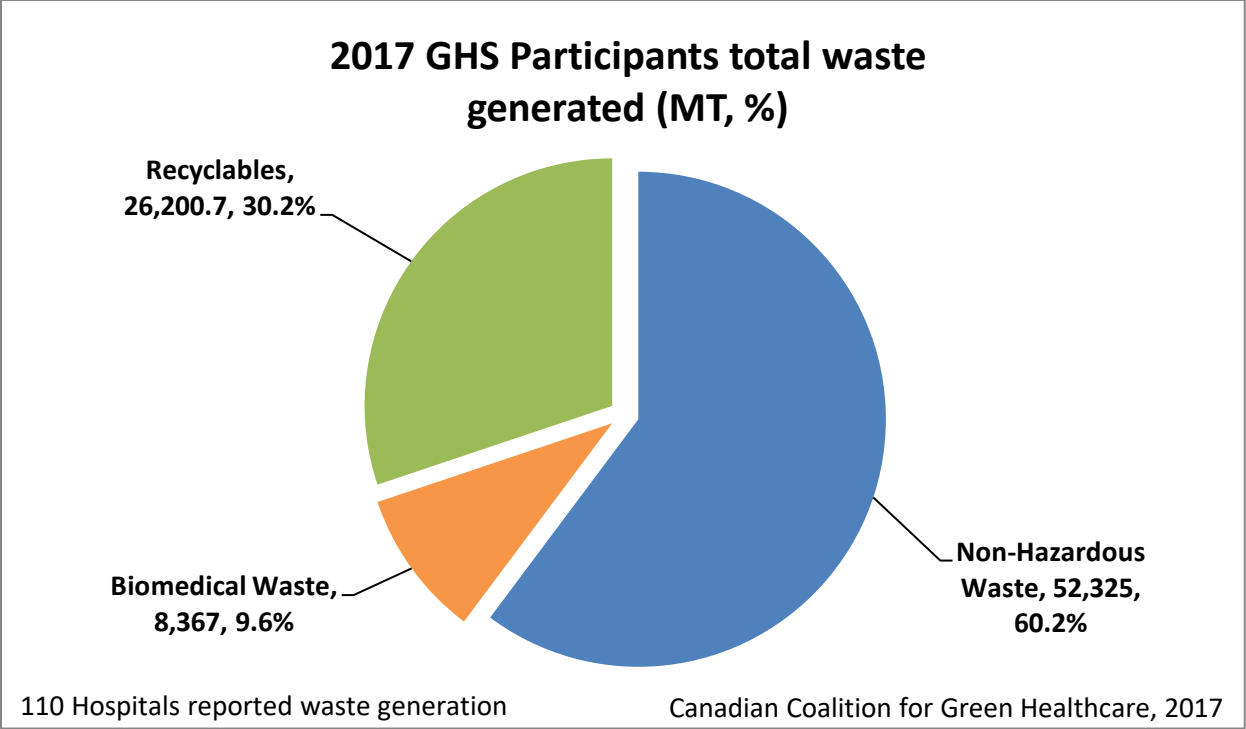


Figure 14 2017 GHS Participant total waste generated

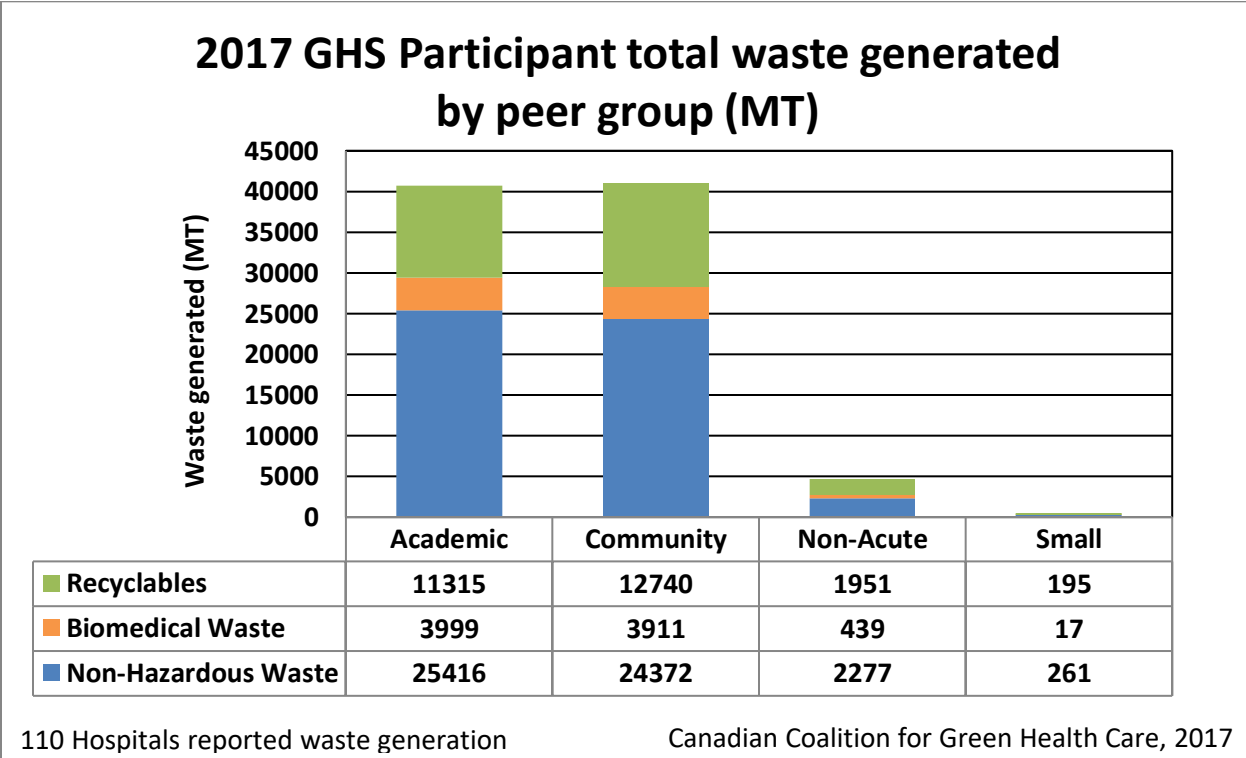


Figure 15 Total waste generated by peer group

Of the 26,200.7 MT of recycling reported by 2017 GHS participants (2016 data), a breakdown is shown below for the 12 categories within the questionnaire. Figure 16 shows this data as a percent of the total recycling across all participating hospitals.

1. 3,935.0 MT of blue bin recycling;
2. 3,355.0 MT of green bin (organics);
3. 4,457.0 MT of cardboard;
4. 9,677.0 MT of shredded paper;
5. 240.0 MT of electronics;
6. 231.2 MT of light bulbs/ballasts, and tubes;
7. 405.5 MT of scrap metal;
8. 168.0 MT of scrap wood;
9. 1,129.0 MT of scrap wood pallets;
10. 74.0 MT of toner cartridges;
11. 649.0 MT of batteries; and
12. 1,882.0 MT of other waste.

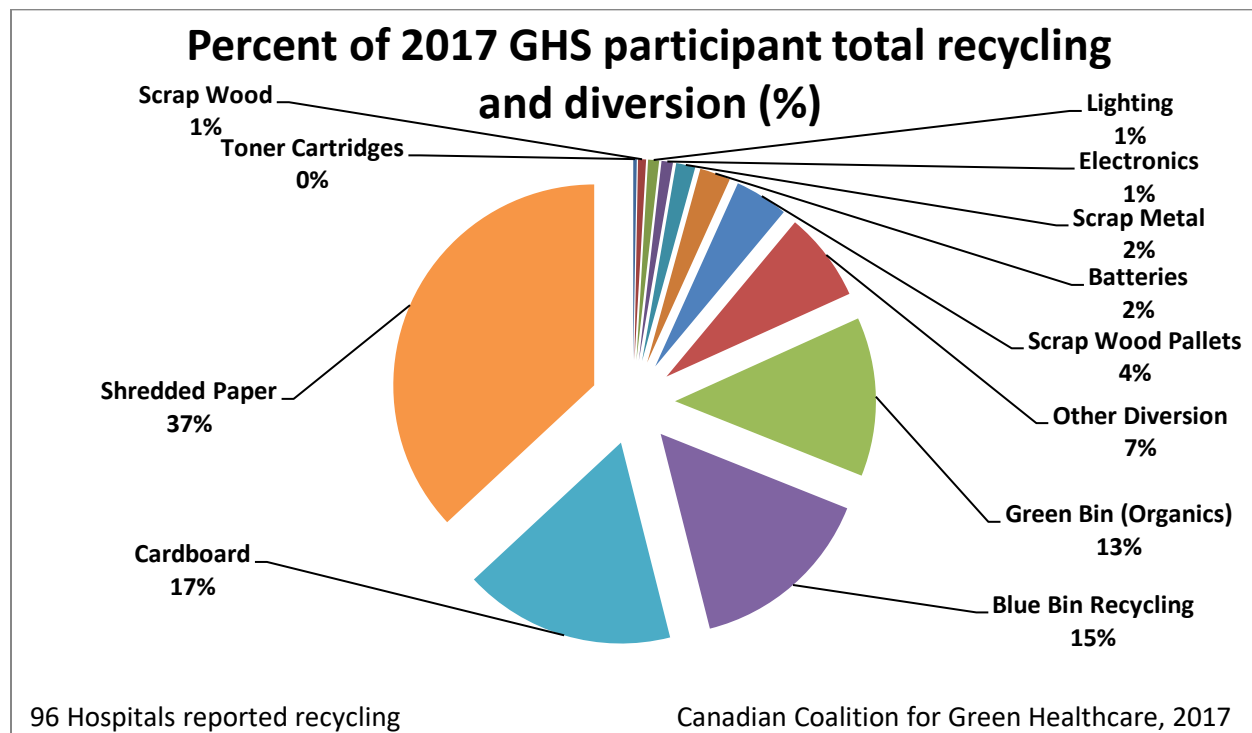


Figure 16 2017 GHS Participant total recycling and diversion

Waste Use Intensity

A benchmarking comparison can be made between the total waste generated by hospitals for the 2017 GHS's data collected (2016 data), based on similar peer groups. As the GHS participants were classified under four peer groups, a waste intensity comparison can be made by relating the waste for each peer group to the floor area, number of beds, inpatient days, and outpatient visits. With respect to waste management in hospitals, an EPI that is commonly used to analyse hospital waste generation is the comparison of MT to number of beds. The 2017 GHS participants had a total average waste intensity of 3.355 MT/bed. A comparison can be made to the previous year's 2016 GHS average waste intensity of 3.550 MT/bed, showing a decrease of 5.5%.

Table 3 represents the average waste intensity key performance indicators (KPI's) by peer group. Figures 17 to 20 display this information by average waste KPI's for each peer group.

Peer Group	Average Waste Intensity (MT/M ²)	Average Waste MT/ Bed	Average Waste MT/ Inpatient days	Average Waste MT/ Outpatient Visits
Academic	0.012	3.386	0.070	0.005
Community	0.018	3.728	0.100	0.005
Non-Acute	0.015	1.926	0.129	0.013
Small	0.008	2.097	0.009	0.002
All	0.016	3.355	0.091	0.006

Table 3 2017 GHS Participant average waste intensity KPI's by peer group

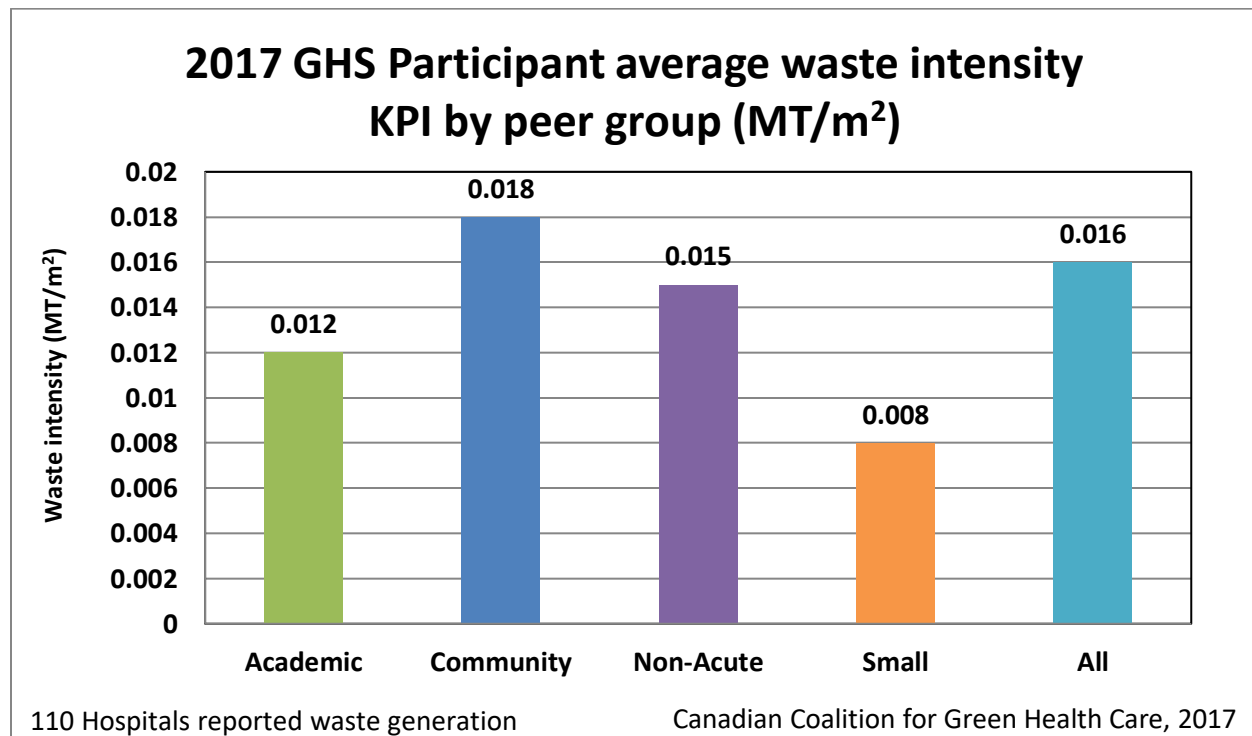


Figure 17 2017 GHS Participant average waste intensity KPI by peer group

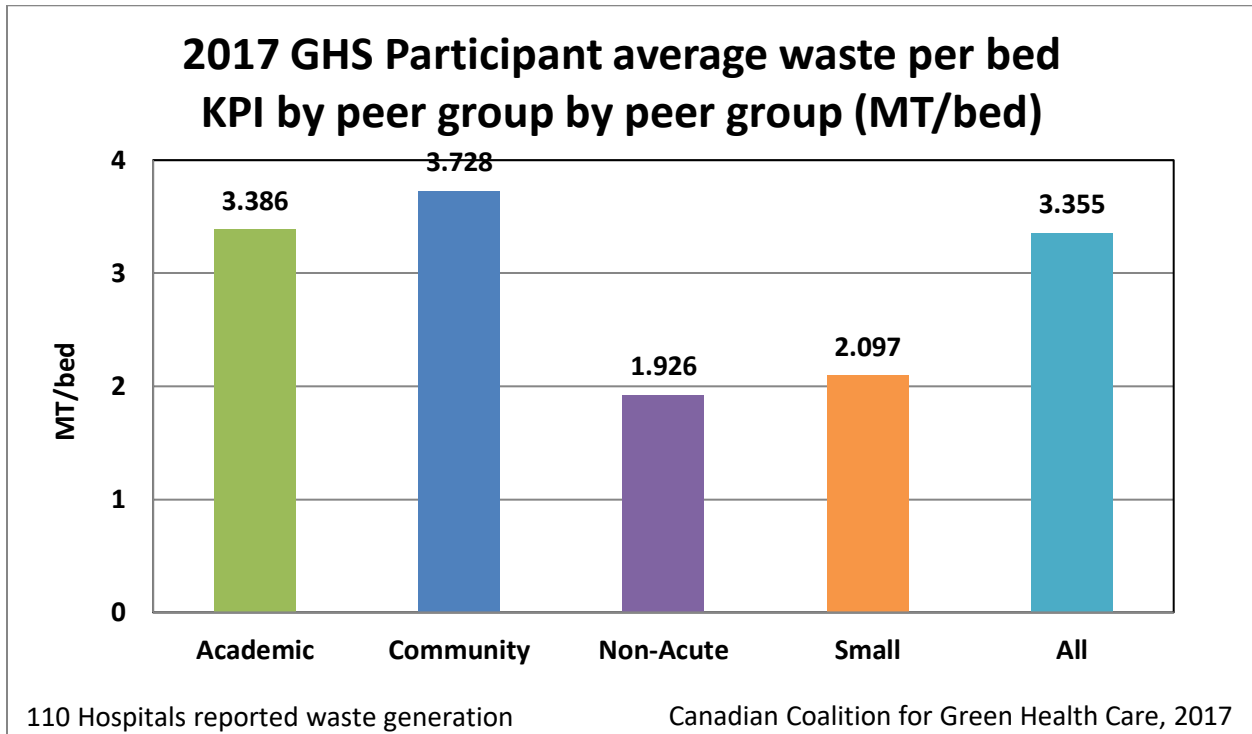


Figure 18 2017 GHS Participant average waste per bed KPI by peer group

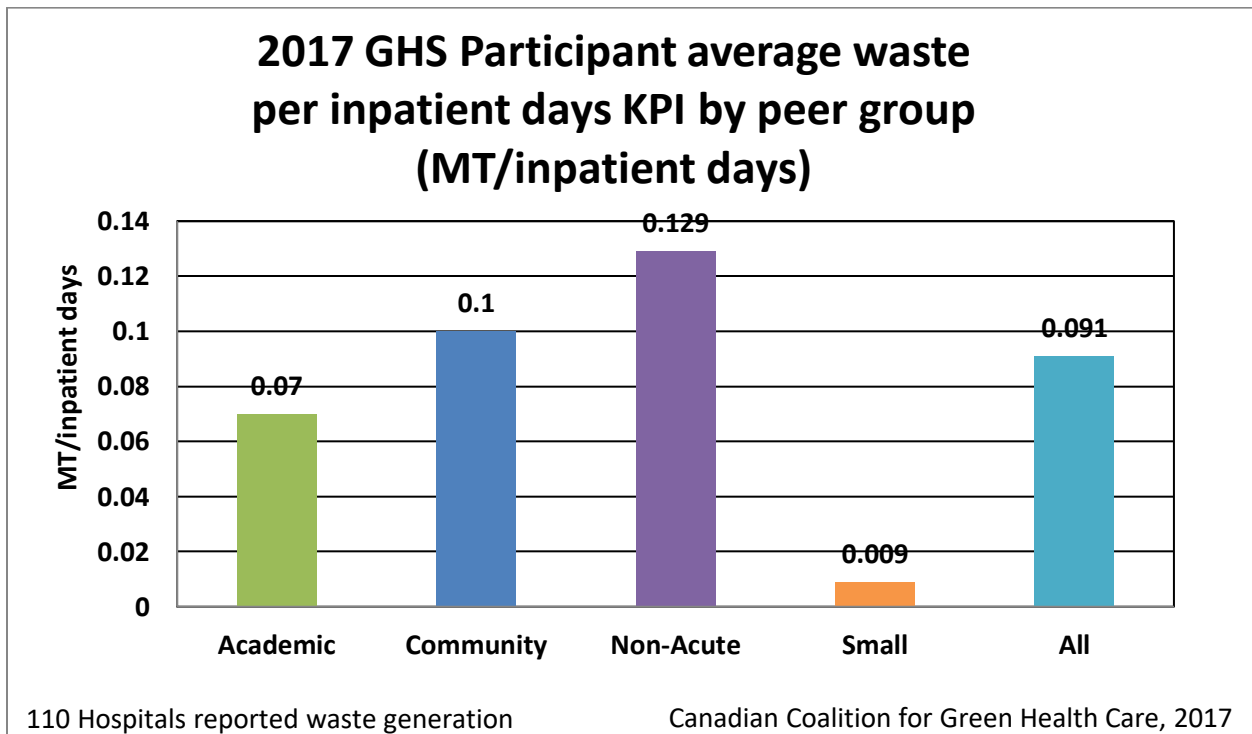


Figure 19 2017 GHS Participant average waste per inpatient days KPI by peer group

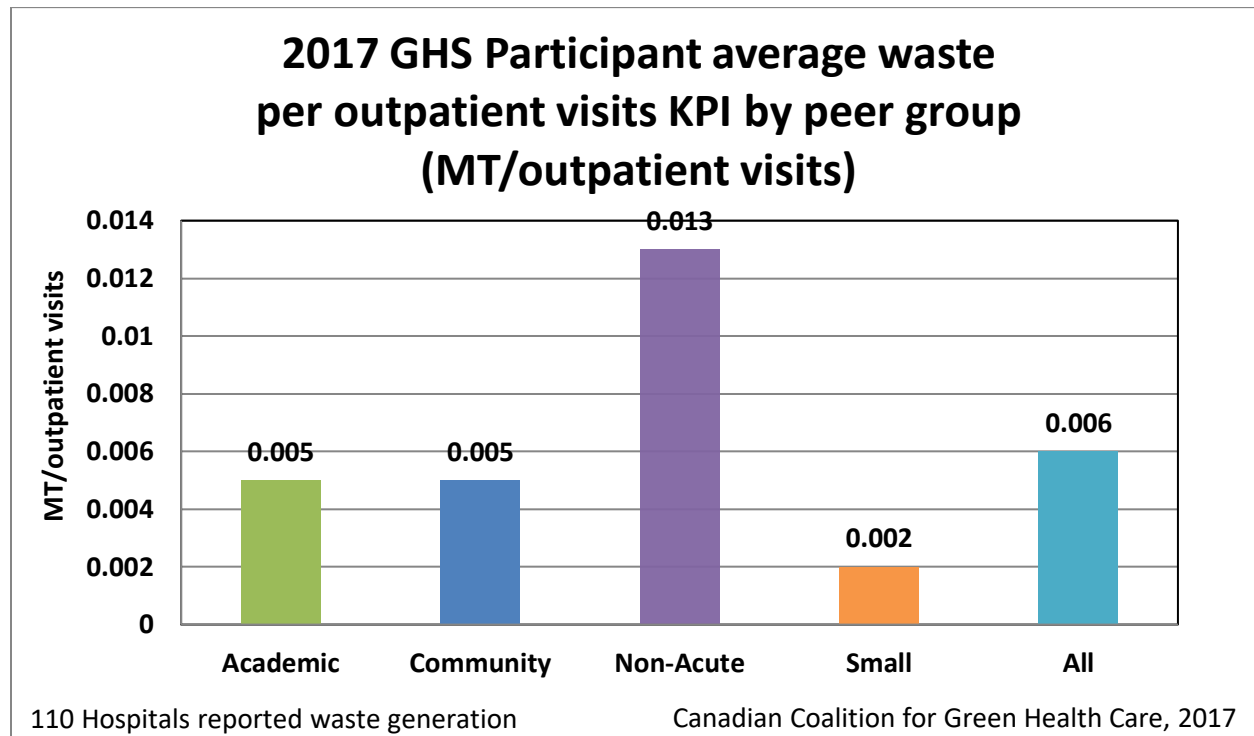


Figure 20 2017 GHS Participant average waste per outpatient visits KPI by peer group

Other Waste Reduction Initiatives

Many hospitals reported various forms of waste that were diverted from landfill under the “other” category from the GHS survey, totaling 1,882.0 MT. Although some of these waste diversion streams should have been imputed within the 12 recycling categories, they are displayed separately as received in the submissions. Many hospitals provided their data for sharps disposal within this category, therefore a new category was added to the current GHS. Pharmaceutical waste is incinerated and sharps are autoclaved and sent to a waste to energy incinerator (EFW) instead of landfill. Figure 21 represents the waste diversion streams as a percent of the total amount of the “other” category.

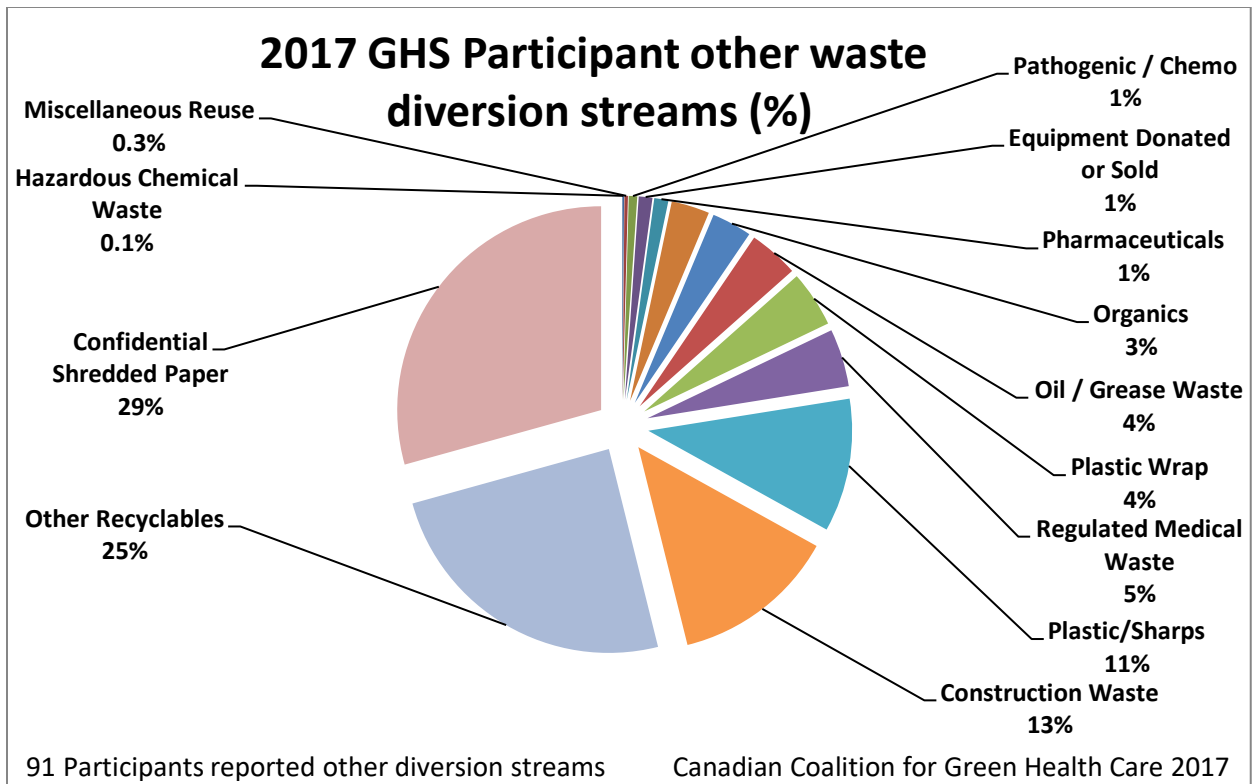


Figure 21 2017 GHS Participant other waste diversion streams

Pollution Prevention

Pollution Prevention is a concept that focuses on selecting less toxic and more environmentally preferred materials for use within the hospital, and considering the impacts of building construction on the environment and within the hospital. In the Green Hospital Scorecard, we measure pollution prevention because it aligns with the "Do no harm" philosophy in health care and recognizes that the health care system uses materials that are harmful to human health and the environment. Pollution Prevention consists of:

- Environmentally preferable purchasing, which aims to reduce an organization's environmental impact upstream through the purchase of products which have environmentally preferred qualities;
- Toxins management, which aims to reduce the downstream impacts caused by managing materials, products and services within hospital that are considered toxic to human health and environment, as well as the appropriate disposal of special and toxic wastes; and
- Sustainable construction/renovation practices, which aim to reduce the environmental impact of hospital sites through the selection and use of sustainable construction and renovation materials and engagement of sustainable construction/renovation practices.

Figure 22 shows the percent of participants that identified as having the following policies, targets and action plans for: Environmental preferable purchasing policy, Toxins management policy, and Sustainable construction/renovation policy. Many 2017 GHS participants who identified as having a policy also provided their policy name, however some did not provide a policy name. We intend on following up with the hospitals in next year's GHS to attain policy names and URL's or attachments of the subsequent policies.

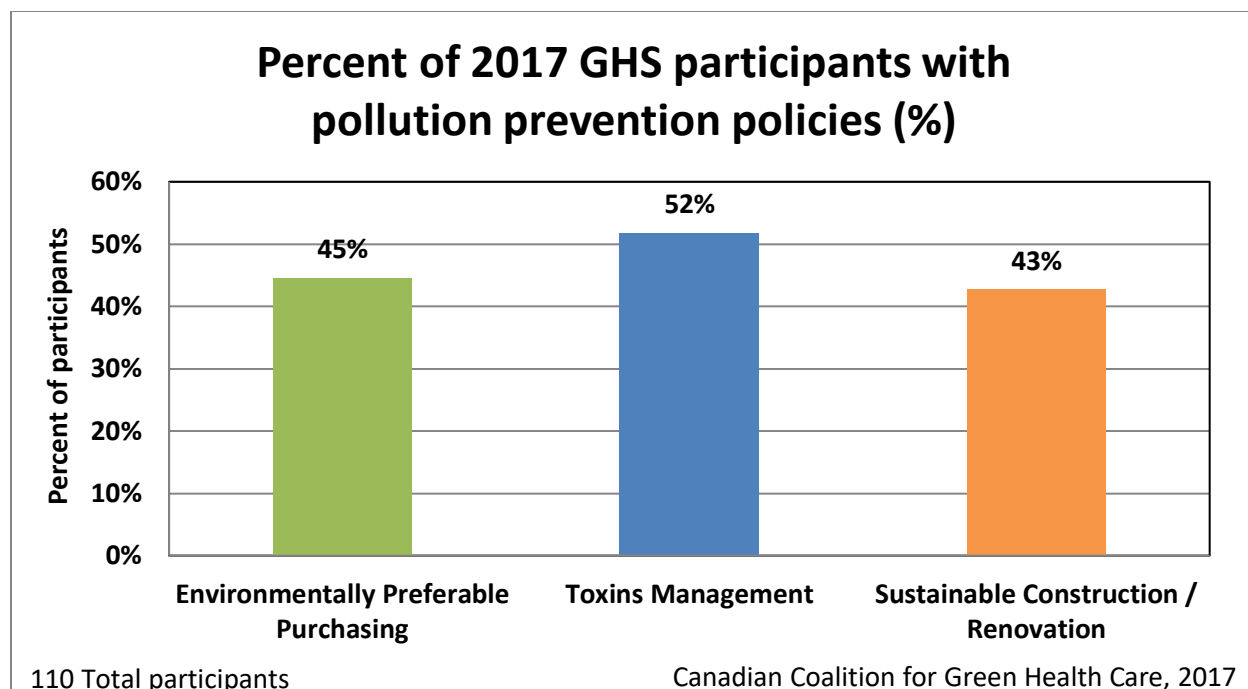


Figure 22 Percent of 2017 GHS participants with pollution prevention policies

Pollution Prevention Initiatives

Many hospitals are striving to improve preferable purchasing, toxins management, sustainable construction/renovation and other green initiatives. Here are some of the responses from 2017 GHS participants for pollution prevention initiatives in the 2016 data collection year.

Environmentally Preferable Purchasing initiatives:

- Two hospitals are latex free
- Strive to buy "green" cleaning products so as to not hurt the environment.
- Latex free building materials, materials with recycled content, products made from renewable resources, energy efficient lighting and mechanical systems, low-flow water fixtures etc.
- Latex, PCB and mercury free group of facilities.
- Renovation, where subcontractors have sustainable and environmentally friendly clauses in the contract pertaining to environmental choice programs.

Toxins Management initiatives:

- Six hospitals have created ways of reducing their hazardous chemical usage by the following ways: ozonated water usage for cleaning, anesthetic gas collection, reviewing MSDS's and developing inventories of hazardous chemicals to minimise disposal.
- Two hospitals are reducing toxins in their waste water through analyzing effluent samples and capturing harmful materials that may be discharged to the sewer.
- One hospital has added a new sharps collection program during the data collection year.

Sustainable Construction/ Renovation initiatives:

- Two hospitals reported attaining LEED silver certification generating substantial energy savings through implementing upgrades such as: lighting controls and sensors, efficient boilers and water heaters, locally sourcing low volatile organic compounds (VOC) materials, using building materials with recycled content or FSC wood, and diverting construction waste from landfill.
- Four hospitals require new construction projects and demolition to reuse or recycle construction waste materials, achieving up to 80% recycling rate.
- Four hospitals reported completing retrofits to building systems including: building envelope, lighting, automation, ventilation, kitchen exhaust, VFD's, AHU's, boilers, and closed loop water cooling. These have vastly improved overall efficiency.
- One hospital is installed linoleum flooring throughout the hospital which is a natural flooring product associated with sustainability, durability, high quality and innovative design as well as low VOC paint throughout all suites.
- Two hospitals have implemented a green roof that supports plant life for environmental, social and economic benefits.
- One hospital has integrated drought free grass that does not need to have a watering system in place.

Other Pollution Prevention Initiatives:

- Two hospitals have conducted facility audits involving inefficient lighting and outdated computers.
- One hospital has implemented a new shredding initiative which will shred and recycle all white paper in order to improve confidential information security.
- One hospital is committed to reducing their carbon footprint by 5% over 5 years.
- One hospital reviews manufacturer recommendations for preventative maintenance on equipment to maintain efficiency while being conscious of the environment.
- One hospital completes the P2 Pollution Prevention Plan required by the City of Toronto every 3 years.
- One hospital has sent out staff e-mails reminding individuals to conserve energy.
- One hospital is utilising stickers on various light switches to remind occupants to conserve.
- One hospital offers a smart Commute program promoting alternative forms of transportation, and carpooling.
- One hospital runs two buses to transport staff and patients between all three sites.
- One hospital's security uses hybrid vehicles, and ground patrols on bike.

Corporate Leadership, Planning and Management

Corporate leadership, planning and management measure an organization's commitment to an environmentally sustainable culture and integration of green objectives into corporate planning and regular business. The presence or absence of a policy is a good way to assess corporate commitment rather than through staff commitment. It focuses on the following three areas:

1. Leadership: A measure of corporate commitment to environmental sustainability as gauged by the presence of formalized organization-wide support and outreach for green initiatives;
2. Planning: A measure of a hospital's progress in environmental planning and target-setting with action plans; and
3. Monitoring & Management: A measure of a hospital's commitment to tracking and monitoring regular resource expenditures.

Corporate Leadership

The 2017 GHS measures corporate leadership qualitatively, through the presence of formal commitments, corporate-level programs, and policies that support green initiatives within hospitals. One hundred and ten (110) participants provided responses to these questions for policies, targets and action plans which were in place during the 2016 data collection period.

Hospitals with corporate commitment to green initiatives included:

- 60% have a corporately recognized environmental mandate or commitment;
- 60% have an executive champion accountable for the overall hospital environmental strategy;
- 38% have a full-time employee dedicated to environmental initiatives; and
- 74% have a green team as shown in Figure 23 below.

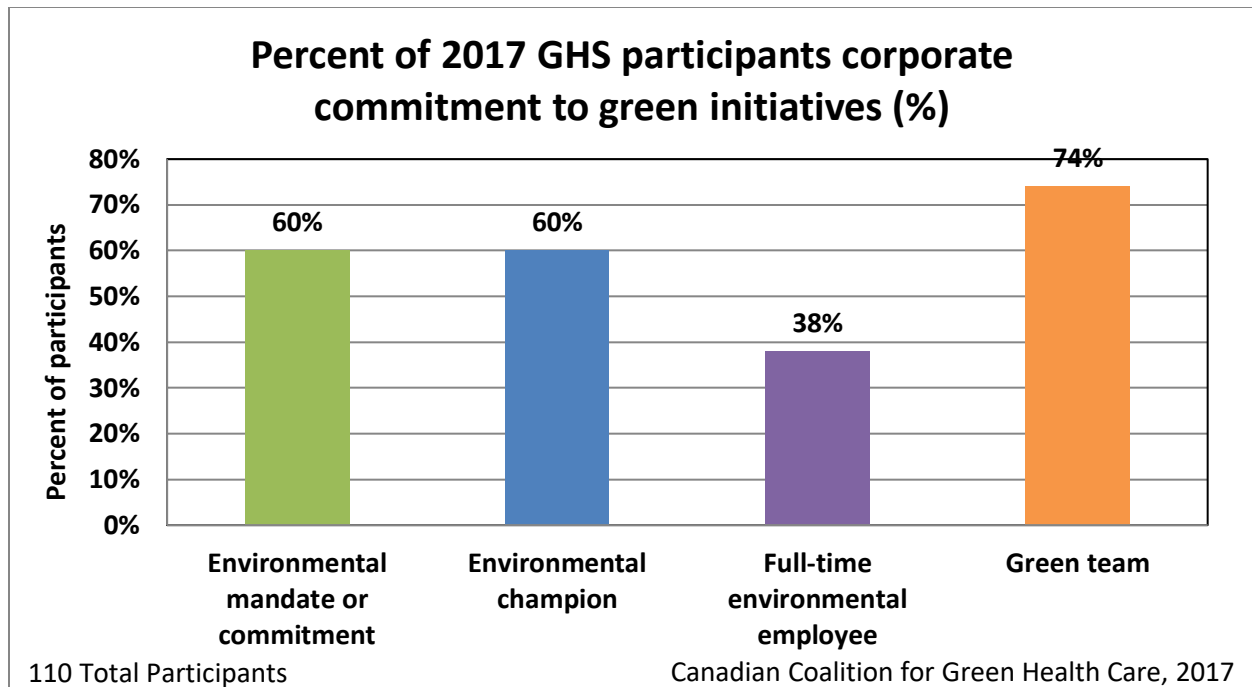


Figure 23 Percent of 2017 GHS participants corporate commitment to green initiatives

Most participating hospitals offer staff engagement and outreach programming in one or more areas:

- 65% in energy conservation;
- 40% in water conservation ;
- 75% in waste management; and
- 68% in green events such as Earth Day as shown in Figure 24 below.

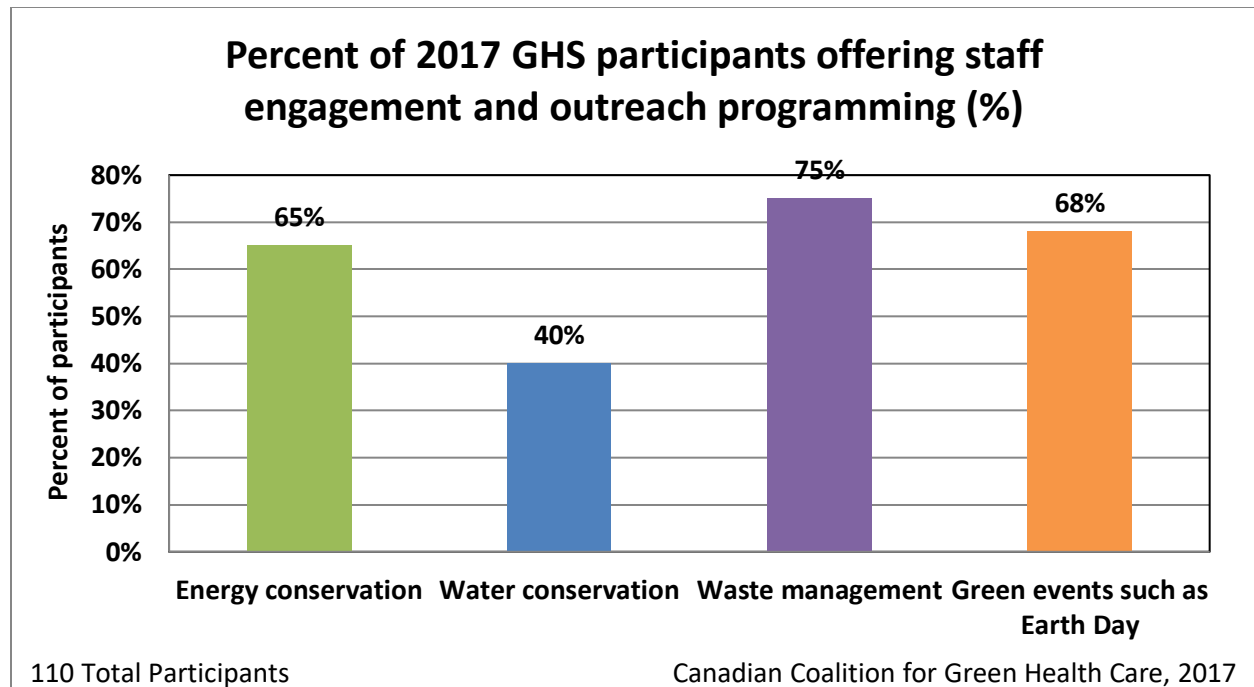


Figure 24 Percent of 2017 GHS participants offering staff engagement and outreach programming

Many participating hospitals provide a budget for staff engagement and outreach programming in one or more areas:

- 49% in energy conservation;
- 42% in water conservation;
- 43% in waste management; and
- 52% in green events such as Earth Day as shown in Figure 25 below.

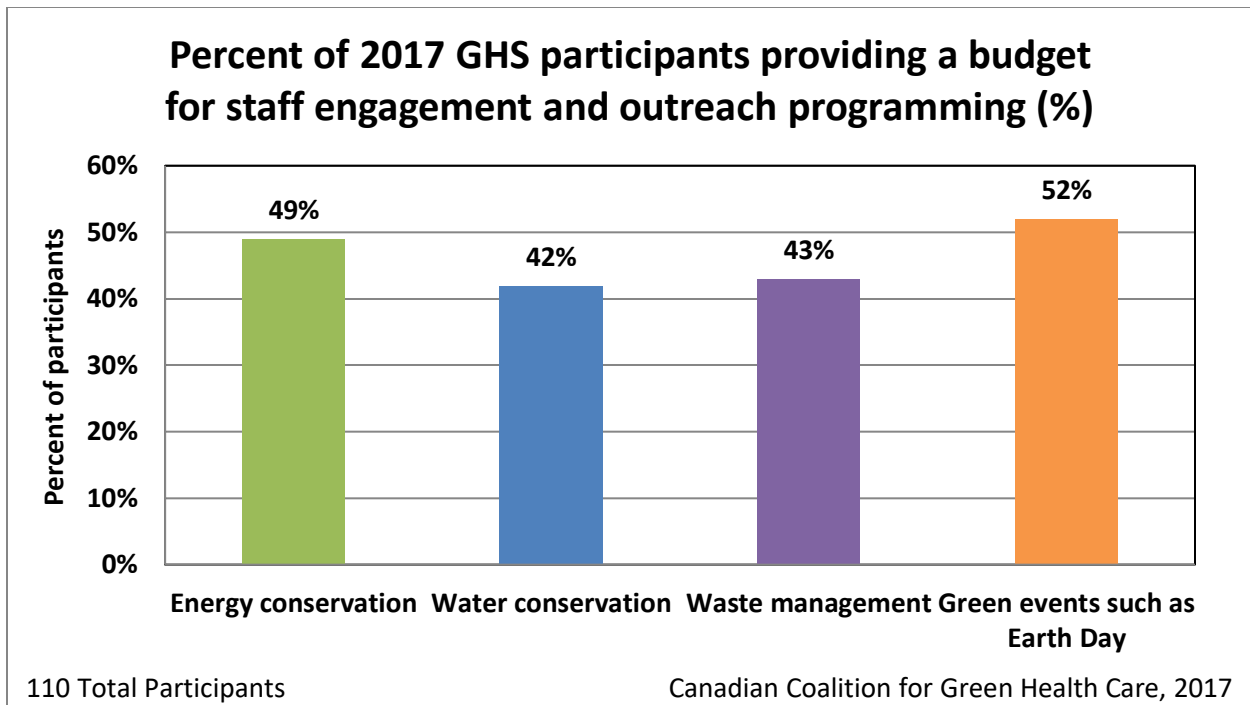


Figure 25 Percent of 2017 GHS participants providing a budget for staff engagement and outreach programming

Planning

A hospital's corporate commitment to environmental performance improvements include creating policies, setting clearly defined targets and having an action plan in place stating how that target will be achieved. Through the 2017 GHS, 110 participants provided responses to questions for policies, targets and action plans which were in place during the 2016 data collection period for energy, water and waste.

Energy Conservation Policies, Targets and Action Plans

The purpose of an energy conservation policy is to clearly define the goals and objectives for hospitals in respect to their energy reduction. Through adopting policies, targets and action plans that outline energy conservation strategies, procedures, and best practices and integrating them from the managerial to the operational level, hospitals can achieve energy efficiency and set a strong, financial foundation. Hospitals with an appointed committee of energy champions, dedicated to green initiatives (i.e. Green Team), can provide leadership in creating these energy conservation policies. Each hospital should also have an Environmental Management System (EMS) that starts off with developing policies and procedures so that hospital staff can follow them as a template for energy conservation. Hospitals can see a reduction in their GHG emissions and create a healthier environment for staff, patients and the community, while setting an example of good environmental stewardship. With many hospitals constantly expanding, optimization of energy consuming equipment can drastically reduce building system loads and energy costs.

Figure 26 displays the percent of 2017 GHS participants with energy conservation policies, targets and action plans in place during 2016.

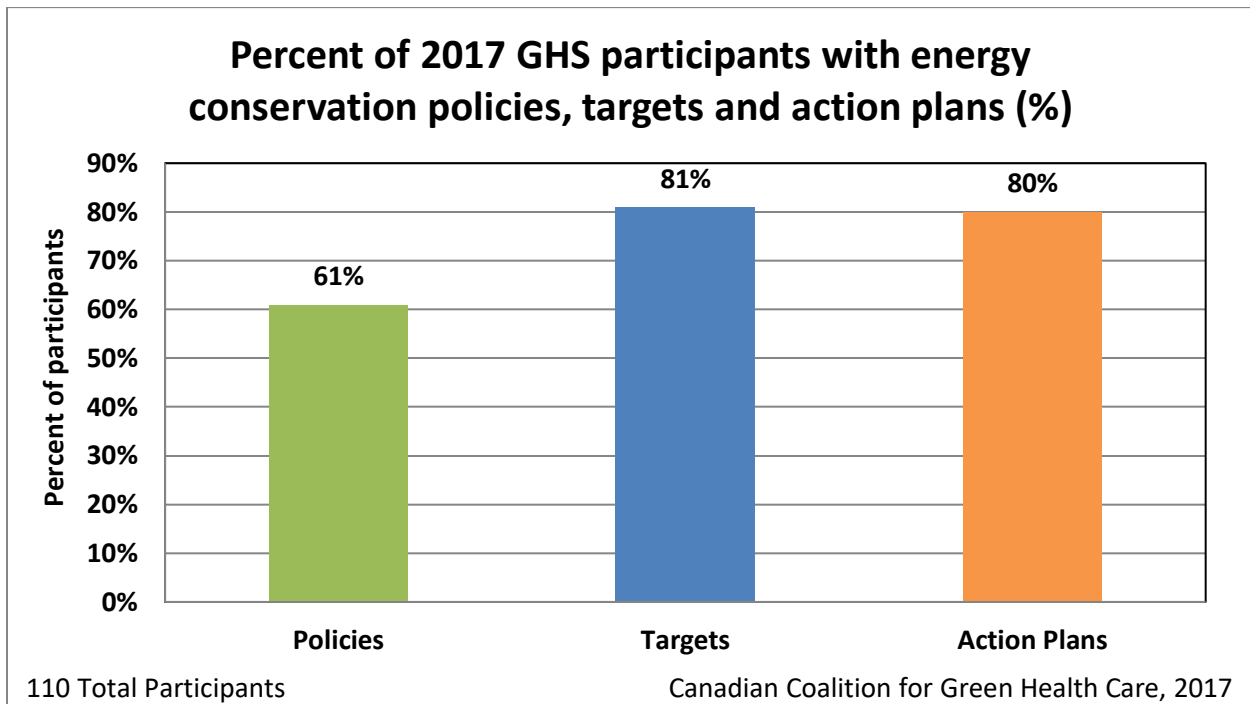


Figure 26 Percent of 2017 GHS participants with energy conservation policies, targets and action plans

Water Conservation Policies, Targets and Action Plans

The purpose of a water conservation policy is to clearly define the goals and objectives for hospitals with respect to their water reduction. Through adopting policies that outline water conservation strategies, procedures, and best practices and integrating them from the managerial to the operational level, hospitals can achieve water efficiency and set a strong, financial foundation. Hospitals with an appointed committee of water champions, dedicated to green initiatives (i.e. Green Team), can provide leadership in creating these water conservation policies. Each hospital should also have an Environmental Management System (EMS) that starts off with developing policies and procedures so that hospital staff can follow them as a template for water conservation. Once this is achieved, hospitals can set their targets and action plans annually. With many hospitals constantly expanding, optimization of water consuming equipment can drastically reduce building system loads and water and energy costs.

Figure 27 displays the percent of 2017 GHS participants with water conservation policies, targets and action plans in place during 2016.

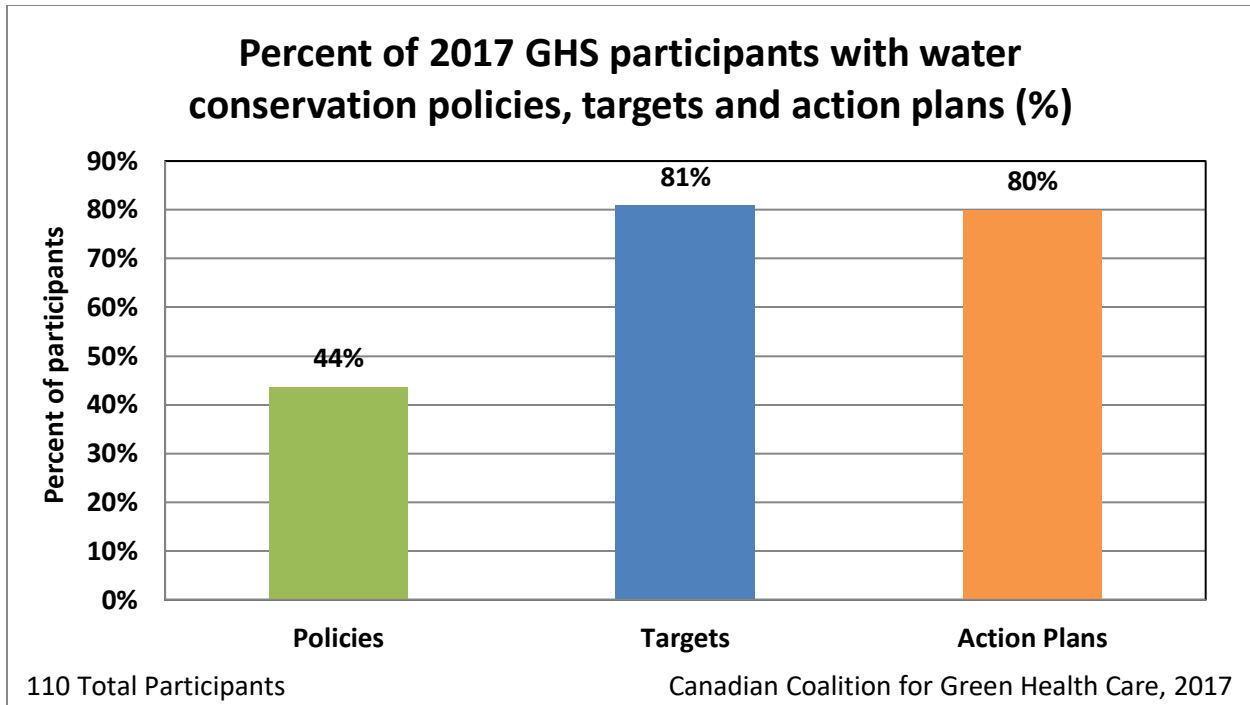


Figure 27 Percent of 2017 GHS participants with water conservation policies, targets and action plans

Waste Management Policies, Targets and Action Plans

The purpose of a waste management policy is to clearly define the goals and objectives for hospitals with respect to their waste reduction, reuse and recycling. Through adopting policies that outline waste management strategies, procedures, and best practices and integrating them from the managerial to the operational level, hospitals can achieve this and set a strong, financial foundation. Hospitals with an appointed committee of waste management champions, dedicated to green initiatives (i.e. Green Team) can provide leadership in creating these waste management policies. Each hospital should also have an Environmental Management System (EMS) that starts off with developing policies and procedures so that hospital staff can follow them as a template for waste management.

Figure 28 displays the percent of 2017 GHS participants with waste management policies, targets and action plans in place during 2016.

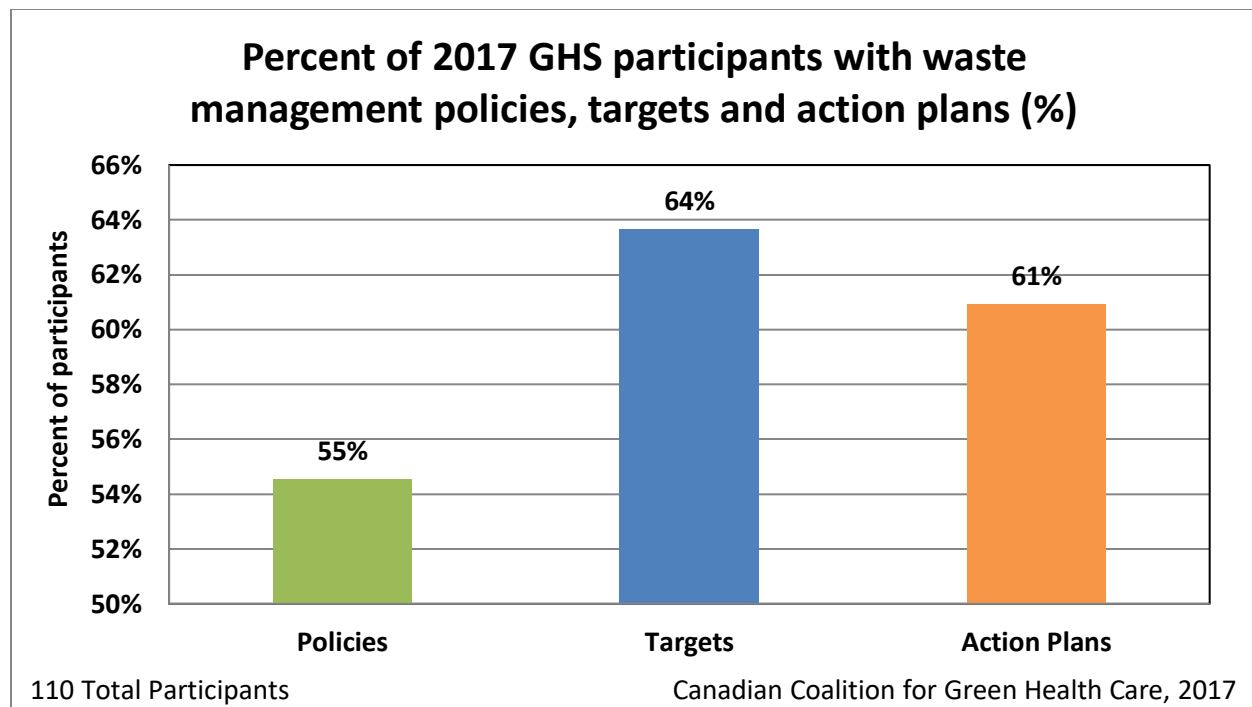


Figure 28 Percent of 2017 GHS participants with waste management policies, targets and action plans

Monitoring and Management

For the 2017 GHS, participants identified how often they are tracking and reviewing their utility billing data. This data revealed that 95% of hospitals are tracking their data monthly.

Other Corporate Environmental Initiatives

- A good way to improve environmental initiatives is through discovering how you are currently performing through auditing of energy, water and waste. Five hospitals have conducted audits to further benchmark and monitor building performance.
- The next step is retrofitting systems that could benefit through upgrading to higher efficiency. Seven hospitals have completed retrofits to building systems such as lighting, air handling units (AHU's), pumps and variable frequency drives (VFD's).
- Two hospitals have received recognition through LEED certification from the Canadian Green Building Council (CaGBC). Upgrades that qualified them for this recognition include, high scores in innovation and design, exceeding building code for performance, rain water collection and water reuse systems, high efficiency HVAC systems with heat recovery, modern lighting and windows incorporated, recycled content and locally sourced building materials. All of this provided an extremely low energy use intensity for these sites.
- Three hospitals utilise the internet to promote sustainability, environmental awareness and for training staff on green practices.
- Three hospitals are making a greater effort to follow the 3 R's, reducing paper and expanded polystyrene (EPS) waste, reusing office supplies before purchasing new ones, and implementing waste programs to increase recycling.
- Three hospitals are involved with the community on various efforts such as earth day awareness, garbage pickup efforts and local procurement of food products.
- One hospital has organised a transportation strategy to reduce commuting through carpooling and bicycle storage facilities.

Conclusion

The 2017 GHS identified environmental data from a wide range of North American Health Care providers. This 5-year initiative uses a holistic approach towards measuring inputs and outputs within hospitals. The highest overall score was awarded to St Michael's Hospital, the highest energy score went to Parkwood Institute, the highest water score was for St Joseph's Health Care, London, and the highest waste score was given to Muskoka Algonquin Healthcare - South Muskoka Memorial Hospital.

The 2017 GHS reports on environmental hospital data for the 2016 calendar year showed the total energy use across all participants (110 hospitals) to be 15,963,580 GJ. The total average EUI across all hospitals was calculated to be 2.5 GJ/m²/year. Participants used 12,960,512 cubic metres (m³) of water in the 2016 calendar year with a total average WUI of 2.0 m³/m²/year. Hospitals generated a total of 86,892 Metric Tonnes (MT) of waste, of which, 26,200.7 MT were recyclables and other forms of non-disposable waste were diverted from landfill. The 2017 GHS participants had a total waste diversion rate of 30.2% and an average waste intensity of 3.355 MT/bed.

The 2017 GHS reported on qualitative data as well from the pollution prevention and corporate leadership, planning and management sections of the report. Hospitals are consistently increasing their green initiatives in the following areas: preferable purchasing, toxins management, sustainable construction/ renovation, energy conservation, water conservation and waste management policies, targets and action plans.

Appendices

Appendix A Green Procurement Checklist

Here is an example of a possible procurement checklist when purchasing environmentally friendly products.

Green Procurement Checklist

One hospital asks all suppliers general questions pertaining to Environmental Issues, including:

- Any initiative taken by the supplier to minimize the amount and weight of packaging used for any goods supplied or used in providing the Services.
- Information on the ability to recycle any packaging and goods supplied or used in providing the services and other information on recycling. Goods that are recyclable include paper, cardboard, glass bottles, metal cans, #1 plastic, (polyethylene terphthalate), #2 plastic (high density polyethylene), hard #4 plastic (low density polyethylene) and #5 plastic (polypropylene).
- Information regarding any opportunity for the purchasers to return all or part of the goods and packaging used during the delivery of the services at no charge to the purchasers.
- A list of the “subject pollutants” listed under the applicable municipal sewer-use bylaw contained within the goods that the proponent will be using in delivering the services to the purchasers. This includes the quantity and type of hazardous materials contained in the goods if such information is not proprietary, and the federal material safety data sheets (MSDS) in accordance with the Workplace Hazardous Materials Information System (WHMIS).
- The overall environmental effect of any goods and packaging supplied in delivering the services, including, but not limited to:
 - whether the goods or the services are certified under Canada’s Environmental Choice Program, ENERGY STAR® program, or any other “eco-labelling” program;
 - a list of materials which are used in any goods or packaging supplied or used during the delivery of the services, including recycled content;
 - unit weights of any goods and packaging material supplied or used in the delivery of the services; and
 - whether the proponent is ISO 14001 certified.
- Provision of a summary of the environmental initiatives undertaken by the proponent.

One hospital has an extensive list of all products used by all sites, and uses a colour-coding system to grade products based on how environmentally friendly they are. If a product is third-party environmentally certified, it is green; if it is not certified but has no components of concern, it is yellow; if it has components of concern, it is marked as red. The goal is to switch from red to yellow and yellow to green for as many products as possible.

References

Ross McKittrick, Elmira Aliakbari, and Ashley Stedman (2018). Evaluating the State of Fresh Water in Canada. Fraser Institute.