PRACTICE Greenhealth®

2016 SUSTAINABILITY BENCHMARK REPORT

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Executive Summary

Health care is faced every day with a range of different priorities including the development of strategies to prevent disease, ensuring access to care, the actual provision of safe, high quality care, all while running an organization that supports its employees and manages critical financial resources in a time of declining reimbursement. Health care administrators have one of the most challenging jobs—to balance these priorities while building trusted relationships with their communities. It's no surprise then that these same administrators are sometime reticent to take on new priorities—especially if they are not clear how a new priority may align with other critical agenda items.

Environmental sustainability initiatives directly align with executive priorities by supporting financial stewardship, driving performance excellence and supporting employee and population health and community benefit through reduced environmental and public health impacts. The data in this year's 8th annual Sustainability Benchmark report substantiates those linkages. As the only comprehensive health care sustainability benchmarking analysis for the sector, the report has become the go-to resource supporting the more than 2,000 hospitals engaged in this work nationwide.

More than 300 hospitals provided data for this year's report, with combined savings of more than $92 million across a range of environmental program areas. The new report provides not only a benchmarking comparison for hospitals already engaged in the work, but also showcases a range of success stories demonstrating how a commitment to a healthy environment can assist health care administrators in achieving financial goals while engaging and empowering staff and supporting community health. The report is organized in 10 topical areas: leadership, waste, chemicals, operating room, food, environmentally preferable purchasing (EPP), energy, water, climate, and green building.

Highlighted below are key takeaways from the of the 2016 report:

Engaged Leadership

A strong sustainability program requires planning, infrastructure, and accountability. It also requires stakeholder engagement–inside and outside the organization. Leaders in health care sustainability are finding alignment with other strategic priority areas, connecting the dots from environmental "wins" to other priority outcomes such as community health, staff engagement, safety and patient experience.

Based on 2015 data, 79 percent of all participating facilities have a leadership-approved commitment statement, principles, or charter for integrating environmental sustainability. Seventy-six percent of all facilities appointed or hired an individual to lead sustainability efforts, and 82 percent are part of a health system that has a dedicated sustainability leader providing support to its affiliates. Sixty-one percent of facilities have created a sustainability program budget, up from 53 percent in 2014, and 94 percent of all facilities have now established a green team or sustainability committee.

Less Waste

Waste is a significant cost center for hospitals. Waste encompasses hazardous and regulated waste, pharmaceutical waste, as well as solid waste, food waste, and construction waste. Source reducing hazardous, medical and pharmaceutical wastes, and increasing the recycling rates of non-hazardous waste, are common strategies among hospitals because they have clear economic advantages.

Smarter waste management is a no-brainer for the bottom line. Recycling is good business. The median cost per ton for disposing of solid waste is $103, while the median cost per ton of recycling is $67, including rebates. On the medical waste front, it costs an average of $1,142 per ton for medical waste disposal and over $4,000 per ton to dispose of hazardous waste; programs to reduce and better segregate hazardous and medical waste pay for themselves.

Safer Chemicals

Hospitals have made significant strides in identifying and reducing chemicals of concern in medical devices, cleaning chemicals and furniture and furnishings. Opportunity remains, however, to better integrate chemical considerations into purchasing policies and into the business review process with suppliers. Likewise, many hospitals could benefit from standardizing the purchase of certified green cleaning chemicals for certain product categories where they have been shown to be effective.

The majority of participating facilities (78 percent) have chemical or purchasing policies in place to identify and avoid specific chemicals of concern. However, while 79 percent of facilities use at least some green certified cleaning products, only half of facilities mandate environmentally preferential cleaning through a policy or plan. In addition, only half of facilities have DEHP/PVC reduction programs, and only one third require that furnishings meet and environmental standard or certification —leaving significant opportunity for improvement.

Greening the Operating Room

A focus on the operating room offers significant cost-savings potential. Hospitals that employ a range of tested strategies can save a median $24,656 per operating room–or approximately $370,000 for a 15 OR surgical suite annually.

Participating hospitals reported $41.7 million in combined cost savings from sustainable initiatives in the OR. The majority of hospitals in the data set have begun to implement key environmental strategies, including recycling of clinical plastics, implementing medical device reprocessing programs, reformulating OR kits to reduce waste and the use of rigid reusable sterilization cases. Key opportunities for growth include: closing the gap between the collection and purchasing of reprocessed devices; increasing the uptake of HVAC setback practices; and increasing awareness and action to reduce the environmental impact of anesthesia.

Healthy Food

Food is still an emerging area of sustainability for the healthcare sector. The majority of facilities have indicated they see sustainable food as an important area of focus—62 percent have a sustainable food policy in place to address this issue. While 72 percent of hospitals reported purchasing locally and/or sustainably grown and produced food, farm to hospital relationships are still in initial or growth stages, and some facilities struggle with operationalizing the definitions of "local" or "sustainable." Just over half of participating facilities have reduced their meat purchases, and 54 percent purchase some portion of their meat/poultry raised without routine use of antibiotics. Eighty-one percent offer a larger selection of healthier beverage options.

Environmentally Preferable Purchasing

What we buy matters. EPP represents a key opportunity to align procurement processes with the sustainability goals of the hospital. While many hospitals are in the early stages of implementing a comprehensive EPP program, the 2016 results show significant progress in this arena: 80 percent of facilities have engaged their supply chain leadership in sustainability activities at some level; 61 percent of facilities have an EPP policy that identifies specific environmental attributes of concern to consider when making purchasing decisions; and 80 percent of facilities have set priorities for purchasing environmentally preferable products.

Leaner Energy

The health care sector is the second most intensive commercial user of energy in the U.S., and inpatient hospitals are the fourth largest energy user sector overall. Energy use contributes to human health problems, both directly (e.g., respiratory disease, asthma, and premature death caused by emissions from coal-fired power plants) and indirectly (through its contribution to climate change, which poses a wide range of threats to human health). Energy efficiency can be a smart financial investment, generating substantial, ongoing for a relatively modest upfront investment. Hospitals have made significant headway in reducing the energy use intensity of their operations.

Participating hospitals saved over 70 billion kBtus of energy in 2015. They achieved an estimated 1.3 billion kBtus in savings from energy efficiency projects, or 1.9 percent of their total consumption. This yielded financial savings of $23.7 million in aggregate for participating hospitals. The median cost savings per facility for energy efficiency in 2015 is $75,100, with a median energy reduction of 5.15 percent from previous year.

Less Water

Water continues to be an undervalued asset in healthcare. Because the cost of water has remained low, water conservation projects have not been a critical priority for many hospitals. Only 17 percent of hospitals reported any water reduction projects in 2015. Participating hospitals saved a combined total of 245 million gallons of water in 2015, and saved $2.1 million. Smaller hospitals outperform larger hospitals on water use, however, smaller hospitals employ fewer strategies to understand and reduce their consumption. The slowly rising price of water combined with severe drought and changing weather patterns in some areas is forcing hospitals to renew their attention to water use.

Federal health care facilities are the leaders in water use reduction–pursuant to their compliance with Executive Orders 13243 and 13693 which target a two percent reduction annually to hit a 16 percent reduction by FY 2015 and a 36 percent reduction from baseline year 2007 by 2025, respectively. Federal hospitals had achieved twice the water reduction of other participating facilities with a median 30 percent reduction from baseline as compared to 15 percent for other non-Federal hospitals in the dataset.

Climate Health

Hospitals are doing well at saving energy–a major contributor to greenhouse gas (GHG) emissions, but a comprehensive approach to climate is still emerging in the sector. The World Health Organization has called climate change the greatest threat to global health in the 21st century. While 43 percent of participating hospitals reported signing on to a climate commitment, only 22 percent of hospitals in the data set have performed a GHG audit, making it difficult for most hospitals to gain a comprehensive picture of their contributions to climate change. Emissions from transportation and supply chain were the most difficult for hospitals to track down.

Green Building

Many hospitals have begun to integrate sustainable practices into the design and construction of new buildings and renovation projects. By building these design principles into the master specifications or contract language that govern the project, organizations can ensure that green building features are built as envisioned in the design phase. More than half of the participating hospitals have integrated green aspects into master specifications, and 55 percent have a policy or commitment to use LEED or another green building standard for all new construction and renovations. A slightly smaller number have integrated green elements into contract language.

Green building does not mean more expensive construction. Several broad studies of the costs of building green have shown that first costs associated with green features are negligible. Moreover, green building features such as efficient HVAC systems and equipment, better insulation, better windows and doors, and water saving fixture save money over time through energy and water conservation. Many studies have also linked better indoor air quality in green buildings with increased productivity and reduced absenteeism, a benefit that has even greater cost savings potential for hospitals than energy conservation features.

Long Term Care

The 2016 report provides the nation's only sustainability benchmarking resource for inpatient health care facilities other than acute care hospitals. This group includes skilled nursing facilities, assisted living and memory care facilities, behavioral health facilities, long-term acute-care hospitals, and rehabilitation hospitals.

Academic Medical Centers

New in 2016—Practice Greenhealth evaluated how academic medical centers compare on sustainability metrics versus other acute care hospitals. The report also noted the impact that onsite research had on key waste and energy metrics for academic medical centers. Academic medical centers with onsite research used 11.7 percent more energy (in terms of energy use intensity) as compared to academic medical centers with no onsite research, and used 15.7 percent more energy than non-academic hospitals. Likewise, academic research hospitals generated 12.5 percent more medical waste than non-academic hospitals and 10.8 percent more medical waste than academic hospitals with no onsite research, demonstrating that health care research labs can have a significant impact on the environmental footprint of their host institution.

Hospitals today are finding innovative ways to operationalize sustainability and are increasingly aware of the value proposition for environmental stewardship work—recognizing its alignment with the population health imperative. Health care organizations are uniquely positioned to be anchor institutions within their communities—demonstrating and modeling the behaviors they believe will protect and promote health. At the same time, this report demonstrates that time and again, sustainability initiatives offer a strong financial return on investment while also offering the intangible benefits of engaging and empowering staff and supporting community health improvement.

Health care leaders who have not yet embraced sustainability have a significant opportunity—and Practice Greenhealth has the tools and resources to support hospitals on that journey. The 2016 Sustainability Benchmark Report provides an in-depth look at sector performance on the sustainability front and showcases numerous examples of outstanding hospital achievement in this space.

Introduction and Methods

Practice Greenhealth's 2016 Sustainability Benchmark Report is the nation's premier compilation of sustainability performance and benchmarking for the health care sector. It represents the most robust data set collected on U.S. hospitals' greening practices, combined with insights and stories of the many achievements and challenges remaining. This report is designed to summarize the sustainability activities of participating hospitals and to help hospitals identify sustainability program opportunities by benchmarking their own programs.

The main body of the report is divided into 10 distinct benchmarking profiles on different components of hospital environmental stewardship programs, including leadership, waste, chemicals, greening the operating room, healthy food, environmentally preferable purchasing (EPP), energy, water, climate, and green building. Each section of the report highlights a mix of performance measures and key metrics for that category. The report makes efforts to standardize the measurement of sustainability performance for each category in order to support more informative comparisons among hospitals. Practice Greenhealth normalizes the data based on the most statistically significant factors, allowing hospitals of different size and scope to more accurately assess their sustainability performance. For example, instead of just reporting total energy used, it reports energy use per square foot. Generally, the figures in this report present the percent of respondents answering in the affirmative for a given question (for example, the percent of hospitals that indicated they have a composting program for food waste, or a donation program for unused medical supplies.)

The report also highlights the key performance metrics for long-term care facilities, and—for the first year, academic medical centers. These two subsets of participating hospitals exhibit unique activity profiles that significantly impact their overall environmental performance.

The report lists the accomplishments of Circle of Excellence award winners, the top performers for each category based on a range of metrics and key performance indicators. These hospitals are the leaders in the field, and their achievements represent the cutting edge of hospital environmental stewardship programs. Also highlighted throughout the report are winners of the Top 25 Environmental Excellence award. This set of hospitals are recognized for their outstanding overall leadership on sustainability, and have earned the designation of the top performing all-around health care sustainability leaders in the country.

For quantitative metrics, Practice Greenhealth reports median performance and 90th percentile points across hospitals, as these values typically provide a stronger basis for comparisons and benchmarking than averages and standard deviations. Averages and standard deviations can be influenced by outliers or incorrect data and can result in misleading conclusions. Median values provide hospitals the chance to compare their sustainability performance, while the 90th percentile informs hospitals on the long term target to reach for—a data-driven determination of how well hospitals can actually perform on a given metric. This data is then paired with analysis of the programmatic actions utilized by best performing hospitals to support improvement in these key metrics—identifying potential opportunities for action.

Finally, the report generally lists the performance of large hospitals and small hospitals for metrics that show variability by hospital size. Hospitals with fewer than 200 beds are grouped in the "small hospitals" data set, and hospitals with more than 200 beds are grouped in the "large hospitals" data set. The report consistantly lists the performance of "all hospitals;" which represents a compilation of all hospitals with a valid data point for that particular program or metric, and includes both small and large hospitals. Throughout the report, the "N" (or sample size) for each group varies. This is because the "N" can differ based on the number of hospitals reporting on that metric—not all hospitals respond to every question or provide data for every metric.

Partner for Change Data Set	Sample Size
Smaller hospitals (<200 staffed beds)	158
Larger hospitals (>200 staffed beds)	162
Did not specify	2
All hospitals	**322**

The data set was collected from a total of 322 hospitals that participated in Practice Greenhealth's 2016 Environmental Excellence Awards and that filled out either the Partner Recognition or the Partner for Change Award application.[1] Data is from the 2015 calendar or fiscal year as reported on the 2016 Environmental Excellence Award applications. Hospitals completed the applications between November 2015 and the end of February 2016. Practice Greenhealth reviews all data submitted by award applicants and analyzes the data for outliers, which can sometimes indicate a mistake in reporting. Practice Greenhealth follows up with applicants where appropriate to inquire about outliers and correct data when necessary.

In 2016, Practice Greenhealth changed the way it analyzed the data to include a more robust data set. In previous years, it limited data analysis to winners of the Partner for Change award or other higher level awards. In 2016, it invested in broadening the data set to include all applicants. This approach results in a data set that is more representative of the sector as a whole. However, the structural differences in the data set limits the ability to compare performance across report years. Furthermore, broadening the data set to include all applicants lowered the all around performance for several metrics. The advanced performance of participating hospitals across years can still be compared in the analysis of the Top 25, Circle of Excellence winners, and 90th percentile hospitals.

1 All facilities in the data set have overnight beds and operating rooms.

Normalizing data is an important step to allow comparisons of performance between hospitals and groups of hospitals, regardless of size or number of patients. Practice Greenhealth normalizes the data to help identify comparable metrics for each category. To normalize data is to determine how different characteristics are affected by other variables. In other words, instead of looking at waste generation by ton, one would look at what variables might impact the amount of waste generated by a facility, and then try to normalize, or standardize, your data by those variables. Practice Greenhealth uses statistical analysis to determine which variables have the greatest impact on characteristics of interest, through the use of multiple regression techniques that reveal which variables correlate the best with each characteristic. The variables that emerge as important influences on each characteristic are called normalizing factors. Practice Greenhealth analyzes each of the following normalization factors for all of the major areas of environmental impact.

Normalization Factors

Adjusted Patient Days	Adjusted patient days (APD) take into account inpatient and outpatient activity and are generally calculated as: *APD = (total patient days)*(total patient revenue/inpatient revenue); where total patient revenue = inpatient + outpatient revenue.*
Patient Days	Each patient day represents a unit of time during which the services of the institution or facility are used by a patient; thus 50 patients in a hospital for one day would represent 50 patient days.[1]
Staffed Beds	Staffed beds are those in-service and patient-ready for more than half of the days in the reporting period. Staffed beds does not include beds ordinarily occupied for less than 24 hours, such as those in the emergency department, clinic, labor (birthing) rooms, surgery and recovery rooms and outpatient holding beds.
Licensed Beds	The maximum number of beds a hospital is licensed to staff.
Employees	Practice Greenhealth uses the term “full-time equivalents” or “FTEs” in the report to designate the number of staff at a facility. This number does not count contracted employees due to key differences in the ways hospitals are tracking employee count.
Operating Rooms	The number of operating rooms at a facility is a relatively easy variable to account for, and does not typically change throughout the year.
OR Procedures	The number of OR procedures indicates how busy a facility’s ORs were over a given year.
Square Footage	Square footage provides data on how large a facility is and can be an excellent normalization factor when looking at energy data and cost, as well as other variables. Square footage is measured as gross floor area, based on the ENERGY STAR definition.[2]
Case Mix Index	The 2015 data was again analyzed against case mix index, a measure of how sick the patients are. While we anticipated a good correlation for RMW or waste, case mix index was not observed to be a good predictor of any variable of interest.

The graphs included in this report provide a summary of the data reported and analyzed this year; comprehensive tables are included in the appendix. For each metric featured in the report, the appendix tables show median values overall, median values for large hospitals, and median values for small hospitals, and the median of the top 10 percent of hospitals (or the 90th percentile).

The next Practice Greenhealth Environmental Excellence awards program begin in December 2016, and hospitals and health care systems are warmly invited to participate. Practice Greenhealth wishes to thank the hundreds of individuals and institutions that participated in providing data for the 2016 Report. Practice Greenhealth hopes you enjoy this year’s report and look forward to celebrating the sector’s achievements in 2017.

2 ENERGY STAR Portfolio Manager Glossary. https://portfoliomanager.energystar.gov/pm/glossary. Accessed on October 4. 2016.

Engaged Leadership

Leaders in health care sustainability are increasingly working to demonstrate alignment with other strategic health care priorities, and key stakeholders understand that environmental "wins" are connected to other priority outcomes—community health, staff engagement, safety and patient experience to name a few. A strong environmental stewardship program requires planning, infrastructure and accountability.

Buy-in from key leaders and department heads drives the development and implementation of a comprehensive sustainability program. Broad stakeholder engagement can inform policies, investment in financial and human resources, and alignment of incentives for sustainability programming. These foundational elements ensure sustainability initiatives endure for the long term.

A health care president or CEO may need initial coaching on how to articulate why a commitment to the environment is important for their organization and how to create a culture of health. Without this executive-level support, the organization doesn't realize its fullest potential, and sustainability programming remains at the departmental and project level.

This chapter provides data on the environmental leadership activities of 322 hospitals, including the degree to which they are implementing a range of activities that are foundational to long-term sustainability success. The Sustainability Benchmark Report has tracked Engaged Leadership since 2009, and this chapter presents trends for those years where benchmarking questions are comparable. This chapter also showcases innovative leadership practices that other hospitals can learn from and build upon.

The data collected in 2016 (based on 2015 calendar and fiscal year) demonstrates that a growing number of hospitals are implementing a core set of leadership activities in an effort to grow their environmental programs. There remains a significant opportunity, however, to expand awareness within executive circles of the multi-faceted ROI for sustainability work. Both large and small hospitals are making progress at engaging leadership and driving organizational initiatives in sustainability, with larger hospitals more likely to communicate their sustainability initiatives publicly in reports, and in-house to staff. Larger hospitals are also more likely to have a full-time dedicated sustainability manager than smaller hospitals, and are more likely to calculate pay-back periods and return on investment metrics when making sustainability decisions.

This year's Engaged Leadership highlights include:

79%
of all facilities have a leadership-approved commitment statement, principles, or charter for integrating environmental sustainability.

76%
reported appointing or hiring an individual to lead sustainability efforts but only 29% had hired a full-time role dedicated to sustainability. **82%** are part of a health system that has a dedicated sustainability leader.

61%
of facilities had formulated a sustainability program budget, up from 46% in 2013.

58%
of facilities published a publicly available annual report that details environmental stewardship accomplishments.

Raymond J. Baxter, PhD, senior vice president for Community Benefit, Research and Health Policy for Kaiser Permanente serves as Keynote Speaker at CleanMed 2016.

2016 Leadership Circle of Excellence Winners

The Leadership Circle of Excellence represents the top performers with a strong infrastructure supporting a long-term commitment to healthier environments through strategic planning, committee structure, education and engagement, performance measurement, communication and reporting.

Advocate Christ Medical Center
Oak Lawn, IL

Advocate Good Samaritan Hospital
Downers Grove, IL

Advocate Illinois Masonic Medical Center
Chicago, IL

Beaumont Health System-Royal Oak Campus
Royal Oak, MI

Bon Secours St. Francis Downtown
Greenville, SC

Cleveland Clinic
Cleveland, OH

Gundersen Health System
La Crosse, WI

Hackensack University Medical Center
Hackensack, NJ

Minneapolis VA Health Care System
Minneapolis, MN

Virginia Mason Medical Center
Seattle, WA

50%
of Leadership Circle of Excellence winners have hired a full-time role dedicated to sustainability and **100%** have a full-time sustainability role at the health system level.

100%
of Leadership Circle of Excellence winners have a sustainability strategic plan.

100%
of Leadership Circle of Excellence winners have a dedicated sustainability program budget.

100%
of Leadership Circle of Excellence winners have an Annual Report featuring the environmental performance of the facility.

Cleveland Clinic Marymount Hospital

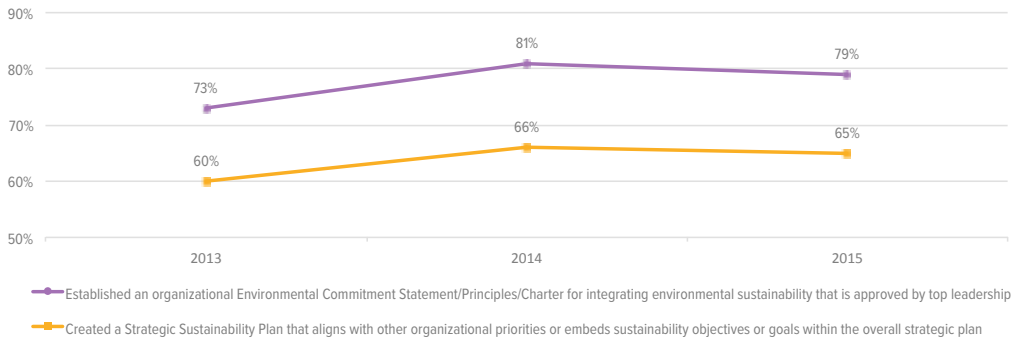
Sustainability Commitments and Plans

Sustainability policies and high-level commitments provide an institutional anchor, ensuring that facility leadership are committed to sustainability goals. Policies can take the form of statements, principles, and/or charters, and need to be approved by top leadership to ensure effectiveness. Strategic sustainability plans then provide the roadmap for meeting the vision, describing the goals, identifying key mechanisms of change and establishing the roles and responsibilities to make it happen.

The adoption of sustainability commitments has increased since Practice Greenhealth began tracking them in 2010. In 2016, 79 percent of all facilities had established a sustainability statement, principles, or charter signed by top leadership. While making a commitment is important, development of a strategic sustainability plan provides more actionable steps—otherwise work can be disorganized and languish as a series of ad-hoc activities. Such plans are critical to building out goals with timelines, accountability and action steps to ensure that commitments are met and strategies are executed.

Fewer facilities have established a sustainability plan than a set of principles, with 65 percent of all facilities having done so in 2015. A baseline assessment is another key element of a strategic plan—and assists hospitals in understanding the opportunities for improvement. Many facilities are using the Practice Greenhealth Environmental Excellence Awards as their primary baseline assessment and gap analysis tool. All applicants in the data set provide annual goals as part of the application process. Leading hospitals are crafting meaningful goals that align with other organizational priorities, and are communicating those goals publicly as a transparency and accountability mechanism.

Figure 1.1: Commitments and Strategic Plans



KAISER PERMANENTE®

Kaiser Permanente, the nation's largest integrated health system, has set bold environmental goals for the year 2025. These ambitious goals include:

- Become "carbon net positive" by buying enough clean energy and carbon offsets to remove more greenhouse gases from the atmosphere than it emits.
- Buy all of its food locally or from farms and producers that use sustainable practices, including using antibiotics responsibly.
- Recycle, reuse or compost 100 percent of its non-hazardous waste.
- Reduce the amount of water it uses by 25 percent per square foot of buildings.
- Increase its purchase of products and materials that meet environmental standards to 50 percent.
- Meet international standards for environmental management at all its hospitals.
- Pursue new collaborations to reduce environmental risks to the foodsheds, watersheds and air basins supplying its communities.

Jodi Sherman, MD

Assistant Professor of Anesthesiology; Environmental Compliance Officer; Affiliated Faculty, Climate Change and Health Initiative, School of Public Health

Dr. Jodi Sherman is an Assistant Professor at the Yale School of Medicine, and Environmental Compliance Officer in the Department of Anesthesiology at Yale-New Haven Hospital. Dr. Sherman is Affiliated Faculty for the Yale School of Public Health Climate Change and Health Program. She serves as Co-Chair of the Environmental Task Force of the American Society of Anesthesiologists. Dr. Sherman passionately advocates for reducing health care pollution, while maintaining high standards for safe clinical care. She is currently funded through the Anesthesia Patient Safety Foundation to investigate the environmental impacts of different anesthesia clinical pathways. Dr. Sherman frequently presents her work at CleanMed and the American Society for Anesthesiologists meetings, and is recognized internationally for her leadership on reducing inhaled anesthetic pollution. Through Yale University, Dr. Sherman developed a free educational smartphone app (Yale Gassing Greener), and launched an international draw-down campaign to reduce waste anesthetic gas pollution—a significant contributor of health care related greenhouse gas emissions.

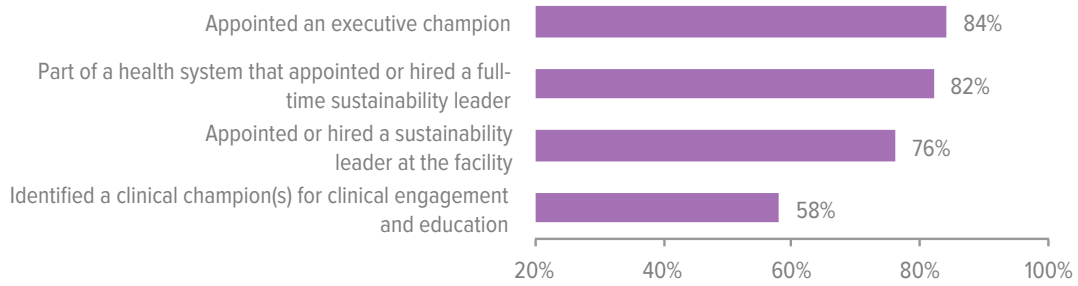
Management and Human Resources for Environmental Stewardship

Without the support of senior leadership, sustainability initiatives often stall. Beyond adopting a policy, senior leadership support can ensure that sustainability initiatives have adequate human resources, that roles and responsibilities are assigned, and that both staff and clinicians are engaged and involved. Twenty-four of the Top 25 award winners and all 10 of the Leadership Circle of Excellence winners, have appointed or hired a sustainability leader for their facility. The creation of a full-time role to support sustainability is an important indicator for success. In 2015, 76 percent of facilities reported they had appointed or hired a sustainability leader. Only 29 percent were full-time roles. Many hospitals are also part of a health system that has created a sustainability role. Eighty-two percent of hospitals in the data set reported they were part of a health system that has hired a sustainability role—with 93 percent of those roles being full-time. Hospitals and health systems who want to be leaders in this space are finding that having a dedicated resource can be a game changer, and can drive environmental performance improvement.

Clinical and executive champions are those who advocate for change, leverage their influence within the organization, and lead their peers on sustainability issues so that it becomes a part of the culture and operating norms for the facility. It is important to note that hospitals need to go beyond the checkmark in the box for executive or clinical champions and support these leaders in truly becoming change agents while driving accountability and results. It is often not enough for a champion to say "I'm on board." Sustainability leads need to consider what information these champions require in order to effectively advocate for change.

Clinicians—especially physicians—can be a challenging group to engage on sustainability initiatives. Leading hospitals often use pre-existing venues for continuing education such as presentations through grand rounds or health care professional associations. Clinicians respond best to science, peer-reviewed literature, and the relationship to patient experience and health outcomes, where data are available. Once engaged, clinicians can help identify new synergies for sustainability programming, connecting the work to critical areas such as population health, antibiotic resistance and staff wellness. Clinical allies are also a trusted voice to help appeal to other employees or community stakeholders.

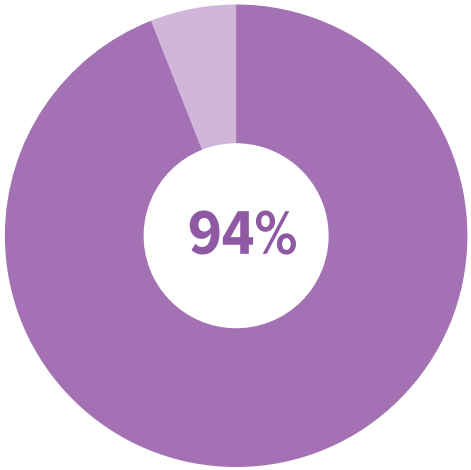
Figure 1.2: Appointing Leaders and Champions



One key strategy involving a range of personnel is the creation of "green teams" that provide oversight for designing, implementing and reporting on environmental sustainability initiatives, and who regularly meet to find solutions to sustainability challenges. Some 94 percent of all institutions in the data set now have green teams or sustainability committees—small and large hospitals alike. Digging deeper, Practice Greenhealth has found that there is variation in how effective green teams are. Some green teams help to establish facility-wide goals and strategic plans and monitor progress towards goals, whereas other green teams tend to serve as ad-hoc project committees to give input on specific initiatives, but don't have a reporting structure that is connected to leadership and the strategic direction of the organization. These types of green teams may have success on a project basis but fall short of their fullest potential.

Figure 1.3: Green Teams

Percentage of facilities that have established a Green Team/Sustainability Committee.



Beth Israel Deaconess Medical Center Green Team

Another strategic initiative is to integrate environmental or sustainability responsibilities into job descriptions, performance evaluation and incentive systems. While less commonly employed, the data demonstrates that this approach is effective in ensuring that a high level of attention is paid to working on sustainability issues, and to measuring results. Eighteen of the Top 25 award winners and all 10 Leadership Circle of Excellence winners have added sustainability measures into performance objectives and evaluations for leadership staff.

More broadly, staff engagement is essential to environmental health and well-being. Engaging staff early in their tenure at a facility can be helpful; for example, some facilities include sustainability information in orientation training and information packages. Smaller hospitals are more likely to have included sustainability goals in new employee orientations than large hospitals—perhaps due to fewer HR hurdles in a smaller organization. Ongoing communications and outreach about the ways in which all staff can contribute to a healthier and safer workplace is also important for establishing a culture that embodies the intent. Guidance should include information on when and how to address challenges or report progress toward environmental goals, and should identify the sustainability responsibilities of different staff and managers as relevant to their work.

Some facilities have also begun to ask about sustainability within their employee engagement surveys, although only 21 percent of facilities reported using this strategy. Larger hospitals are more likely than small to have included sustainability questions in their employee satisfaction surveys. Including such questions in employee surveys could provide an effective way to engage more staff across the facility, and to gather valuable data on the effectiveness of outreach activities.

Figure 1.4: Integration into Performance Evaluations and Incentives

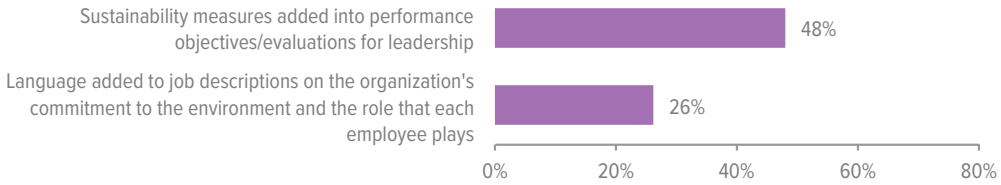
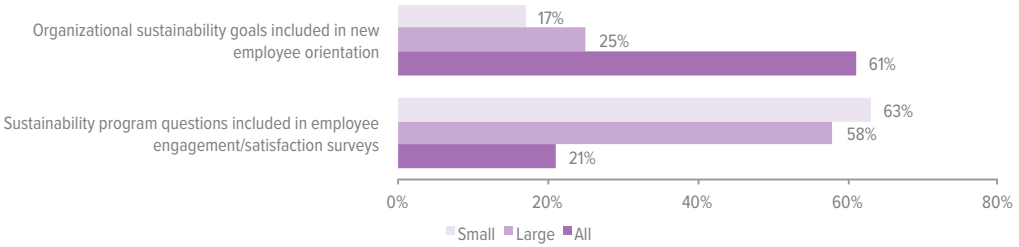


Figure 1.5: Staff Orientation and Engagement



Providence St. Joseph Health

In 2015, Providence Saint Joseph Health and its more than 50 hospitals became members of Practice Greenhealth. The Pope's Encyclical helped ignite a deep desire on the part of Rodney Hochman, Providence's Chief Executive Officer, to create a firm organizational commitment to a system-wide sustainability strategy. The organization, with the support of its most senior leaders and the sisters, embarked on an impressive sustainability journey by formalizing short-term and long-term environmental stewardship goals in support of their stewardship values and mission to serve their communities. The emerging strategic plan includes working with regional executives to support the vision for and implementation of goals and metrics around mission, operations (e.g., energy use, water use, safer chemicals, etc.), clinical engagement (Greening the OR, Greening the Lab, etc.) and community partnerships (investments, policy advocacy, foundation and international missions).

Richard Beam was named as Providence's Chief Environmental Officer in 2016 and was empowered to work with Practice Greenhealth and other consultants to develop a process, committee structure and deployment strategy to create the healthiest health care system in the nation. The focus is on building on the sustainability successes of several Providence hospitals (including Providence Portland Region, Providence St. Patrick's and Providence St. Peter's,) while increasing information-sharing, sharing best practices and setting system-wide goals with annual performance metrics. The organization is also invested in educating nurses and other caregivers to intimately understand the environmental impacts of health care while raising awareness on clinically appropriate mitigation tactics.

Cleveland Clinic

In May of 2016, Cleveland Clinic announced the establishment of a $7.5 million Green Revolving Fund (GRF)—the largest established fund of its kind in the health care industry. In addition to being the largest green revolving fund among U.S. health care systems, Cleveland Clinic's annual commitment is one of the largest in any business sector nationally. This dedicated fund will help drive Cleveland Clinic's continued commitment to energy conservation and sustainability, including the goal to reduce energy intensity by 20 percent by 2020 as part of President Obama's Better Buildings Challenge. Through the end of 2015, Cleveland Clinic has reduced its energy demand by 12.3 percent as part of this challenge. The establishment of the green fund is part of the Sustainable Endowments Institute's Billion Dollar Green Challenge which encourages colleges, universities, and other nonprofit institutions to invest in self-managed green revolving funds, with the goal of creating a combined total of one billion dollars in funding.

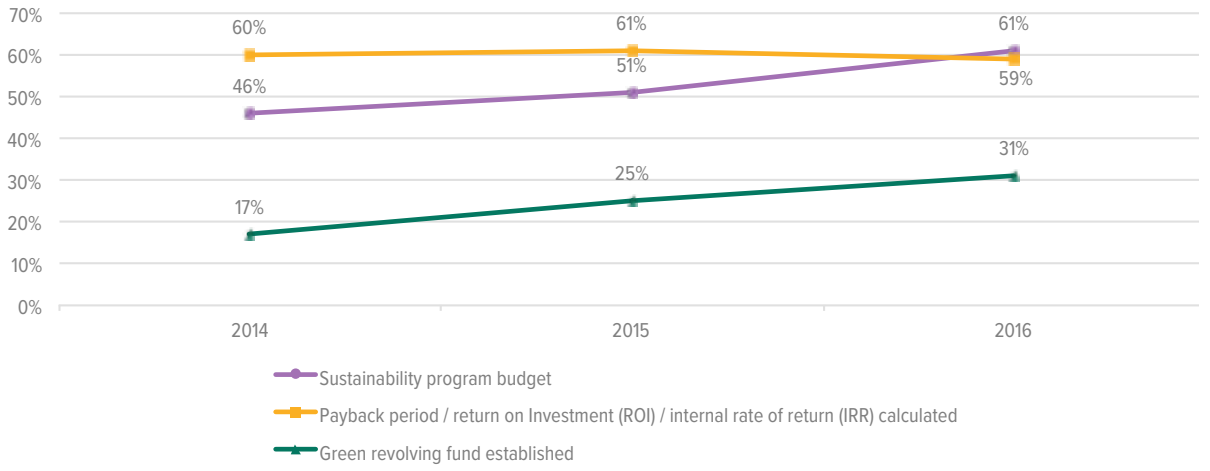
Cleveland Clinic

Budgets and Making the Business Case

Some environmental initiatives require an up-front investment of financial resources—for example to deploy a new energy-efficient lighting solution, or to pay for the salary of dedicated sustainability staff. A dedicated sustainability budget allows hospitals to match their sustainability plans with the funding to finance it. Sustainability investments typically generate a positive return on investment (ROI) for the facility, reinforcing the business case for the sustainability plan. Sometimes this return is realized immediately and directly, such as when energy is saved and utility bills are lowered. Other times, a project will lead to reduced waste, training or other lifecycle costs—though these savings may not be immediately apparent or easy to measure.

Since Practice Greenhealth began tracking this indicator in 2011, it has seen increasingly sophisticated approaches to calculating the expected ROI or the internal rate of return (IRR) for a range of sustainability projects. More recently, there has been an uptick in the establishment of green revolving funds. Green revolving funds (GRFs) are internal investment vehicles that provide financing for implementing energy efficiency, renewable energy, and other sustainability projects that generate cost-savings within a facility. Savings are tracked and used to replenish the fund for the next round of green investments.[1]

Figure 1.6: Budgets, Measuring Returns and Dedicated Funds



1 For more on green revolving funds, see the Billion Dollar Green Challenge: http://greenbillion.org/wp-content/uploads/2013/01/GRF_Implementation_Guide.pdf

Communications, Reporting and Engagement

Sustainability initiatives are successful when they rely on shared goals and common solutions across a wide range of hospital stakeholders. Communication is the connective tissue that brings different stakeholders together. To motivate activity, sustainability requires frequent communication with employees. Employees need to know the rationale for any changes in practice that might affect them, and instructions on what they should do differently. Beyond posters, newsletters and web resources, leading hospitals are growing sustainability awareness with staff and key stakeholders using innovations such as champion programs, internal awards and recognition, employee suggestion programs, and games and competitions. Advanced programs are also communicating the commitment of executive leadership to sustainability through town hall meetings, grand rounds and other public presentations.

Figure 1.7: Reporting Up

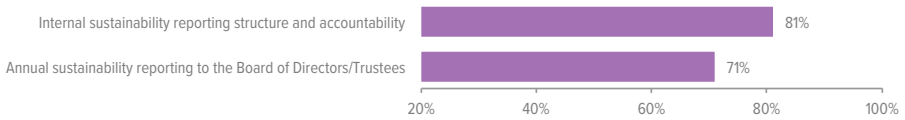


Figure 1.8: Communicating about Sustainability

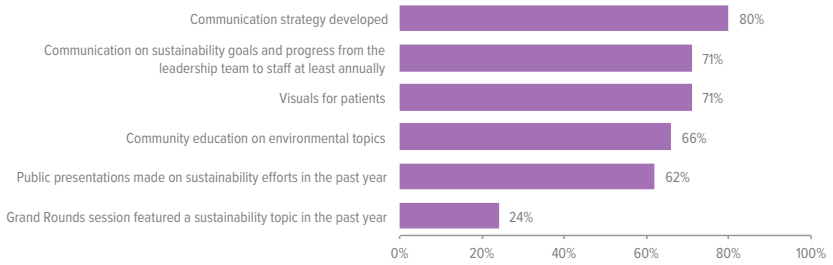
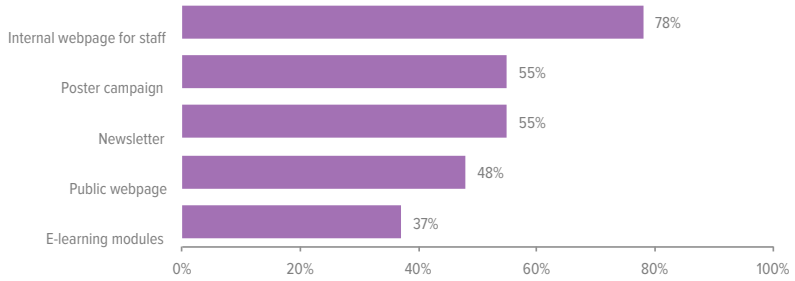


Figure 1.9: Education and Engagement



MedStar Franklin Square Medical Center

In 2015, the leadership at MedStar Franklin Square Medical Center pushed for the reestablishment of its sustainability committee. The mission, vision, values, and structure were updated and approved by the hospital president, as well as the senior vice president of operations and chief nursing officer. The reinvigoration of the charter and the highlighting of key focus areas has created an amazing group of over 20 associates who are determined to spread sustainability awareness throughout the medical center.

The hospital established a list of key departments such as facilities, housekeeping, safety, food services, surgical services, marketing, nursing and wellness to meet and collaborate at bi-monthly sustainability committee meetings. The committee voted on the top three focus areas: (1) waste separation and recycling, (2) energy conservation, and (3) associate and community engagement. There are now well-established sub-committees that meet on their own time outside of the sustainability committee and report out on goals, successes, next steps, and support needed from the committee. The committee's goal is to push specific programs through any roadblocks they may face before they can be implemented.

Examples of engagement mechanisms include:

- Setting up kiosks, display tables and booths
- Social media outreach (such as Facebook/Twitter)
- Sending informational emails to staff directly
- Using screen savers, wall clings and other displays across facility
- Creating videos
- Including information in employee handbooks
- Conducting hospital green tours
- Hosting events (such as Earth Day, Bike-to-Work Day, e-waste collections, vendor fairs and cooking demonstrations)

Advocate Good Samaritan Hospital

Advocate Good Samaritan Hospital (GSAM) led a team effort by its Corporate Environmental Stewardship, GSAM Good Health for Good Life team and the GSAM green team to host a green workshop for all directors and managers. The purpose of the green workshop was to educate leadership on environmental stewardship and a healthy environment and how the two are integrally connected. In 2015, associates were evaluated on environmental stewardship and a healthy environment. Their intent was to recruit new green advocates. Green advocates are associates who volunteer to promote the adoption of environmentally sustainable practices in their department. The program successfully recruited 49 champions.

UH Ahuja Medical Center Earth Day Activities

As the spotlight on sustainability increases, so too does the call for transparency and public reporting on sustainability goals and achievements. Fifty-eight percent of leading hospitals are reporting to external stakeholders by producing dedicated sustainability or environmental reports, and 12 percent are following the internationally recognized Global Reporting Initiative (GRI) environmental reporting protocol. Some non-profit hospitals are also beginning to integrate sustainability information into Community Benefit Reports to the Internal Revenue Service (IRS) (39 percent). Leading hospitals are working to engage external stakeholders in their sustainability activities at the local and sometimes national level, and 68 percent are providing mentorship on sustainability topics to peer hospitals. Hospitals are demonstrating their commitment by taking public leadership positions on important global environmental issues including climate change and population health, and are creating collaborative relationships with other community-based organizations. One example is The Democracy Collaborative, which has partnered with University Hospitals Health System, Kaiser Permanente and other member hospitals to focus on community problems that drive many of the health disparities prevalent in the United States.

Figure 1.10: Public Sustainability Reporting

Percentage of facilities that write a publicly available annual report that details environmental stewardship accomplishments.

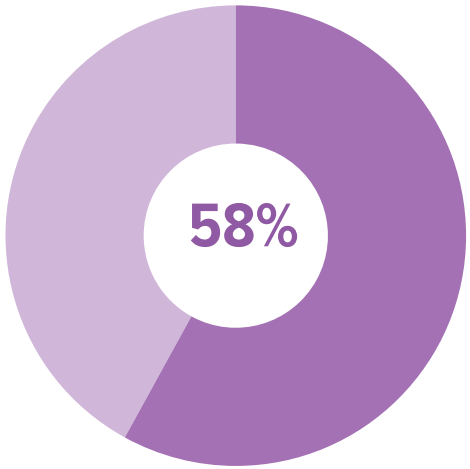


Figure 1.11: Types of Sustainability Reports

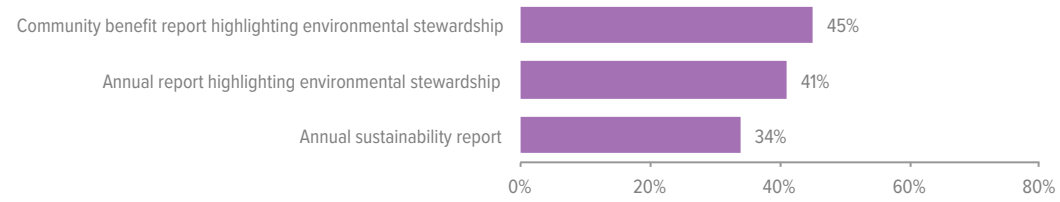
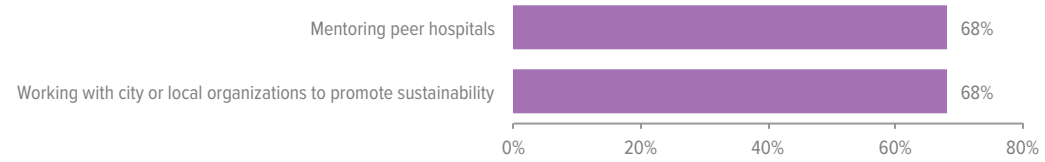


Figure 1.12: Working in the Community and Leading Peers



Littleton Adventist Hospital
Earth Day booth for Project C.U.R.E.

Conclusion

Sustainability leaders are increasingly comprehensive and strategic in their approaches to organizational sustainability. They leverage existing resources and communication channels, and connect sustainability topics to the interests of stakeholders. These leaders determine lines of responsibility and resources to ensure that progress on sustainability goals can be made, measured, and communicated to stakeholders inside and outside the organization. As sustainability initiatives mature, hospitals tend to become more public about them, and widen the circle of stakeholders engaged in the facility's sustainability journey. However, many hospitals and health systems still have opportunity in this area. All too often, sustainability programming rests squarely on one or two individuals' shoulders, which can result in burn out. The strongest programs employ true team work and an understanding of each departmental role in meeting sustainability objectives. Early adopters are connecting sustainability to wellness, quality and community benefit/population health. Hospitals can check to see if these departments are represented on the facility's environmental stewardship team and connect the dots for a more powerful and multi-faceted program.

Beaumont Hospital-Royal Oak Green Team

Resources

Healthier Hospitals V 2.0 Engaged Leadership Challenge

Leadership Talks, Walks and Envisions A Healthier Future

Practice Greenhealth Sustainability Marketing Plan Toolkit

Practice Greenhealth Toolkit: Sustainability and Employee Engagement – A Winning Strategy

THRIVE: Setting Bold Environmental Goals with Kaiser Permanente. Practice Greenhealth Webinar. March 2016

Less Waste

Waste is one of the most visible environmental issues associated with hospitals and health care systems, both in terms of the quantity of waste generated and in the complexity of managing it appropriately. Hospitals in the United States produce more than 4.67 million tons of waste each year—a conservative estimate.[1,2] Leading hospitals are taking a proactive approach to waste management by finding ways to reduce material coming into the facility. And for material designated as waste, leaders are implementing innovative waste management solutions, including better separation techniques, recycling, and composting. The net effect of these activities is to reduce the throughput of materials passing through a facility, improve the efficiency of waste management processes, reduce environmental and human health impacts, and generate cost savings.

Given the potential to reduce costs while improving public image, waste is often the starting point for hospitals' sustainability efforts. Typically, hospitals start by getting a baseline picture of their waste and material streams and current systems in terms of waste volumes, costs, and management processes. If regulated medical waste (RMW) comprises more than 10 percent of total waste, red bag reduction is typically an early priority, due to its significant cost savings potential. Recycling is also an obvious opportunity for cost savings and environmental improvement. Waste volumes and costs are predictably sensitive to the scope of the facility, measured by the number of staffed beds, square footage, employees (FTEs), adjusted patient days (APDs), and operating rooms (ORs)—among others.

The health care industry has many tools and resources available to help hospitals measure and monitor waste. Practice Greenhealth has been tracking hospital waste data since 2002, and in this chapter present trend data on key indicators where datasets are comparable. The results presented in this chapter, while comprehensive, are a subset of the available data on reducing waste. Detailed data tables and results can be found in the appendix.

This year's Less Waste highlights include:

30%
is the recycling rate routinely achieved by leading hospitals—more than double the early EPA goal of 15%—but it is getting harder to surpass the 30% mark.

More than 10 years after EPA began training hospitals on pharmaceutical waste compliance, many hospitals are still challenged by the management costs and training necessary to minimize the impact of this waste stream.

55%
of the hospital's waste budget is composed hazardous waste and regulated medical waste (RMW), whereas these two categories represent only 8% of the total waste volume.

1 4.67 million tons is a conservative estimate extrapolated from the median pounds of waste generated per staffed bed in some of the most environmentally conscious hospitals in the country and multiplied by the number of staffed beds in U.S. hospitals)

2 American Hospital Association. Fast Facts on U.S. Hospitals. 2016. http://www.aha.org/research/rc/stat-studies/fast-facts.shtml Accessed on October 3, 2016

2016 Less Waste Circle of Excellence Winners

The hospitals in the Waste Circle of Excellence have excelled in waste prevention and material handling, demonstrated through high recycling rates, low regulated medical waste generation and low rates of total waste generated per patient day. These mature programs address all facets of the complex health care waste stream.

Gundersen Health System
La Crosse, WI

Harborview Medical Center
Seattle, WA

Littleton Adventist Hospital
Littleton, CO

Memorial Sloan-Kettering Cancer Center
New York, NY

Metro Health Hospital
Wyoming, MI

Seattle Children's Hospital and Regional Medical Center
Seattle, WA

Spectrum Health Blodgett Hospital
Grand Rapids, MI

The University of Vermont Medical Center Unit
Burlington, VT

U.S. Army Madigan Army Medical Center
Tacoma, WA

Virginia Mason Medical Center
Seattle, WA

4.86%

is the median percentage of waste handled as RMW by Circle of Excellence winners as compared to 6.85% for the rest of the data set—a **29%** difference.

100%

of Circle of Excellence winners recycle clinical/medical plastics in the OR as well as other departments across the hospital.

40.7%

is the median recycling rate for Circle of Excellence winners as compared to 28.1% for the rest of the data set.

E-Waste Day at Kaiser Permanente Moreno Valley Medical Center

Waste Types and Costs

A waste profile (or baseline) involves collecting the costs and volumes of the different types of waste moving through a facility. Developing such a profile is an effective first step in managing waste.

The four primary categories of waste in hospitals and health care facilities are solid waste, recycling, regulated medical waste (RMW) and hazardous waste. Pharmaceutical waste is an important sub-category—and can be included in RMW, solid waste, or hazardous waste, depending on its regulatory status and how the hospital chooses to segregate it. Food waste is also an important component of the hospital waste stream—making up nearly 25 percent of total waste by some accounts. Food waste is typically tracked as a subset of solid waste or recycling (if the facility composts its food waste).

Construction and demolition waste (C&D), while often comprising a significant volume, is only highlighted briefly in this chapter. While developing a management framework for recycling C&D waste is a critical element in a comprehensive approach to waste management, this waste stream is not typically measured as a percent of total waste—as the extreme weights of building materials such as concrete, metals, wood, or drywall skew the waste composition analysis.

Waste costs are driven by a range of factors including the quantity, quality, and types of waste being generated, as well as fuel pricing and distance to the final treatment or disposal location. They are also influenced by regulation, historic costs, labor costs, onsite space constraints, and investment in waste management infrastructure. Costs also vary by the facility's capacity to manage, segregate and/or treat the waste onsite, and the availability of offsite services.

MetroHealth

MetroHealth hired a consultant to conduct a waste audit in July 2015. The audit sought to determine financial and environmental opportunities within the management of different waste streams. The consultant began by collecting bags of trash, recycling, and compost from various departments across the hospital including the emergency department, nursing units, patient rooms, the cafeteria, the kitchen, and support services departments. They collected the initial weights and then correctly segregated the waste and recorded those weights. They performed a visual audit of pharmaceutical and regulated medical waste streams. In order to obtain the financial and environmental savings, the data was extrapolated to encompass the entire hospital. Based on their findings, MetroHealth could realize a potential cost savings of over $25,000 with proper waste stream segregation. The opportunity for environmental impact is also immense—they calculated that MetroHealth could increase recycling in one year by 67 tons, increase composting by 224 tons, reduce trash by 289 tons, and decrease pharmaceutical waste by six tons.

The largest percentage of the overall spending on waste tends be on regulated medical waste (RMW)—an expensive waste stream that accounts for an average 40 percent of participating hospitals' waste budgets in 2015 (Figure 2.2) while only comprising an average of 7.8 percent of the total waste stream (Figure 2.1). While solid waste is relatively cheap to dispose of per ton, its sheer quantity (61.7 percent of total waste on average) means it utilizes an average 30 percent of the waste budget. Minimization of solid waste or diversion to recycling, reuse programs (internal to the facility or external), or donation programs can help to reduce the total amount of solid waste. Hazardous waste comprises a very small percentage of overall health care waste (on average 0.6 percent by volume), but takes up an average 15 percent of waste budgets.

The median cost per ton of disposing of solid waste was $103 in 2015 as compared to $67 per ton for recycling—demonstrating again the business case for launching comprehensive recycling programs as a best management practice. The median cost per ton of RMW is more than 11 times the cost of solid waste and 13 to 17 times more expensive than recycling. Every item that can be safely diverted from RMW into either recycling or solid waste is a cost benefit to the organization. The median cost per ton for hazardous waste was $4,245 (Figure 2.3). Practice Greenhealth estimates that if participating hospitals disposed of all of their recyclable materials as solid waste, it would cost a typical hospital an additional $9,000 per year or an additional $2.9 million dollars across the data set. The savings from universal waste recycling (computers, fluorescent lamps, certain batteries or mercury-containing devices) are even more dramatic due to the high cost per ton for hazardous waste. A typical hospital is saving around $33,000 per year by managing certain

Figure 2.1: Average Percent of Total Waste

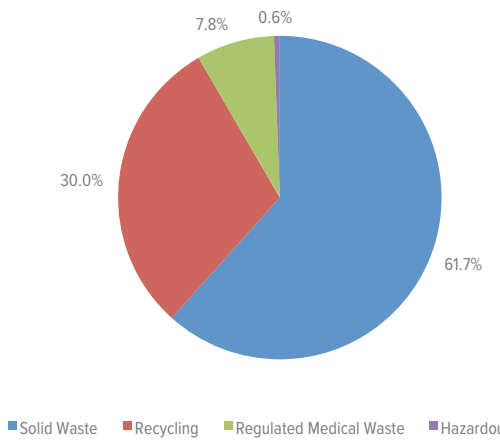


Figure 2.2: Average Percent of Total Cost

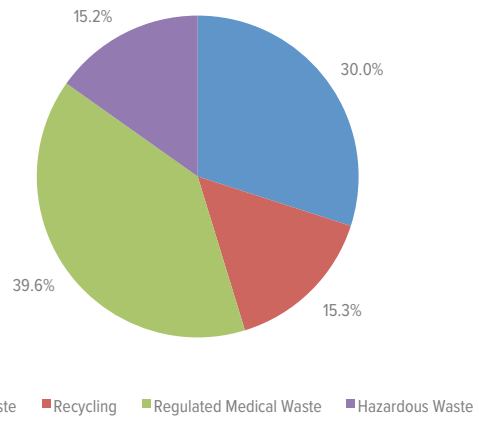
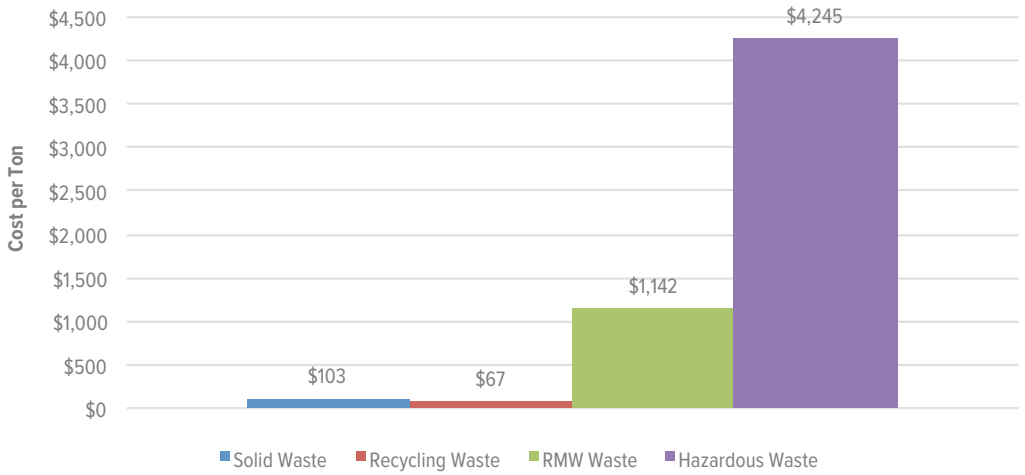


Figure 2.3: Median Waste Costs by Waste Type[3]



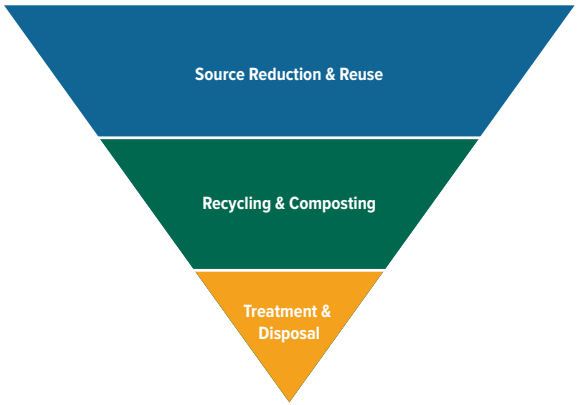
3 The median of $67 per ton for recycling includes rebates for recycled materials. The median cost per ton for recycling not including rebates was $87 per ton.

University Hospitals and Buckeye Industries employees sort through medical plastics for recycling

categories of hazardous waste as universal waste—an aggregate of $20.8 million dollars in savings through universal recycling programs across the data set. An important aspect to note however, is that many hospitals were previously managing these universal waste streams inappropriately—with RCRA-regulated electronics or batteries sometimes mistakenly ending up in the solid waste stream rather than the hazardous waste stream. A regulatory compliance violation can costs untold thousands of dollars.

The most effective means to reduce waste generation of all types is through the adoption of environmentally preferable purchasing practices. As indicated by the waste hierarchy diagram (Figure 2.4),[4] the most environmentally and cost-effective approach to waste is source reduction and reuse, which should be emphasized wherever possible. "Source reduction" (also sometimes called pollution prevention) means any practice that reduces or eliminates waste at the source by modifying processes, promoting the use of non-toxic or less toxic substances, implementing minimization techniques, and reusing materials rather than putting them into the waste stream. The overall impact is to reduce the amount of hazardous substances, pollutants, waste or contaminants released into the environment. Source reduction happens prior to recycling, treatment or disposal; and can include modifications of equipment, processes, the reformulation or redesign of products, the substitution of raw materials, and improvements in housekeeping, maintenance, training, inventory control and purchasing.[5]

Figure 2.4: Waste Hierarchy Diagram



4 Practice Greenhealth's waste hierarchy diagram is based on the US EPA's non-hazardous waste hierarchy (Sustainable Materials Management: Non-Hazardous Materials and Waste Management Hierarchy: https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy)

5 US EPA. Pollution Prevention (P2). https://www.epa.gov/p2/pollution-prevention-law-and-policies#define. Accessed on October 4, 2016.

Solid Waste

In hospitals and health care facilities, solid waste encompasses the majority of the waste, including food, packaging, diapers, gloves and other trash. While similar to hotel or municipal waste, solid waste in hospitals have a higher plastic content, due to various disposable medical devices and products such as IV bags, tubing, gloves, basins, drapes and gowns, admission kits and Foley catheter bags—to name a few. Volume and cost data for solid waste is typically gathered by reviewing invoices. Costs may include container (dumpster/ roll-off) rental, pick-up or hauling fees, fuel surcharges and tipping (dump) fees.

Solid waste can be normalized against different utilization factors in order to indicate trends and provide a more comparable number for reduction purposes. That said, it can be challenging to measure progress on solid waste alone—as its volume can fluctuate based on proper segregation and recycling programs. More typically, hospitals are looking at the reduction of total waste metrics. The two most highly correlated normalizing factors for solid waste are by the number of operating rooms (ORs) a facility has, and adjusted patient days (APDs) (Figure 2.5 and Figure 2.6).

Figure 2.5: Solid Waste per OR (in tons)

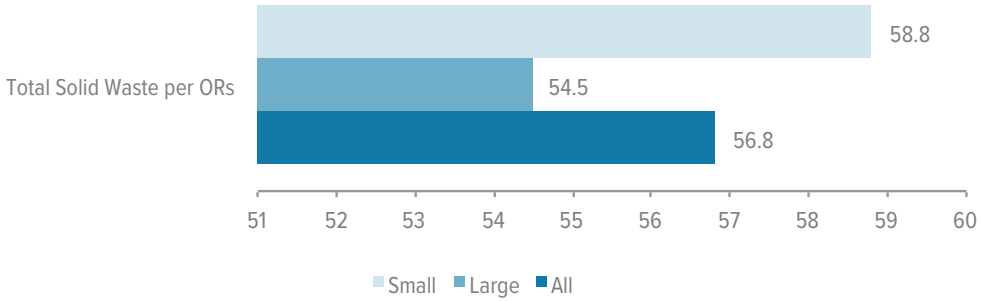
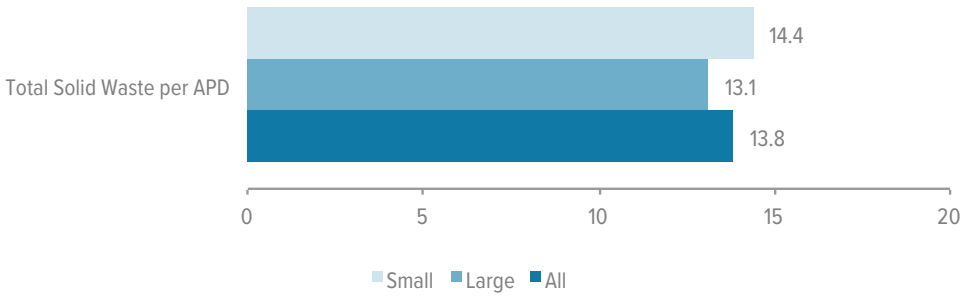


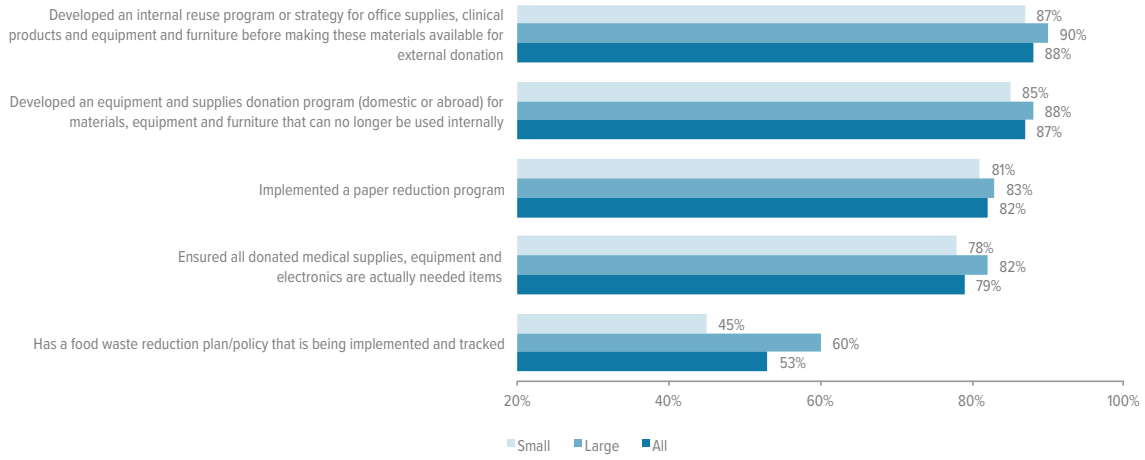
Figure 2.6: Solid Waste per APD (in pounds)



In most facilities, solid waste is directed to landfills, where it generates landfill gas, and can contaminate groundwater if not properly treated. Landfill gas typically contains carbon dioxide, methane, volatile organic compounds (VOCs), hazardous air pollutants (HAPs), and odorous compounds that can adversely affect public health and the environment at the local and global level.[6] Incineration is an alternative for treating solid waste, and, managed well, energy can be recovered from incineration to generate usable heat, electricity or fuel. However, incinerators also contribute to environmental impacts by generating toxic emissions such as heavy metals, dioxins and furans. Without comprehensive best-in-class pollution control equipment, incinerators can negatively affect the health of surrounding communities.

The focus for solid waste is reducing the total amount of waste being generated to begin with, and the diversion of solid waste to recycling. The proper segregation and diversion of non-infectious materials from RMW to solid waste can actually grow this waste stream while decreasing others. Some of the specific waste reduction strategies being employed by leading hospitals include setting up internal reuse programs, donating equipment and supplies for external reuse, food waste and paper use reduction programs (Figure 2.7).

Figure 2.7: Waste Reduction and Prevention



6 US EPA. Landfill Methane Outreach Program, 2016. https://www3.epa.gov/lmop/faq/public.html. Accessed on October 3, 2016.

Food Waste Reduction and Prevention

Preventing food waste is of growing concern to hospitals, as well as to a wide range of other sectors. It is estimated for each staffed bed, an estimated 3.42 pounds of food waste is generated per day—giving a typical 200-bed hospital a food waste footprint of nearly 684 pounds of food waste each day. The EPA estimates that more food waste reaches landfills and incinerators than any other single material, constituting 21 percent of discarded municipal solid waste.[7]

Wasting food causes environmental and human health problems not only from disposal and treatment, but also from the loss of massive quantities of resources used to produce, package and transport the food, from pesticides and fertilizers, to energy and water. Fifty-three percent of participating hospitals have a food waste reduction plan or policy that is being implemented. With one in seven people hungry or at risk of being hungry, alternatives to simply wasting food can also be found—for example, by donating excess food to Feeding America[8] food banks. Practice Greenhealth has developed a pilot project with Feeding America to highlight the use of food donation programs as a viable option for improving food security while reducing hospital waste. Only 12 percent of the data set currently have food donation programs in place—in many cases due to misperceptions on the liability or risk of donating food.

Re-using fats, oil and grease as a fuel source is another option, and many participating hospitals (49 percent of the 2015 data set) are now recycling cooking oil. Turning residual food waste into compost can also reduce food waste quantities, as well as greatly enrich soils, reducing the need for fertilizers and improving landscapes. Composting of food waste is growing, as more hospitals realize the cost and environmental benefits associated with composting. In 2015, 35 percent of participating hospitals were engaged in some form of food waste composting, whether that be pre-consumer, post-consumer (in tray or in the cafeteria) or from catering events. One challenge holding back composting, aside from training staff, employees and visitors to separate compostable materials, is the need to eliminate polystyrene (Styrofoam) in cafeterias, and replace it with cost-effective compostable options that make separation of materials easier. See the food chapter of this report for more detailed information.

Minimizing food waste and finding environmentally preferable ways of managing it both reduces costs and improves environmental and community health outcomes. Setting a food waste reduction goal can help to focus efforts in facilities. In May 2016, Practice Greenhealth introduced a Less Food to Landfill toolkit, which provides three levels of increasingly challenging goals—reducing food waste sent to landfill by 10 percent, by 20 percent and by 50 percent (compared to a baseline year). The Less Food to Landfill toolkit can help connect environmental stewardship with healthier communities by combining food waste prevention with donation.

Virginia Mason

Virginia Mason has seen an 80 percent reduction in its waste from kitchen operations in 2015. The hospital accomplished this by using the Virginia Mason Production System (VMPS or Lean) to improve their operations. The kitchen began to cook food from scratch, and focused on just-in-time cooking. Rather than cooking extra trays of items, they made just enough based on their census, and if they ran out, they cooked a new batch at that point in time. With scratch cooking, there was more food prep, and staff had to be trained to keep an eye on how much food they were wasting. The hospital started the WasteWatchers program where each chef is given a clear bin for their food waste, and at the day's end they empty it into a composting bin. This allows them to observe the amount of food they are wasting that could have been used. The supervisors also have a visual way of coaching the team. Virginia Mason estimates that it has reduced food waste by 14 tons in 2015—a 60 percent reduction in food prep waste—by focusing on smarter food preparation processes.

7 US EPA. Food Waste Basics. 2016. https://www.epa.gov/sustainable-management-food/sustainable-management-food-basics#what. Accessed on October 4, 2016.

8 Press Release: Practice Greenhealth and Feeding America Partner to Mobilize the Health Care Sector to Reduce Food Waste and Provide Food to Those who Struggle with Hunger. https://practicegreenhealth.org/about/press/press-releases/practice-green-health-and-feeding-america-partner-mobilize-health-care-sec.

Recycling

Beyond waste prevention, recycling can divert solid waste from the landfill, give new life to materials and potentially generate cost savings for hospitals, depending on the material being recycled. Participating hospitals are now routinely recycling large volumes of materials—due in part to the growing availability of single-stream recycling programs.

The median recycling rate for participating hospitals in 2015 was 28 percent. While the number may vary slightly, it has plateaued for many hospitals around the 30 percent mark (Figure 2.8). While some participating hospitals routinely recycle more than 40 percent of their total waste streams, and the 90th percentile performers are recycling a median of 46 percent of their waste, it can be challenging to identify new recycling wins or to collect additional volumes of the same materials. Increasing recycling rates means ensuring the hospital is capturing a variety of recyclables and is working to maximize the capture rate of those materials. To capture more recyclable materials, leaders need to look into new areas of the hospital such as outpatient and administrative buildings, and to materials that may be available only in smaller volumes, and or may be less easy to gain rebates for. Some health systems have also set up warehouses and instituted backhauling of recyclables with linen or other internal material distribution to maximize volumes and potential rebates for recyclable materials.

Recycling can be classified into two subsets: solid waste recycling and universal waste recycling. Commonly recycled solid waste materials include confidential paper, mixed-office paper, mixed plastics, corrugated boxes, glass and steel cans from the kitchen (Figure 2.9). Universal waste recycling includes materials that meet the regulatory definition for hazardous waste but if collected, stored and recycled under certain conditions, can be managed as universal rather than hazardous waste. This includes fluorescent lamps, batteries, some electronics, and mercury-containing equipment. Depending on the quantities and exact materials being handled, universal waste streams that have been approved for removal as recycling under RCRA do not count toward hazardous waste generator status. Given how expensive it is to treat hazardous waste, there is a clear cost and regulatory incentive for recycling universal waste streams.

The costs for recycling are typically driven by the availability of haulers, and include compactor or container rentals, tipping fees, fuel surcharges and taxes. The ease of separation, pick up and collecting the recyclable materials also affects costs. For solid waste recycling, such costs can be offset—or even completely covered—by rebates and payments for materials, though these rebates can vary based on markets for the materials. When recycling costs are compared per ton to costs for landfill and/or incineration of the same materials—recycling typically comes out ahead. Solvent reprocessing is also a viable recycling program with strong costs savings (although not within the universal waste realm), and is discussed in the hazardous waste section of this chapter.

Figure 2.8: Recycling Rate Trends (2008-2015)

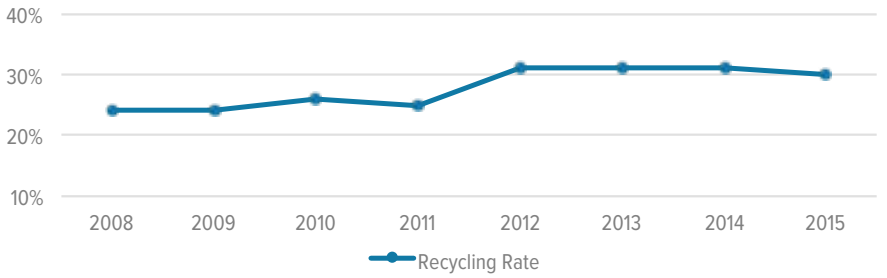
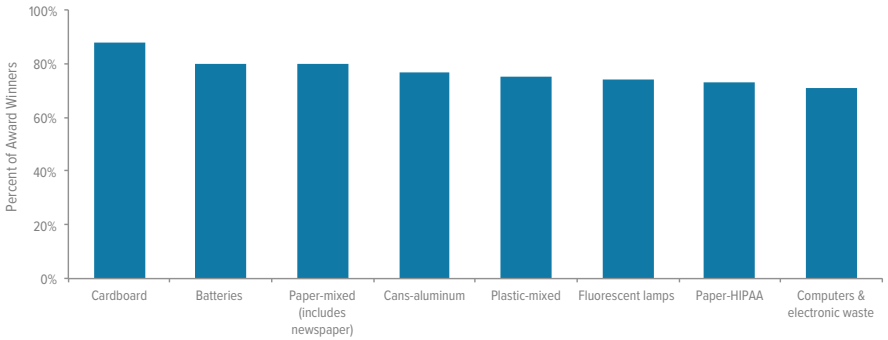


Figure 2.9: Most Commonly Recycled Materials



Regulated Medical Waste

Regulated Medical Waste (RMW) is material that is considered infectious or biohazardous and requires segregation, special handling and treatment, as determined by state regulation. RMW typically includes sharps; items saturated, soaked or dripping with blood; microbiological waste; pathological and anatomical waste; and non-RCRA/ trace chemotherapy waste bound for medical waste incineration. The 2015 hospital median for RMW was 6.9 percent of total waste. This year's median is slight increase from the 2014 median of 6.5 but not surprising given slight differences in this year's data set as well as lingering universal precautions required by the Ebola scare in 2014.

Figure 2.10: RMW as a Percent of Total Waste

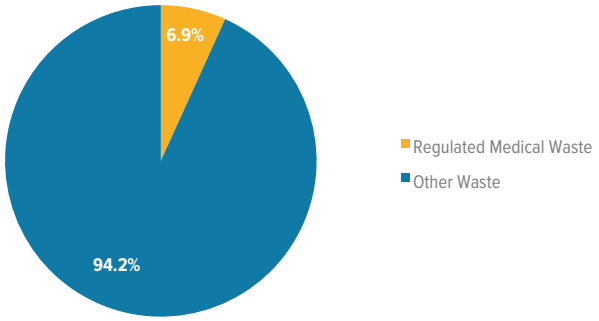


Figure 2.11 presents the normalized metrics for RMW generation, presenting those with the highest correlation first. The two best normalizers (according to R-squared analysis) for RMW are tons of RMW per OR and pounds per staffed bed per day. Both have risen slightly to a median of 5.80 tons of RMW per OR per year and 1.95 pounds of RMW per staffed bed per day—for the same reasons as noted previously.

Figure 2.11: Normalized Regulated Medical Waste Metrics[9]

Normalized Regulated Medical Waste Metrics	All	Small	Large	Circle	90th
Total tons of RMW per OR	**5.80**	5.76	5.80	4.63	2.33
Total pounds of RMW per staffed bed per day	**1.96**	1.98	1.96	1.53	0.92
Total tons of RMW per square foot	**0.21**	0.21	0.21	0.15	0.09
Total pounds of RMW per FTE	**88.16**	91.63	83.57	59.32	38.79
Total tons of RMW per patient day	**3.00**	2.97	3.12	1.99	1.47
Total tons of RMW per adjusted patient day	**1.43**	1.44	1.27	1.20	0.56

9 While Practice Greenhealth has included patient day and adjusted patient day in this chart, they have r-squared values of 0.61 and 0.57 meaning both are weaker indicators of predicting accurate RMW generation rates.

MAYO CLINIC HEALTH SYSTEM

Mayo-Clinic Rochester is a large health care organization—with more than 1,500 licensed beds as well as significant health care research laboratories and a school of health sciences for health care professional education. In order to divert waste streams from the landfill and control costs, Mayo Clinic designed and runs a recycling center where material from across its three Minnesota hospitals (health, research and education campuses) is sorted and processed for transport offsite. Here, they separate and recycle 46 different waste streams—sorting, aggregating and compacting the material, which allows the organization to earn more substantial rebates for recyclables—reducing waste costs.

The recycling center gathers and compacts 1,000 pounds a day of Styrofoam (primarily coolers) from laboratories and pharmacy. The Mayo Clinic-Rochester shreds 220,000 pounds of mixed recyclables a month—or five semi-trucks worth of material—and also processes approximately two semi loads of electronics monthly. All materials are compacted or bailed and the materials are sold on the market. Mayo expanded its patient care/laboratory plastics program to additional spaces in 2015 and saw a 22 percent increase in its plastics recycling in 2015 as compared to 2014. As a co-benefit, students from the Medical College and the Mayo School of Health Sciences learn about proper sorting and recycling through their clinical experiences at the hospital and in the laboratories—creating sustainability leaders of the future.

This expensive waste stream was responsible for 40 percent of the average hospital's waste budget in 2015. The median treatment and disposal cost per ton is $1,142 for RMW, with significant differences between hospitals that disinfect waste onsite vs. those who utilize offsite treatment technologies. The median cost per ton for onsite treatment of RMW was $956 per ton while offsite treatment cost a median of $1,198 per ton. Smaller hospitals paid considerably less than larger hospitals for onsite treatment (Figure 2.12). It is important to note, however, that many hospitals did not include the cost of labor, training, energy or water costs to run the onsite treatment technologies. Hospitals that treat RMW onsite utilize several different technologies with the majority of hospitals utilizing an autoclave at 81.4 percent (Figure 2.13).

Figure 2.12: Median Cost for RMW Treatment and Disposal (per ton)

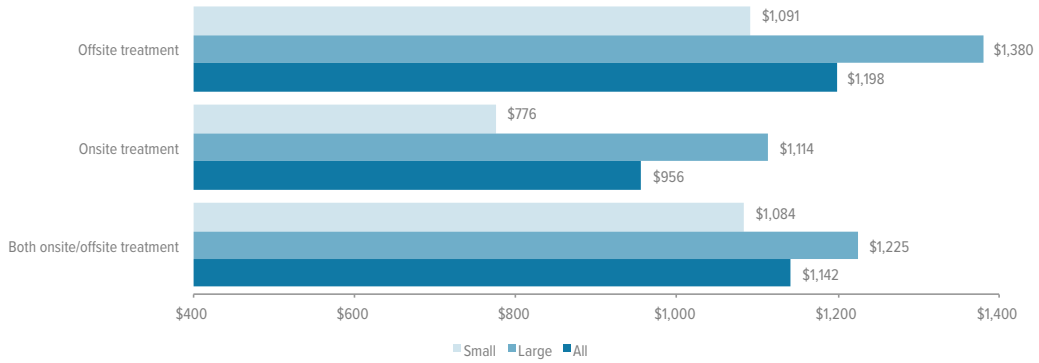
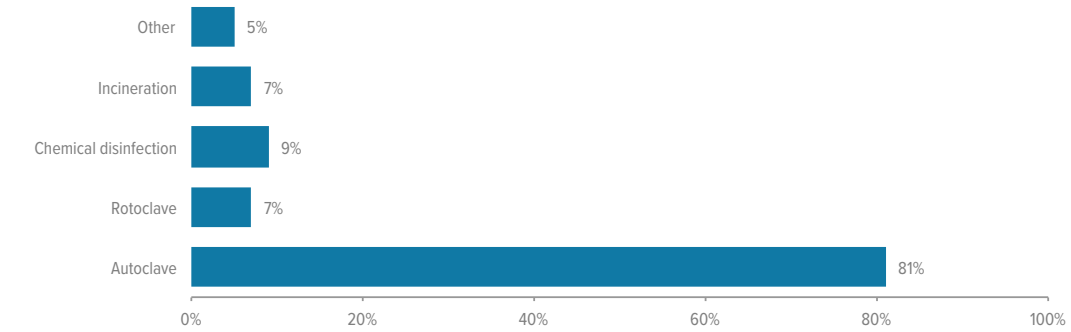


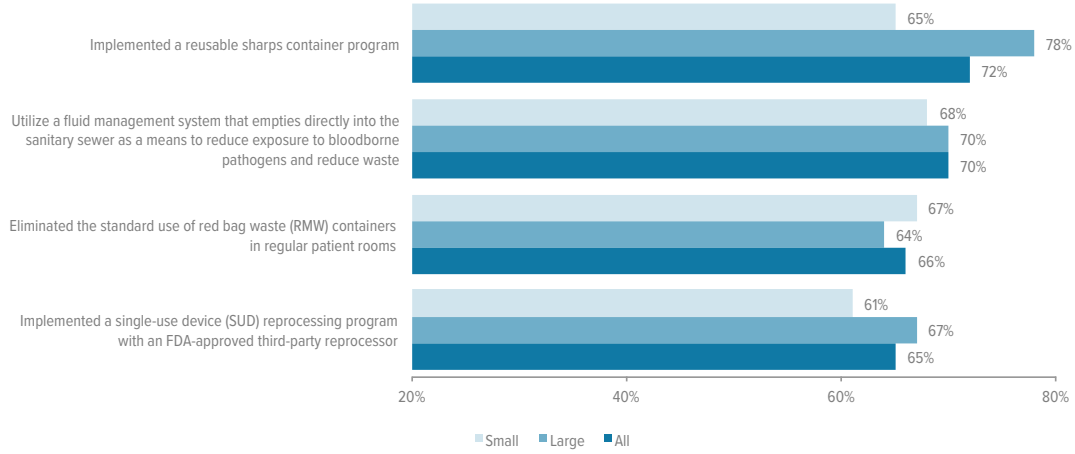
Figure 2.13: Onsite RMW Treatment Technologies



Reducing the generation of RMW drives down costs and environmental impacts substantially, and most participating hospitals are employing strategies such as eliminating the standard use of red-bag waste containers in regular patient rooms,

implementing a reusable sharps container program, implementing a single-use device reprocessing program and instituting a fluid management system for liquid RMW (Figure 2.14). Growth in such strategies is evident, and nearly all winners of the Top 25 Environmental Excellence award and Waste Circle of Excellence winners are employing these strategies.

Figure 2.14: RMW Reduction Strategies



Hospitals have learned that proper container placement and sizing are key to minimizing red bag waste. Removing red bags from under handwashing sinks and from patient rooms and replacing necessary red bag containers with smaller containers makes proper segregation easier and more intuitive. Instead of disposing of sharps containers as regulated medical waste, leading hospitals utilize reusable sharps containers that are machine-emptied, washed and then reused—diverting tons of plastic waste from the landfill. The median avoided RMW tonnage from using reusable sharps containers was 10.5 tons per facility annually—an estimated cost savings of nearly $12,000—with larger facilities seeing considerably higher savings. More detailed information on fluid management systems and single-use device reprocessing can be found in the OR chapter of this report.

UW Medicine
HARBORVIEW MEDICAL CENTER

Harborview Medical Center has had a keen focus on RMW minimization with an impressive 4.7 percent RMW rate. It has achieved this success by continuing to evaluate new opportunities for waste reduction and diversion. Harborview implemented a new disposal process for single-use, non-critical instruments such as trauma shears, tweezers, sterile scissors and other small metal instruments that cannot be reprocessed. Historically, these items have been placed into sharps containers where they are treated as RMW and ultimately end up in the landfill. They are now collected in a designated container located in the soiled utility room and picked up by staff from central processing. After the instruments have been cleaned and sterilized, they are placed into empty five-gallon pickle buckets for transport to the scrap metal dumpster outside for recycling. The clean, empty pickle buckets are provided by nutrition and food services. As a result of the program, Harborview has diverted a significant volume of waste from the landfill.

Hazardous Waste

The regulatory maze governing hazardous materials and waste in hospitals is complex. Hospitals have a legal obligation to identify and properly manage waste classified as hazardous by the US EPA's Resource Conservation and Recovery Act (RCRA) Subtitle C and per state-specific rules. Likewise, they are accountable to the federal and state occupational safety and health administration (OSHA) for their handling of hazardous materials. Many hospitals struggle with the hazardous material/waste characterization process and find themselves cited for mismanagement. Top contributors to the generation of hazardous waste in hospitals include pharmacies, laboratories, maintenance shops, morgues, ORs, and chemotherapy treatment centers. Hazardous wastes may include mercury containing equipment, lab chemicals, fixatives and solvents, refrigerants, and pesticides, as well as certain pharmaceuticals. Waste materials can also acquire hazardous waste status if they are mixed, contaminated or derived from other wastes that are hazardous. Different hazardous waste handling rules apply depending on the quantity, type and characteristic of the waste material, and rules can be complex.

Hazardous waste is the most expensive waste stream to manage, due to the specific disposal techniques required to ensure safety and environmental protection. While it is typically a small percentage of overall hospital waste by volume (a median of 0.4 percent), because it is so costly even very small amounts can add up. And that does not count the potential costs and liability for mismanagement or a regulatory infraction. A Delaware hospital was fined more than $84,000 in 2015 when state regulators identified 22 violations regarding the mishandling of pharmaceutical wastes.[10] In 2015, hospitals participating in the Practice Greenhealth Environmental Excellence Awards program paid a median amount of $4,245 per ton to dispose of hazardous waste. By way of comparison, the median total cost of waste per ton (for all types of waste, including hazardous waste) was $181 in 2015.

Overall rates of hazardous waste being generated by participating hospitals have largely held steady over the past three years—at less than one percent of total waste. But at the individual facility level, rates can vary significantly in a given year if a laboratory clean-out was conducted, or if a large volume of product (such as alcohol-based hand scrubs) expired and required disposal. The generation of hazardous waste does not correlate well with any of the typical normalization factors used by Practice Greenhealth—although from a statistical perspective, square footage and the number of full-time employees (FTEs) had the highest correlation via R-squared analysis. What is apparent, however, is that hospitals with onsite labs or onsite research have significantly higher generation rates of hazardous waste. One might also expect that hospitals that either specialize in cancer treatment or are cancer specialty hospitals would also see higher generation rates due to their use of chemotherapeutic agents—the vast majority of which are treated as hazardous waste.

10 State of Delaware. DNREC Public Affairs. http://bit.ly/2dBlvp1 . Accessed on October 6, 2016.

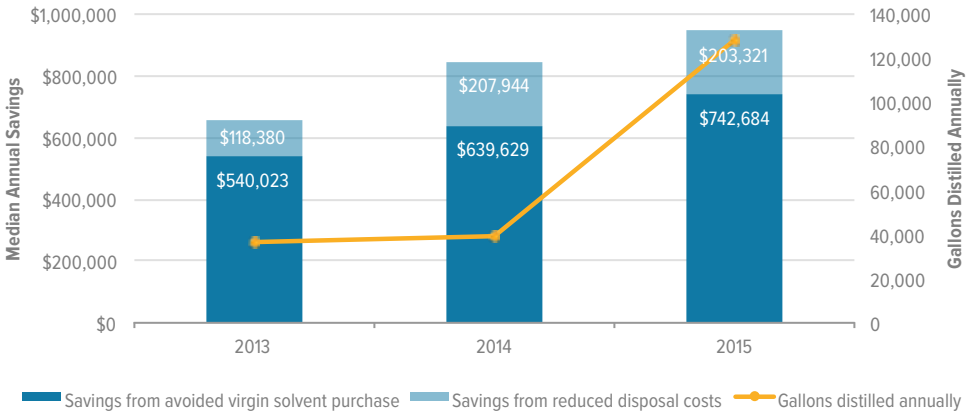
Waste Sort Day at Hudson Hospital, Hudson, Wisconsin

The 2015 data indicates that 83 percent of participating hospitals had laboratories onsite and 27 percent of participating hospitals had onsite research labs—mostly academic medical centers. Laboratories can generate a range of hazardous waste streams including corrosive and flammable chemicals, fixatives, stains, and solvents which need to be carefully identified and managed as hazardous waste. Some of the most common hazardous waste violations occur in the lab setting and include disposing of hazardous waste down the drain, failure to perform or improper hazardous waste determinations, and lack of or inadequate training of employees in hazardous waste management and labeling.

Given the costs and impacts, reducing hazardous waste is a priority for many hospitals. As a first step, it is very important to identify the different hazardous materials and wastes across the facility. Performing an internal audit is one standard mechanism for ensuring compliance with hazardous materials/waste regulations. Eighty-five percent of facilities in the data set contract for, or perform internally, a hazardous chemical/material audit by hospital department and update at least annually.

There are a range of strategies for reducing the generation of hazardous waste. These strategies include diversion to universal waste through recycling, product substitution, stock rotation to avoid expiration, microscale chemistry, internal reuse and just-in-time purchasing of chemicals to avoid overage and waste. Certain solvents such as formalin, xylene or alcohols can also be recycled or reprocessed onsite, through distillation. While many of these chemicals would otherwise be considered hazardous waste, solvent reprocessing can give these chemicals a second life—reducing the purchase of virgin solvent as well as disposal costs. The use of solvent distillation/reprocessing as a strategy has continued to grow. Twenty-eight percent of facilities with an onsite laboratory are doing solvent distillation, with a median savings of $11,779 per facility annually. Savings per facility can vary widely based on the kind of lab procedures performed.

Figure 2.15: Trends in Aggregate Solvent Distillation and Reprocessing



Park Nicollet HealthPartners

In 2015, Park Nicollet Methodist Hospital reduced its hazardous waste by 3.37 tons over 2014 results—largely due to education and having an embedded Clean Harbors technician at the campus full time. The hospital also has an established solvent reprocessing program and was able to distill 3,900 gallons of laboratory solvents (xylene, alcohols and formalin), saving the organization $79,800 in avoided purchase costs for new solvents and $6,900 in avoided disposal fees in 2015.

Alcohol/Xylene Distillation Unit

Formalin Distillation Unit

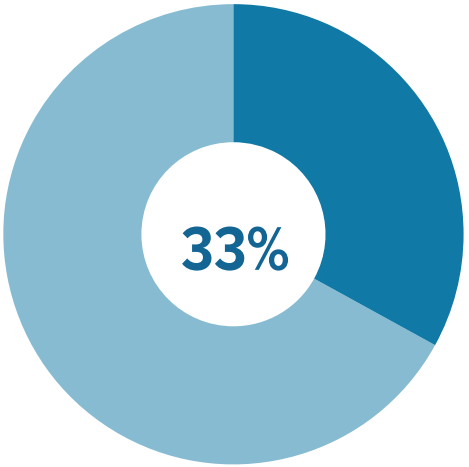
Pharmaceutical Waste

Managing pharmaceutical waste is perhaps the most complex challenge in the waste management arena. Pharmaceuticals are showing up in lakes, streams and rivers—and even in drinking water—at concentrations high enough to draw concern. A decade ago, much of this waste stream found its way into red bags or got dumped down the drain—with many hospitals oblivious to the stringent regulations that pertained not just to hazardous waste but also to certain pharmaceutical wastes considered hazardous. Hospitals struggled—and in many cases continue to struggle—to not only identify which pharmaceuticals qualify as hazardous, but also to train and educate pharmacy and clinical staff on the proper segregation and disposal parameters for this waste stream.

Current best practice involves the hospital conducting a formulary review to assess which drugs need to be legally handled as RCRA hazardous, as well as a determination of which drugs may not qualify as hazardous waste but should be specially managed to protect human health and the environment. Some hospitals specially manage all drugs on the NIOSH Hazardous Drug list, for example. This second set of drugs (non-RCRA by definition) include antidepressants, statins, hormone-replacing therapies, and antibiotics—to name a few. Some hospitals have chosen to dispose of all pharmaceuticals as hazardous waste, opting for the most protective management scheme while avoiding much of the training necessary to achieve proper segregation of RCRA versus non-RCRA drugs. Thirty-three percent of participating hospitals have chosen this comprehensive management approach (Figure 2.16). But due to the high cost for hazardous waste management, this approach can be very costly. Another set of hospitals have chosen to segregate and send the non-RCRA portion for disposal via incineration—medical waste or solid waste incineration depending on the hauler. The former strategy eases the burden on practitioners but includes high disposal fees; the latter strategy improves segregation onsite but requires increased staff training, education and onsite auditing costs. There is no way around the focus required for a legal and safe process for pharmaceutical waste segregation.

Figure 2.16: Pharmaceutical Waste RCRA Treatment

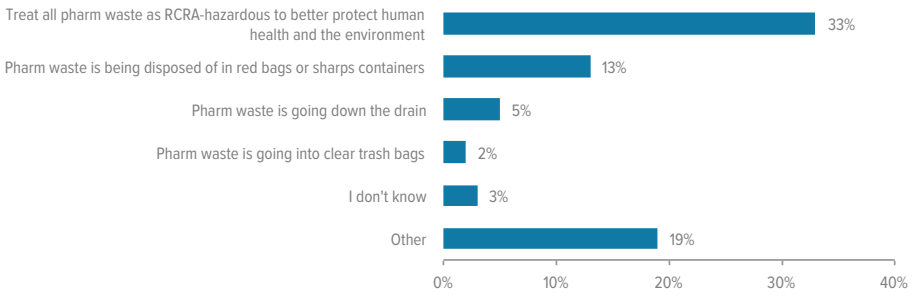
Percentage of facilities that treat all pharmaceutical waste as RCRA-hazardous to better protect human health and the environment.



Of the hospitals that were unable to provide data for non-RCRA pharmaceutical waste going out for incineration, hospitals indicated the alternative management strategies in Figure 2.17. From an environmental impact perspective, drain disposal (for pharmaceutical waste other than saline or Ringer's solution) and disposal in a standard red bag or sharps container bound for steam sterilization (with residual steam going to the sanitary sewer) are not preferable choices because they allow pharmaceuticals to enter our waterways.

Some pharmaceutical wastes are further classified as controlled substances by the Drug Enforcement Agency (DEA). Controlled substances need to be handled in a specific way when disposed of to eliminate the potential for abuse—including techniques such as "witnessed wasting" that render the waste as irretrievable. The best management approach for disposal of controlled substances is a hot topic in health care today, as increased concern over sewering of any pharmaceutical material is leading to conversations around how to legally render controlled substances irretrievable while avoiding sewer disposal.

Figure 2.17: Alternative Disposal Methods Used for Non-RCRA Pharmaceuticals



There are a range of viable pharmaceutical waste reduction strategies that hospitals are employing to minimize this expensive waste stream. The University of Wisconsin Hospitals and Clinics has developed an impressive set of recommendations for minimization of pharmaceutical waste (shared with permission in Figure 2.18).

Figure 2.18: University of Wisconsin Hospitals and Clinics - Pharmaceutical Waste Reduction Strategies

Pharmaceutical Waste Reduction Strategies	Details	Reduces Amount	Reduces Toxicity
Administer a patient-specific dosage	Prepackaged unit dose drugs are replaced with patient specific doses to prevent waste from partial use, especially in neonatal and pediatric units. This strategy may also be used for drugs that are acutely toxic waste when discarded, whose "containers" must also be managed as hazardous waste.	Y	N
Commit publicly to avoid inappropriate prescribing	Health care providers make personal and public commitments not to issue prescriptions unless medically indicated.	Y	N
Maximize shelf life	Drugs are stored at appropriate temperature, light level, moisture, etc. such that their shelf-life is prolonged or maximized. Or a facility may switch to pre-mixed products, which have a longer shelf life than reconstituted products.	Y	N
Minimize drug order	Health care providers order only enough of a drug from the pharmacy as will be used in a given procedure or as needed by a patient. For procedures, a pharmacist may agree to be on hand to mix more of a drug as needed. This idea can be expanded to the facility, which should only purchase as much of a drug as will be used, in order to minimize drug expirations.	Y	N
Provide non-pharmacological alternatives	This strategy involves creating an environment or offering treatment alternatives which can help people heal faster with fewer drugs. For example, a health care provider may serve healthy fresh food and beverages, incorporate natural designs, increase use of natural light, or create spaces for meditation such as healing gardens. The provider may also offer non-pharmacologic interventions, such as acupuncture or yoga or playing meditative music before surgery, in order to help patients rely less on medications.	Y	N
Repackage large quantities into unit doses	Drugs are bought in large quantities and the pharmacy splits them into unit doses.	Y	N
Rotate drug stock	Medications nearing expiration are reallocated to areas of high use. For example, drugs in patient floor medication cabinets, crash carts, malignant hyperthermia kits and other decentralized locations can be allocated to the emergency department. Or, drugs within storage areas can be arranged so that the oldest stock is used first.	Y	N
Use alternate packaging	Specialty packaging for drugs which are not often used are replaced with an alternative packaging, which both allows for proper administration of the drug and the flexibility to use that drug elsewhere if needed before expiration.	Y	N
Use an alternate drug or drug combination	Commonly wasted pharmaceuticals are replaced with alternative, lower-waste or less-toxic drugs or combination of drugs with equal efficacy. For example, a drug may have multiple formulations with varied minor components (excipients) which may significantly affect the drug's eco-toxicity.	Y	Y
Use trial sizes for initial prescriptions	For patients starting new prescriptions, a trial size is issued initially, which can be filled later in full, especially for medications with high rates of discontinuation.	Y	N
Analyze inventory and modify purchasing	Demand for pharmaceuticals and current inventory is analyzed with usage reports, especially from a computerized inventory management system, which can track use and wastes, among other functions. The analysis is used to determine appropriate dosages to be purchased and to modify orders. A facility may choose to switch to premixed products, which have a longer shelf life than reconstituted products.	Y	N
Donate medications	Health care facilities donate non-expired drugs to legitimate non-profits, locally or internationally.	Y	N
Maximize use of opened/bulk containers	Medications are administered to multiple patients from a single bulk container, especially those that must be disposed of when a patient is discharged.	Y	N
Minimize size of containers	Higher volume containers of medication are replaced with smaller containers to avoid waste from partial use, where appropriate.	Y	N
Re-label for home use	Medications are either prelabeled or relabeled for a patient to take home and use after being discharged from the facility. This strategy could apply to any prescription medication, but particularly to inhalers, creams, ointments, ear drops, antibiotics and sometimes insulin.	Y	N
Require samples to have long shelf life	Require pharmaceutical representatives to log dates of sample medication drop off and expiration. Only allow samples with one or more years of shelf life left.	Y	N
Use voucher option for samples	The health care facility keeps only a limited amount of commonly used sample drugs in stock, reducing potential for waste. Drug manufacturers provide sample vouchers to the health care facility, which can be given to patients to be filled in a trial dose size at a pharmacy. The pharmacy is reimbursed by the manufacturer.	Y	N
Use an alternate delivery method	Drugs which would be wasted if delivered the usual way, such as using an IV mixture are delivered in a different manner, such as a syringe.	Y	N
Use expired medications during education	First time administering pharmaceuticals may be challenging. Practice sessions will increase efficiencies but can be expensive to use medications from stock. Expired medications provide opportunities for practice during mock drills or educational modules.	Y	N

Total Waste

As hospitals make progress on better segregation of waste streams—moving solid waste out of RMW, moving recycling out of solid waste—it will become more challenging to derive incremental gains. A central focus on prevention of waste needs to be integral to any hospital's waste management approach. As hospitals gather better data on the volumes and costs of different waste streams within the hospital, it becomes possible to identify trends and do deeper analysis on what processes are generating large volumes of waste. Some examples might include:

- Surgeries are generating large volumes of suction canisters and fluid waste.
- Nursing is generating large volumes of paper waste—with one daily report routinely comprising 40 pages of paper per patient.
- Endoscopy is generating a large volume of chemical cartridge waste because one of the most commonly used endoscopes is not autoclavable.

This kind of targeted waste analysis allows hospitals to take the next step and think about how can they prevent the waste to begin with, rather than identifying less impactful disposal routes. In the scenarios above, the hospital might consider:

- Could a reusable canister fluid management system reduce worker exposure risk while also reducing supply costs and generation of RMW in the OR by disposing of liquid waste automatically to the sanitary sewer?
- Could nursing consider whether they need a printed version of the daily report or whether an electronic copy used for documentation and accessible through a tablet for clinical staff might work instead?
- Could endoscopy evaluate if there are other versions of the same scope that are autoclavable, reducing the need to purchase separate chemical disinfection cartridges for each scope cleaning?

Practice Greenhealth has been measuring total waste for hospitals since 2013. In 2015, all of the total waste metrics decreased slightly due to the change in composition of the data set (inclusion of all award applicants rather than just Partner for Change winners and above) but still stayed fairly steady—moving from 86.00 to 90.35 tons per OR annually. A review of the data suggests that for award winners only, the total waste metrics have stayed steady or improved slightly—suggesting that hospitals have not made major improvements in the area of waste prevention, and that it needs to be more fully represented in organizational goals. Total waste metrics are provided in descending order (based on R-squared correlation) in Figure 2.19.

Figure 2.19: Total Waste Metrics (in tons)

	All	Small	Large	90th %
Total tons of waste per OR per year	**90.4**	93.3	89.6	44.0
Total pounds of waste per FTE per year	**1,378**	1,426	1,347	769
Total pounds of waste per square foot per year	**3.1**	3.3	2.9	1.9
Total pounds of waste per adjusted patient day	**21.1**	21.2	20.8	11.6
Total pounds of waste per patient day	**42.5**	41.5	45.5	26.8
Total tons of waste per staffed bed annually	**5.17**	5.21	5.16	2.90

MedStar Franklin Square Medical Center
Kick the Cup campaign

Conclusion

Hospitals continue to find new and innovative ways to drive down total waste generation while diverting more material from the landfill and ensuring safer disposal for more toxic waste streams. While the sector continues to celebrate impressive recycling rates, structural challenges in the recycling markets may make it challenging to continue to grow this material stream—pushing hospitals to shift their focus to preventing or reducing waste at the source through process substitution and efficiency analysis. Together, Practice Greenhealth participating hospitals recycled 121,556 tons of material in 2015 and netted nearly $23.7 million dollars in savings through recycling.

Hospitals continue to improve and refine their management of regulated medical waste. Hospitals can save around $1,000 per ton by shifting waste from RMW to solid waste or recycling. Pharmaceutical waste management continues to be a challenge for many hospitals—both financially and from an environmental impact and compliance perspective. And the proper disposal of controlled substances adds another layer of complexity. The need to reduce and better manage food waste also became more apparent with Practice Greenhealth, the US EPA, universities, and other major non-governmental organizations launching campaigns to meet the EPA and USDA goal to reduce food waste rates by 50 percent or more—and reduce food waste's contribution to climate change through greenhouse gas emissions from rotting food in landfills.

Green Team at Clement J. Zablocki VA Medical Center, Milwaukee, Wisconsin

Resources

Healthier Hospitals' Less Waste Challenge

Less Food to Landfill Goal and Toolkit

Practice Greenhealth Pharmaceutical Waste Web Page

University of Wisconsin Health's Pharmaceutical Waste Reduction Guidance

Safer Chemicals

Hospitals purchase and use a wide range of products in the delivery of care to patients. While these products serve an important function in the treatment and protection of patients, some products contain materials and chemicals that can have negative impacts on human health and the environment. Practice Greenhealth award-winning hospitals are pioneering programs to identify and minimize patient and staff exposure to potentially hazardous substances in their facilities. This work can span several functions across the hospital, including patient care, cleaning processes, sterilization and disinfection, pest management, and procurement of paints, furnishings, and other products that can offgas harmful chemicals.

This chapter summarizes how hospitals participating in Practice Greenhealth's Environmental Excellence Awards are conducting safer chemicals programs, and highlights a range of innovative approaches across various aspects of patient care and staff welfare.

This year's Safer Chemicals highlights include:

78%
of hospitals have chemical or purchasing policies that identify specific chemicals of concern to human health and the environment.

79%
purchase third-party certified green cleaning chemicals for at least one product category.

30%
indicate they have programs in place to purchase furniture or furnishings that avoid chemicals of concern.

93%
identify and/or avoid mercury in purchasing policies, with 44% having earned the Making Medicine Mercury Free Award.

2016 Chemicals Circle of Excellence Winners

The Chemicals Circle of Excellence celebrates facilities with sound chemical reduction policies and practices. Winners address toxicity through purchasing, replacement of products, services and equipment, and educate their staff and the community on hazardous chemicals, and chemicals of concern.

Advocate BroMenn Medical Center
Bloomington, IL

Advocate Christ Medical Center
Oak Lawn, IL

Advocate Good Samaritan Hospital
Downers Grove, IL

Advocate Sherman Hospital
Elgin, IL

Cleveland Clinic-Marymount Hospital
Lyndhurst, OH

Dartmouth-Hitchcock Medical Center
Lebanon, NH

Hackensack University Medical Center
Hackensack, NJ

James E. Van Zandt VA Medical Center
Altoona, PA

University Hospitals Ahuja Medical Center
Beachwood, OH

Yale-New Haven Hospital
New Haven, CT

100%

of Circle of Excellence winners have transitioned to green cleaning chemicals for four primary cleaning product categories—general purpose, window/glass, bathroom and floor cleaners, with nearly 100% spend on third-party certified green options. Together, these winners spent a median of **89%** of their cleaning budgets on certified green cleaning products.

80%

of Circle of Excellence winners require furniture to meet an environmental standard/ certification or obtain LEED HC credit.

90%

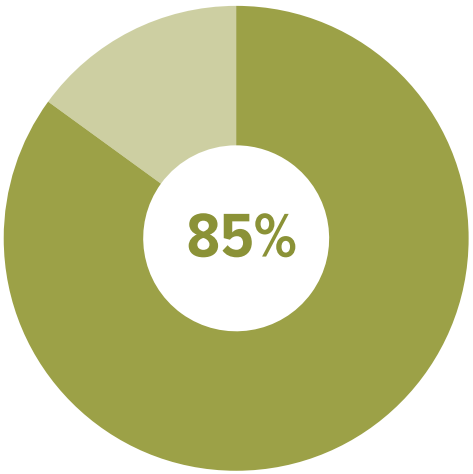
of Circle of Excellence winners have a DEHP/PVC reduction program in place.

Getting Started on Chemicals

There are several steps hospitals can take to reduce exposures to chemicals used throughout health care that may have links to health problems. A safer chemicals focus often begins with an organizational commitment to reducing unnecessary exposures, identifying one or more product categories to address, and preferring products that contain safer materials and chemicals. A first step involves hospitals identifying what chemical products are being utilized in their facilities, and how to properly manage those chemicals while they are in use and during disposal. Conducting a hazardous material audit each year is a foundational element that ensures hospitals are aware of where and how hazardous materials/wastes are being handled across the facility. Participating hospitals were asked if they contract for, or perform internally, a hazardous chemical/material audit by hospital department each year. Overall, a total of 85 percent of award participants have this element in place.

Figure 3.1: Hazardous Chemical Audits

Percentage of facilities that undertake hazardous chemical audits.



While internal audits support environmental compliance efforts and can be used to identify opportunities for hazardous material or waste minimization, they can be limiting in that they typically identify chemicals of concern through the lens of regulatory compliance (such as OSHA or RCRA) or waste management, but stop short of identifying chemicals of concern that may not be addressed by the regulatory framework. The use of formaldehyde in furnishings, for example, is legal—but can offgas and affect indoor air quality. The use of the phthalate DEHP in flexible medical products is also allowable by the FDA, but can leach into the bodies of vulnerable patient populations and cause a range of reproductive health impacts. Today, a hospital focused on safer chemicals must look beyond environmental compliance and understand the opportunities to address other chemicals of concern in the products purchased for use in health care.

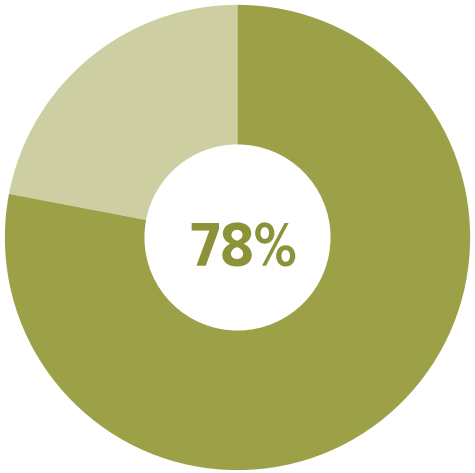
Chemical Policies

One mechanism to address chemicals of concern is to implement policies that identify and minimize these chemicals through the purchasing process. The data indicates that participating hospitals are increasingly taking steps to minimize the use of chemicals of concern by creating policies that state their preference (or requirement) for products made without the use of certain target chemicals. A growing number of hospitals require suppliers to respond to a request for information (or RFI) or address questions during the business review process that ask whether products are free of certain chemicals of concern. While in many cases suppliers are still working to answer these questions or provide safer alternatives, the inquiries are a strong market signal that hospitals have a preference for products that avoid certain chemicals of concern.

The list of target chemicals for many hospitals includes PVC and DEHP, and also flame retardants, other phthalates, bisphenol A, perfluorinated compounds, carcinogens, mutagens or reproductive toxicants, and volatile organic compounds (VOCs). Participating facilities were asked if they have chemical or purchasing policies that identify and avoid specific chemicals of concern in products that may be hazardous to human health and the environment. The majority of facilities have applicable purchasing policies in place (78 percent), and the Top 25 award winners essentially all have relevant policies in place (at 96 percent).

Figure 3.2: Chemical Policies

Percentage of facilities with chemical or purchasing policies that identify and avoid specific chemicals of concern contained in products that may be hazardous to human health and the environment.



Fragrance chemicals are also an area of concern. Many personal care products contain chemicals that are known sensitizers and can trigger allergic reactions including asthma, wheezing, headaches or contact dermatitis. Hospitals have increasingly addressed the use of fragranced personal care products as an employee and patient safety issue, with about half of the facilities in the data set reporting a fragrance-free policy for hospital staff (53 percent).

Green Cleaning

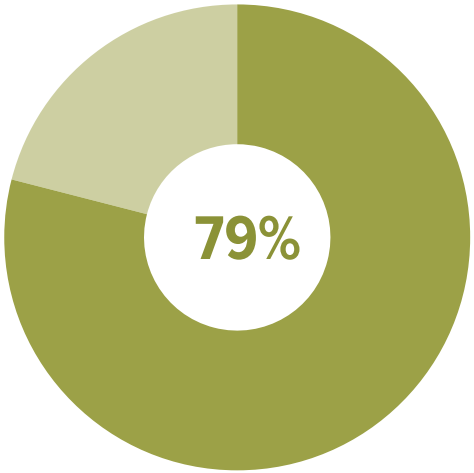
Keeping the hospital environment clean while keeping patients safe from exposure to pathogens is an important goal of hospital staff. Environmental services and housekeeping staff rely on a variety of cleaning and disinfecting protocols to achieve this goal. As chemicals used in the care of patients can sometimes be harmful, so too can chemicals used in the cleaning process—causing asthma, sensitization, allergies and other respiratory impacts in patients and staff. There are a range of cleaning products available that are safer for human health and the environment, as certified by reputable third-party standard organizations such as Green Seal and UL ECOLOGO. Participating hospitals are increasingly switching to green cleaning products that achieve the necessary performance standards with less risk.

A key starting point is to understand which chemicals are being used for surface cleaning and disinfection across the hospital, and where. Seventy-nine percent of hospitals reported conducting an inventory of cleaning chemicals across their institutions. Participating hospitals were asked if they use any Green Seal or UL ECOLOGO-certified cleaning products—almost 80 percent of facilities report that they use at least one Green Seal or UL ECOLOGO-certified cleaning product. The majority of facilities that use green cleaning products use them for general purpose, window/glass, bathroom/restroom, and floor cleaners.

The Chemicals Circle of Excellence winners demonstrate that hospitals can make strong progress in this area. One hundred percent of Circle of Excellence winners have conducted a cleaning product inventory and utilize green cleaning products almost exclusively in these same four categories of cleaners, and spend a median of 89 percent on green certified cleaning products.

Figure 3.3: Usage of Green Cleaning Products

Percentage of facilities that utilize any Green Seal or UL ECOLOGO-certified cleaning products.



Practice Greenhealth analyzed the cleaning chemical data in several ways. Overall, 145 facilities (or 45 percent of the total data set) reported spend for green cleaning products with a median 51 percent of their cleaning chemical spend on Green Seal or UL ECOLOGO-certified cleaning products. Some hospitals, however, did not report spend on certain categories such as liquid/foam handsoaps, which all hospitals purchase and can make up a considerable percent of cleaning chemical spend—if included—driving down the percent spent on green certified chemicals. If handsoaps are removed from the spend data, the spend percentage jumps to 54 percent. Practice Greenhealth also looked at percent spent on just the five target cleaning chemical categories included in the Healthier Hospitals Green Cleaning goal (general purpose, window/glass, bathroom, carpet/rug cleaner and floor cleaners) which totaled a median of 60 percent of spend on certified green cleaning chemicals. This data demonstrates that a substantial community of hospitals are making strong progress on transitioning to greener cleaning products but that there is still substantial room for improvement in certain product categories such as hand soaps, floor strippers, floor finishes and laundry detergent. Likewise, only about half of facilities (47 percent) have instituted a policy and/or implementation plan that specifically addresses environmentally preferable cleaning. Encoding the preference for environmentally preferable chemical selection and cleaning processes in a policy can help build cultural awareness and long-term support for these principles.

Overuse of antimicrobials and the increasing rate of antibiotic resistance are of growing concern to the health care community. The Centers for Disease Control (CDC) makes clear in their guidance on antibiotic resistance that for consumer populations (for hospitals this would only apply to non-clinical areas) there is no added benefit to using soaps containing antibacterial ingredients compared with using plain soap. The FDA recently concurred. The majority of facilities reporting (66 percent) have inventoried their use of antimicrobial hand soaps, which is an important first step in understanding where antimicrobial hand soaps are still in use throughout their institutions, and 39 percent of facilities have eliminated the purchase and use of antimicrobial hand soaps in non-clinical areas. Going a step further, 43

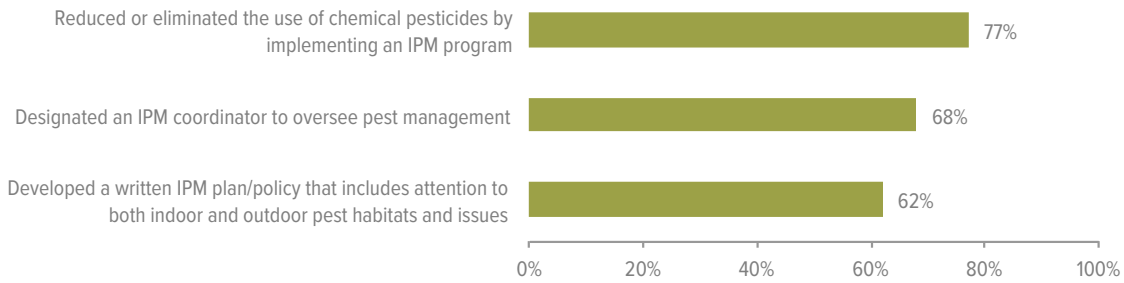
Dartmouth Hitchcock Medical Center (DHMC) is celebrating its second year in the Chemicals Circle of Excellence and its green cleaning work demonstrates that commitment. With 100 percent spend on green certified cleaning chemicals in six of nine categories (general purpose, window/glass, bathroom, carpet/rug, floor, and liquid hand soap), DHMC exemplifies the concept of leading by example with an overall 89 percent green spend in 2015. "Green cleaning chemicals have a lower health risk when used appropriately and help maintain better indoor air quality. These chemicals are also required to be produced with less environmental impact," says John Welenc, Director of Environmental Services for DHMC. Walk-off mats, microfiber mopping and cleaning cloths, recycled content janitorial paper products and trash liners, and low VOC floor finishes round out this program. In 2015, the hospital also moved away from antimicrobials in soaps—consistent with new evidence-based guidelines.

percent of facilities claim to have eliminated the purchase of antimicrobial hand soaps that contain triclosan or triclocarban—antibacterial additives that have been shown to increase antibiotic resistance of some organisms, and are endocrine-disrupting chemicals. These numbers are expected to grow in the coming years as hospitals continue to wage war on antibiotic resistance mechanisms. The majority of facilities also use automatic scrubbing machines and microfiber mops/cloths, reducing the need for harsh chemicals. Some facilities (34 percent) have also begun to incorporate non-chemical methods for disinfecting such as the use of UV light disinfection units. UVGI disinfection is a complementary technology to safe and effective surface cleaning, and has been demonstrated by the peer-reviewed literature to be effective at combating C-difficile in certain clinical areas after cleaning.

Integrated Pest Management

An integrated pest management (IPM) program is a pest management strategy focusing on long-term, non-chemical strategies for the prevention and suppression of pest problems through a combination of structural, cultural, mechanical, physical, and biological controls, with least-hazardous pesticides used only as a last resort. IPM includes looking at the lifecycle of the pest and addressing the factors that determine pest survival (food, water, habitat). Seventy-seven percent of hospitals in the data set have an IPM program in place, and 68 percent have a designated IPM coordinator. Figure 3.4 summarizes the percent of facilities with IPM policies or programs in place to support their IPM efforts.

Figure 3.4: Facilities with Integrated Pest Management Programs



Sterilization and Disinfection

Hospitals work constantly to ensure patient safety through proper sterilization and disinfection practices for medical devices and equipment, traditionally relying on a set of chemical sterilants and disinfectants that may have the unwanted side effect of health impacts on employees. For example, the sterilant ethylene oxide (EtO) is a known human carcinogen. Glutaraldehyde is a known respiratory sensitizer and can cause asthma and other respiratory impacts. Inventorying and replacing the use of these chemicals with safer methods (where possible) are important steps in creating a healthier hospital environment.

Practice Greenhealth focuses on a number of ways to reduce the negative impacts associated with common sterilization or disinfection protocols, including a transition to environmentally preferable instrument detergents, the elimination of glutaraldehyde and EtO through selection of safer chemicals/processes, and the use of automatic machine washers/disinfectors to replace soak bins. Medical devices must be cleaned before they are sterilized/disinfected. Thirty-nine percent of facilities reported utilizing medical instrument cleaners that are certified by EPA's Safer Choice Program. More than two-thirds of facilities have eliminated glutaraldehyde and EtO (75 percent and 70 percent, respectively)—and all Top 25 award winners and Circle of Excellence winners have eliminated the use of both glutaraldehyde and EtO. Commonly used alternatives to these two chemicals are highlighted in Figures 3.6 and 3.7.

Figure 3.5: Sterilization and Disinfection Practices

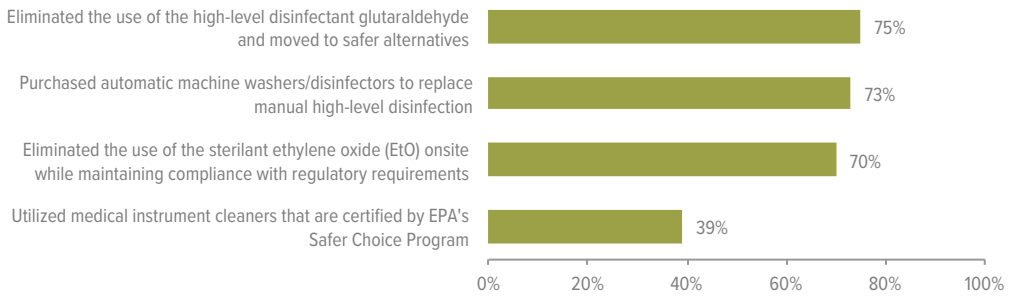


Figure 3.6: Alternatives to Glutaraldehyde

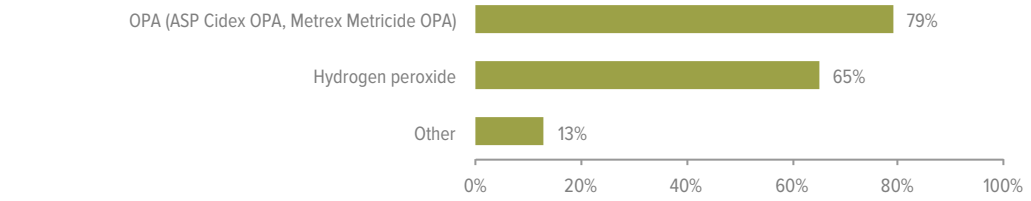
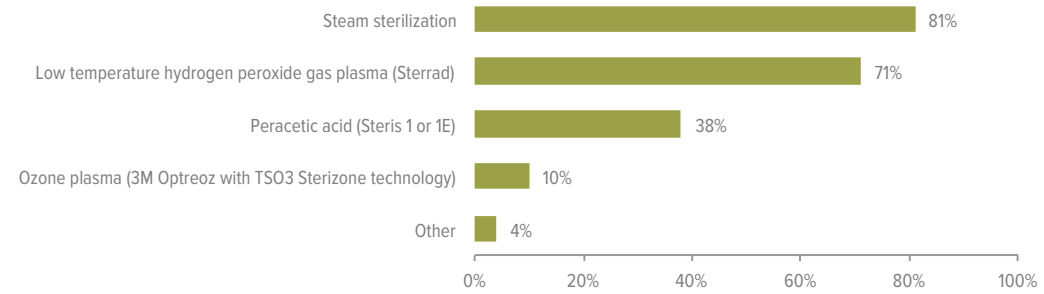


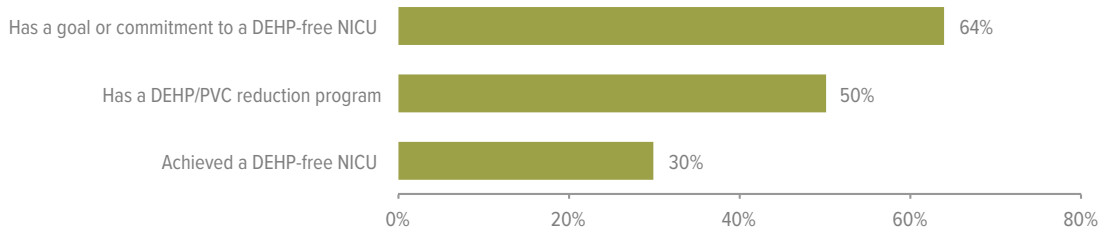
Figure 3.7: Alternatives to Ethylene Oxide



Chemicals of Concern in Medical Devices

DEHP is a chemical used to make rigid plastics (like polyvinyl chloride or PVC) soft and flexible, and is used in a variety of medical plastic applications. An FDA public health advisory recommends that hospitals limit the use of DEHP-containing medical products with sensitive patient populations—particularly male infants in the neonatal intensive care unit (NICU). Overall, half of the hospitals in the data set reported having a DEHP/PVC reduction program in place (50 percent). Sixty-four percent of facilities with a NICU have a goal or commitment to operate a DEHP-free NICU, and more than a quarter (26 percent) have achieved a DEHP-free NICU. It appears that there is a significant difference between the commitment to reducing DEHP and PVC between large and small hospitals—large hospitals with a NICU have a much higher percentage of reduction programs and commitments to DEHP-free NICUs than smaller hospitals (69 percent versus 50 percent).

Figure 3.8: Facilities' Activities to Reduce DEHP and PVC



Practice Greenhealth has also worked hard to help hospitals address and eliminate the use of mercury—a potent neurotoxin—in medical devices and products. Ninety-three percent of hospitals indicated they have either established a mercury-free purchasing policy or included it within a broader chemicals or purchasing policy. Hospitals have made strong progress on the elimination of mercury in thermometers, blood pressure and other clinical devices such as bougies and dilators with hospitals reporting at greater than 85 percent for all three product categories. Although only 44 percent of participating facilities have won the Making Medicine Mercury Free Award (MMMF), this is not necessarily an indicator of lack of progress but instead demonstrates that hospitals have silently done the hard work while not always seeking recognition for that work.

HackensackUMC

In 2015, Hackensack University Medical Center (HUMC) made a DEHP-Free NICU a formal goal of its Purchasing Department Green Team. HUMC updated their inventory of supplies in the NICU and met with each vendor that had a product which contained DEHP. The hospital immediately converted to DEHP-free options for the following three products: ear and ulcer syringe, infusion set tubing and mucous specimen trap. HUMC inventoried the the mother baby unit, general pediatrics, labor and delivery, PICU, and pediatric oncology. They met with their GPO and notified companies of their intent to eliminate DEHP from not only the NICU but also the Women and Children's Hospital.

> "Chemicals such as DEHP are bad for all of us, but especially for infants and children. Reducing exposures for our most vulnerable patients is in line with our mission to protect children's health and the environment."
>
> KYLE TAFURI
> SENIOR SUSTAINABILITY ADVISOR, HACKENSACKUMC

The sustainability efforts originate from the Deidre Imus Environmental Health Center® at HUMC, also a leader in research and education related to safer chemicals.

Healthy Interiors

Hospitals are increasingly focused on the impact of interior furnishings on indoor air quality, working to reduce offgassing of chemicals of concern such as flame retardants and formaldehyde often found in casework, seating, workstations, and other products (Figure 3.9). There are two primary ways participating hospitals are achieving this goal. First, facilities are working through their chemical policies to ensure that products purchased comply with them. Second, a fast growing number of facilities are committing to purchase furnishings that meet a specific environmental standard (see Figure 3.11). Practice Greenhealth's Healthier Hospitals program has targeted interior furnishings through its Safer Chemicals Challenge. In 2015, 30 percent of participating hospitals had signed on to participate in the Healthy Interiors goal of the Safer Chemicals Challenge. This year, hospitals that reported working toward the elimination of chemicals of concern from furnishings spent over half (56 percent) of their total furnishings spending on furnishings in compliance with the Healthy Interiors goal.

There are many misconceptions about the appropriateness of flame retardants in health care. At first glance, the presence of flame retardants appears to be a safety issue. But research has shown that flame retardant chemicals do not remain fixed in the product, and slowly release into our air, dust, and water, eventually entering the environment and our bodies. Recognizing that fire safety could be achieved through modern day advances, including automatic sprinklers, Partners HealthCare, parent of the prestigious Massachusetts General Hospital and Brigham and Women's Hospital, took the flame retardant issue straight to the City of Boston. Together with a strong coalition of environmental health organizations, firefighters, and others, Partners successfully advocated for a change to the flammability standard so it reflected real life fire scenarios with the added health benefit of enabling the system to purchase flame retardant-free furniture, in alignment with other jurisdictions across the country.

Figure 3.9: Healthy Interiors Strategies

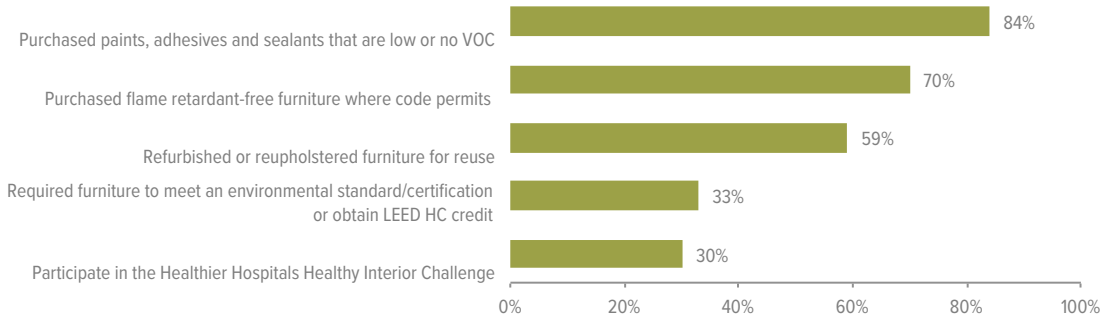


Figure 3.10: Environmental Standards for Furnishings

Percent of facilities that require furniture to meet an environmental standard/certification or obtain LEED HC credit.

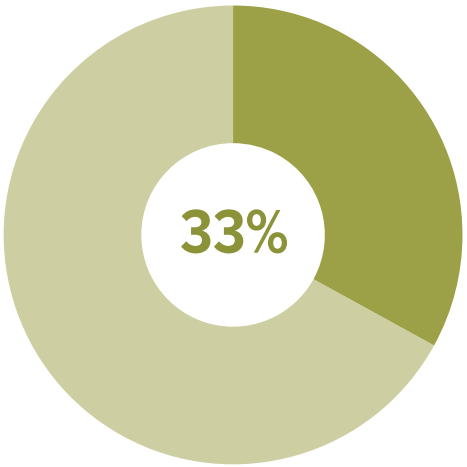
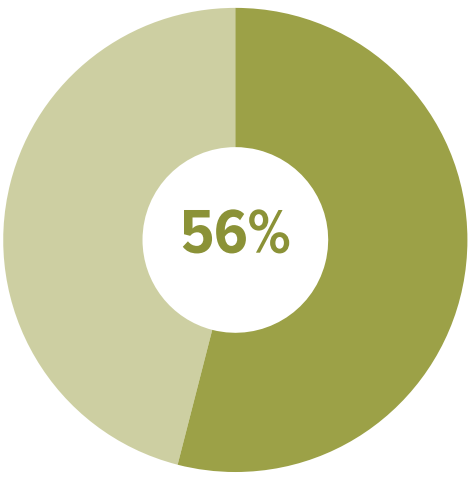


Figure 3.11: Green Furnishings Budget

Percent of total furnishings budget spent on green furnishings.



University Hospitals

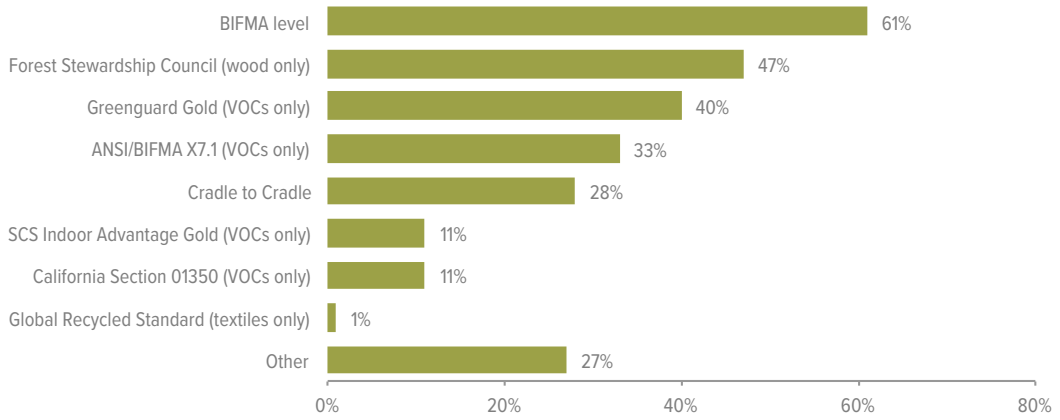
University Hospitals Health System's goal is to have all interior materials purchases to have reduced or eliminated chemicals of concern, as a best practice for the health and safety of its patients and staff. University Hospitals works with vendors to ensure this best practice and appreciates the proactiveness of leaders and internal purchasers in reinforcing purchasing of furniture and furnishings that meet the criteria of the Healthier Hospitals (HH) Healthy Interiors goal. All furniture and furnishing vendors have been notified of University Hospitals' commitment to purchase indoor furnishings free from five chemicals/classes of chemicals of concern:

1. Halogenated organic flame retardants + all chemical flame retardants
2. Polyvinyl Chloride (PVC)
3. Perfluorinated compounds
4. Formaldehyde
5. Antimicrobials: Products supplied must not contain triclosan and triclocarban

No other added or built-in chemical antimicrobials are allowed. Vendors have been asked to offer products free of these chemicals to the utmost extent possible and to outline offerings that meet the HH criteria in University Hospitals-branded catalogs. Purchase data from vendors is collected on a semi-annual or annual basis to track these purchases and the amount spent on healthy (free from chemicals of concern) vs. non-healthy (conventional) products. University Hospitals is also extending chemicals of concern preferences for healthy interiors beyond furniture and furnishing vendors to interior materials (flooring, wall coverings, carpeting, tile, etc.) vendors as a best practice.

There are a range of different third-party certifications that address chemicals of concern in furniture and furnishings. Figure 3.12 highlights the different certifications being utilized by participating hospitals to evaluate furnishings. It is important to note that some certifications cover multiple attributes and some are focused on a single attribute. Because of this, many hospitals utilize more than one certification to cover a range of chemicals of concern.

Figure 3.12: Environmental Certifications for Furniture



Market Transformation

In June 2014, at CleanMed in Cleveland, Ohio, Kaiser Permanente committed publicly to phasing out flame retardants from upholstered furniture systemwide. In September 2014, four large health systems followed suit with a similar announcement, including Advocate Health Care, Beaumont Health System, Hackensack University Medical Center and University Hospitals, which represent 7,000 patient beds throughout Illinois, Michigan, New Jersey and Ohio. Combined with Kaiser Permanente, the five health systems spend nearly $50 million a year on furniture for their facilities. This public commitment helped drive the market away from targeted chemicals of concern, in support of the Healthier Hospitals Healthy Interiors goal. Since that time, great progress has been made in moving the market toward safer products, as evidenced by the more than 30 furniture manufacturers that have provided lists of products that meet the Healthy Interiors criteria.

Conclusion

Although there is significant room for growth in the integration of chemical considerations into purchasing policies and practices, great progress continues in the identification and reduction of harmful chemicals in the hospital setting. The majority of facilities reported have chemical or purchasing policies to identify and avoid specific chemicals of concern, and have begun the transition to greener cleaning products. The data shows that many hospitals have made progress on five key categories of cleaning products—and that hospitals from across the sector have an opportunity to optimize their cleaning programs by making the switch. More than three-quarters of the hospitals in the data set have an IPM program in place. Half of the hospitals are working to eliminate DEHP and PVC from one or more medical product lines, and 64 percent are committed to creating a DEHP-free NICU. Challenges continue in identifying cost-effective, safe and available alternatives for some of these critical medical devices but as demand for alternatives continues to increase, prices will start to come down and more options will emerge in the market. The number of hospitals working to eliminate chemicals of concern in furnishings through the Healthy Interiors goal continues to grow, with 30 percent working to achieve it in 2016. Together, Practice Greenhealth and Health Care Without Harm are working hand-in-hand with hospitals to help them better integrate chemical considerations into purchasing practices and leverage their relationships with suppliers to drive the market for safer products in health care.

Resources

Antimicrobials in Hospital Furnishings: Do They Help Reduce Healthcare-Associated Infections?

List of Furniture and Materials that meet the Healthier Hospitals Healthy Interiors Goal

Integrated Pest Management Checklist

Greening the Operating Room

When approaching a challenge, leaders look to address the primary factors—and often use the Pareto rule to determine which areas or factors are creating the majority of the problem. Forward-thinking hospital administrators are applying the same business rule to sustainable operations. Operating rooms (ORs) generate a significant environmental footprint relative to other departments in a health care facility. Hospitals utilize large amounts of energy to drive special ventilation, lighting and cooling requirements in the OR, and the OR generates a substantial portion of the hospital's waste footprint. Studies show that an estimated 20 to 30 percent of the total waste generated by hospitals comes from the OR—and up to 60 percent of the facility's regulated medical waste.[1] The department is also responsible for 40 to 60 percent of the total supply costs for the organization, with the estimated average supply spend per surgical suite totaling between $850,000 and $1 million annually. An average 15-room OR has 3,000 to 4,000 products available in multiple locations (sterile core, crash carts, case pick areas, and more).[2] Many of these supplies become waste without ever being touched by a patient. Practice Greenhealth's Greening the OR® Initiative is a collaborative sector-wide effort to identify best practices for a range of programs in the OR—from waste reduction, to energy and water savings, to recycling and reprocessing opportunities.

This chapter discusses the ways in which leading hospitals are taking steps to reduce the environmental impact of their ORs while improving efficiency and effectiveness of care and driving down costs. Several of the practices and programs discussed in this section relate to or overlap with other sections of this report, including the waste, energy, climate and EPP chapters. It is important to single out efforts relating to the operating room because of its significant footprint, and because in most facilities, OR policies and procedures are managed separately from other departments and affect a different set of stakeholders.

The Greening the OR Initiative was rolled out in 2010 and questions specifically pertaining to the OR were integrated into the Environmental Excellence Award applications in 2013; therefore, this is only the third year that facilities have been asked to report on these metrics and programs. While hospitals are improving at tracking the savings associated with the initiatives described in this chapter, it is important to note that many of the savings are still underreported. Energy and water savings can be challenging to track unless the area or equipment is submetered. Tracking avoided waste costs can also be difficult unless the hospital is able to tag and weigh waste bags coming from the OR. In addition, some hospitals do not continue to track these metrics once the initiative has recovered its initial costs. Twenty-six percent of participating facilities reported avoided waste tonnage, 52 percent reported cost savings, and only three percent reported energy savings. Therefore, the impact results discussed in this chapter capture just a small portion of the total activity by hospitals in the data set. In addition, in 2016 Practice Greenhealth changed the way it analyzed the data to include a more robust data set—including all award applicants with valid data instead of just Partner for Change award winners and higher. The inclusion of additional data points has pulled some of the medians down slightly this year.

This year's Greening the OR highlights include:

9.2 million kWhs
of energy saved
(for 10 reporting facilities).

$41.7 million
in combined cost savings
(for 185 reporting facilities).

2,150 tons
of waste avoided
(for 85 reporting facilities).

65%
have implemented a single-use device reprocessing program with $30.5 million in combined savings.

$73,407
is the median annual average savings on avoided supply and waste disposal costs from using a reusable canister fluid management system in the OR.

68%
reformulate OR kits, and 66% reuse surgical items where environmentally and clinically preferable.

1 Greening the Operating Room. Practice Greenhealth. Practicegreenhealth.org/initiatives/greening-operating-room. Accessed on September 2, 2016.

2 Pfiedler Enterprises. Effective Operating Room Inventory Management. CE Online. 2014. Available at: http://www.pfiedler.com/ce/1265/files/assets/common/downloads/Effective Operating Room Inventory Management.pdf Accessed on September 29, 2016

2016 Circle of Excellence for Greening the OR

The Greening the OR Circle of Excellence highlights leaders who have made significant inroads in addressing the environmental impacts of the surgical setting. All winners have tackled recycling clinical plastics, medical device reprocessing, reformulation of OR kits, utilization of reusable surgical items and reusable sterilization containers, to name a few initiatives.

Cleveland Clinic[3]
Cleveland, OH

Cleveland Clinic-Marymount Hospital
Garfield Heights, OH

Harborview Medical Center
Seattle, WA

Johns Hopkins Hospital
Baltimore, MD

Memorial Sloan-Kettering Cancer Center
New York, NY

Regions Hospital
St. Paul, MN

The University of Vermont Medical Center
Burlington, VT

University of Maryland Medical Center
Baltimore, MD

Virginia Mason Medical Center
Seattle, WA

Yale-New Haven Hospital
New Haven, CT

100%

of Circle of Excellence winners have a sustainability champion or leader in the operating room.

60%

of Circle of Excellence winners have calculated the carbon footprint of their anesthetic gas emissions (compared to 11 percent of remaining facilities), and 100 percent have made connections between anesthesia and climate work—providing education for anesthesia providers on the environmental impacts of inhaled anesthetics and potential reduction strategies.

$30,710

is the average amount saved per operating room by Circle of Excellence winners while implementing environmental improvements.

3 Practice Greenhealth recognizes the one top performing hospital at greening its operating rooms with the Greening the OR Leadership Award. This year's top winner was Cleveland Clinic.

Cleveland Clinic

In 2016, Cleveland Clinic earned the prestigious Greening the OR Leadership Award for its outstanding work to reduce the environmental impact of the surgical environment. The Leadership Award recognizes the all-around top performer for greening the operating room. Cleveland Clinic's main campus, which has 86 operating rooms and performed 91,731 surgical procedures in 2015, has continuously shown tremendous commitment to reducing its environmental footprint, and was also a Circle of Excellence winner in this category for the past two years. In 2015, Cleveland Clinic's comprehensive sustainability program within its surgical department resulted in 193 tons of avoided waste (almost two tons per OR), over 3.6 million kWhs of energy saved, and $1,015,226 in cost savings (nearly $12,000 per OR). Cleveland Clinic's staff and clinicians have made the connection between patient care and climate change, and have virtually removed the inhaled anesthetic desflurane from its formulary, have worked to use low flow rates for anesthesia, and have reduced both nitric and nitrous oxide consumption in their effort to reduce the climate impact of their anesthesia department while still providing world class patient care.

Leadership

Circle winners saved an estimated $30,710 per OR by prioritizing and supporting program development in the OR space. To achieve this kind of savings and success, it is critical that hospitals have not only a sustainability leader who can connect the OR team to the technical resources, training and case studies they need to learn and implement these programs—but also a departmental champion or leader who can push for program development and performance excellence. Sixty-three percent of hospitals in the data set indicated they had identified a sustainability leader or champion in the OR. On the anesthesia front, identifying a champion is paramount—as many of the strategies for improvement can be clinically relevant and need to be approached carefully in order to avoid any impact on patient care.

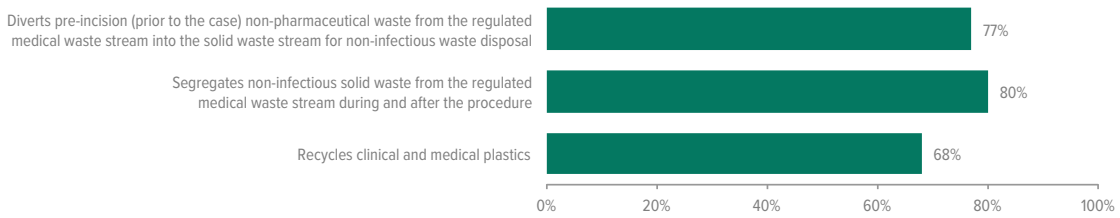
Waste Segregation

A disproportionate amount of the waste generated by a hospital comes from the operating room, including both solid waste and regulated medical waste. There are a number of ways that facilities can reduce the waste generated in the OR, and better manage the waste produced—moving waste from costly and environmentally impactful disposal options to less expensive and more environmentally preferable alternatives. Better segregation of regulated medical waste (RMW) from solid waste can reduce the total volume of RMW, and better diversion of recyclables can reduce the total solid waste bound for the landfill. This section summarizes the waste management strategies being implemented by participating hospitals.

Many hospitals begin a waste focus in the OR by reexamining waste segregation procedures. Figure 4.1 highlights three notable strategies for smarter waste management in the OR. All of the Top 25 award winners and Circle of Excellence winners have prioritized and implemented these three waste segregation strategies.

- Divert pre-incision waste from regulated medical waste stream to solid waste and/or recycling for non-infectious waste disposal.
- Segregate non-infectious solid waste from regulated medical waste streams during and after surgical procedures.
- Recycle clinical/medical plastics.

Figure 4.1: Waste Segregation Programs

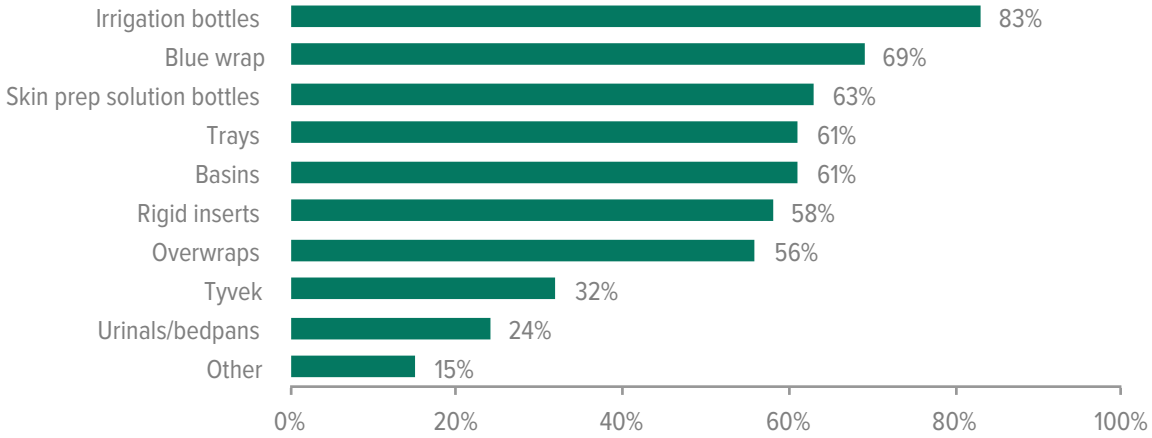


Retraining OR staff to better understand waste definitions can ensure that solid waste is not ending up in the RMW stream. Availability of the proper containers in appropriate sizing can make a big difference in where waste is placed. More than three-quarters of participating hospitals are taking care to ensure proper segregation of RMW from solid waste before (77 percent) and during the case (80 percent). Making smaller waste receptacles available can also be a flag for clinicians to stop and consider whether the waste is truly infectious before placing it in the red bag.

While there is often the perception that the waste generated by the OR is messy and/or potentially infectious, a lot of the waste is actually clean, dry and even sterile in some cases. Clinical or medical plastics are widely used in the OR, from outer and inner packaging, to disposable sterile wrap, to saline bottles—most of these plastics can be recycled safely and effectively. Many of the plastic materials used in the OR are generated during case set up—before the patient enters the OR, although there are also a range of recyclable materials that are generated during the case but never come into contact with patients, such as additional irrigation bottles and product packaging for supplies opened during the case.

Two-thirds of participating facilities recycle clinical/medical plastics in the OR (67 percent). It can be very difficult to track the weight of the clinical/medical plastics that are recycled from the OR—only 23 percent of the facilities that reported the implementation of clinical plastics recycling were able to share the weight of the clinical/medical plastics recycled from the OR. But the yield was surprisingly high—with 11.7 tons of recyclables per facility annually, or 0.7 tons of medical plastics recycling per OR annually. The most common types of recycled plastics in the OR are highlighted in Figure 4.2.

Figure 4.2: Types of Recycled Plastics



Waste Reduction

There are myriad activities in the OR that can reduce the generation of waste. Reformulating OR kits helps to avoid the unnecessary purchase and disposal of unused supplies, along with the use of reusable linens and surgical supplies. Using reusable sterilization containers reduces the need for disposable sterilization wrap. Reusable sharps containers, fluid management technologies and third-party reprocessing of FDA-approved single-use devices (SUDs) can all help reduce regulated medical waste.

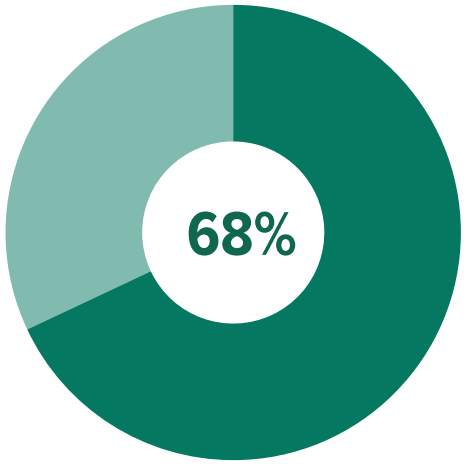
Reformulate OR Kits

Reformulating OR kits involves reviewing each kit to identify supplies that are unnecessary and/or are regularly thrown out without being used. A recent study in the Journal of Neurosurgery looked at the cost of unnecessary supplies being thrown away during each surgery at a major academic medical center, and estimated that across the 58 surgeries studied, the average cost of unused supplies per surgery was $653—with a range from $89 to $3,640. This represented 13.1 percent of the total cost of surgical supplies, a monthly cost of $242,968 or $2.9 million per year.[4] Sixty-eight percent of participating hospitals have reformulated their OR kits. Of those who have reformulated their custom kits, the median percentage of kits reformulated is 100 percent—meaning that it was typically an "all or nothing" activity where if the hospital tackled kit review, they typically reviewed all kits.

Together, Practice Greenhealth hospitals reported saving more than $2.6 million on avoided supply costs and avoided waste costs through OR kit reformulation—an incredibly conservative estimate given that only 17 percent of facilities reporting were able to share any tracked savings. Challenges with tracking savings include identifying or estimating savings per item removed from kits, the actual number of items removed, the number of cases that would have used the kit, and other measures—unless the hospital can work with its vendor to identify these numbers. Additionally, some savings are delayed as often facilities need to use existing inventory of pre-made kits before reformulated kits become available. Despite these data challenges, average savings per facility for avoided supply costs was $67,917 annually while the average savings per facility for avoided waste costs was $7,502 annually for an average total of $75,419 saved annually per facility.

Figure 4.3: Reformulate OR Kits

Percentage of facilities that reformulate OR kits.



4 Operating Room Waste: Disposable Supply Utilization in Neurosurgical Procedures." Journal of Neurosurgery, Published online May 6, 2016; DOI: 10.3171/2016.2.JNS152442. http://thejns.org/doi/abs/10.3171/2016.2.JNS152442.

One of Dartmouth-Hitchcock's 2020 goals, endorsed in December 2014 by its Board of Trustees, is to standardize all surgical instruments and supplies by case types, with a transparent tracking and reporting exception process, for all procedural areas at Dartmouth-Hitchcock Medical Center (DHMC).

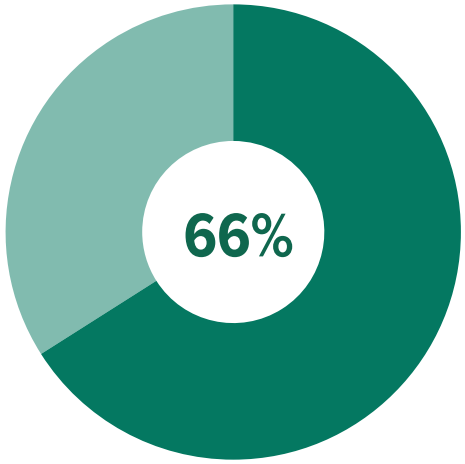
DHMC reviewed 75 percent of its surgical kits in 2014, looking at purchased supplies and surgical instruments. This work resulted in annual savings on case-cart supplies of $858,759, reduction in overall number of instrument sets from 152 to 111, and reduction of number of instruments processed each year by 485,489 (or 91,753 pounds), which eliminated $606,861 in estimated annual labor costs.

Reusable Linen and Surgical Supplies

While the majority of facilities (66 percent) indicate they utilize reusable surgical items where environmentally and clinically preferable, this response is only an indication that they are using at least one reusable item.

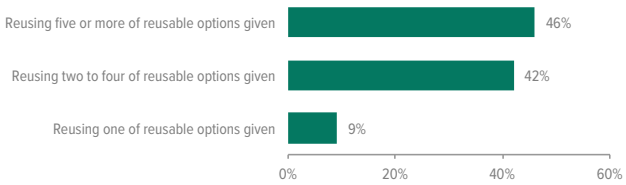
Figure 4.4: Reusable Surgical Items

Percentage of facilities that utilize reusable surgical items where environmentally and clinically preferable.



Practice Greenhealth looked at how many reusable items hospitals are building into their inventory, which demonstrates whether they truly have a focus on moving toward reusables versus opportunistic purchase of a preferentially priced reusable item. The most common reusable surgical items are patient positioning devices, surgical towels, surgical basins and pitchers, and trocars. Of those that use reusable surgical items, nine percent use only one reusable item, 42 percent use two to four items, and 46 percent use five or more reusable items, as illustrated in Figure 4.5.

Figure 4.5: Reusable Items



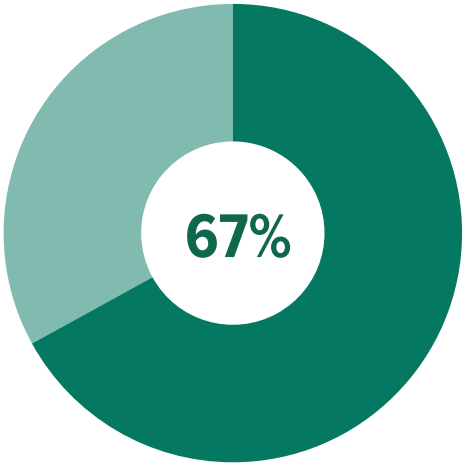
Hospitals reported reusing these items more than 75% of the time.

Rigid Sterilization Containers

Utilization of rigid reusable sterilization containers for surgical instrumentation reduces the need for disposable blue sterile wrap and can help facilities retain and keep track of instrumentation, as well as reduce the need for flash sterilization when a blue-wrapped container tears open. Sixty-seven percent of reporting facilities utilize rigid reusable cases for sterilization.

Figure 4.6: Rigid Sterilization Containers

Percentage of facilities that utilize reusable hard cases for sterilization of surgical instrumentation and reduction of disposable sterile wrap.



Further reduction of propylene-based (plastic #5) disposable sterile blue wrap can also be achieved with the use of other alternative materials such as reusable surgical textiles and sterilization peel pouches. All but one of the Top 25 award winners and all of the Circle of Excellence winners have transitioned to rigid sterilization containers.

Memorial Sloan-Kettering Cancer Center

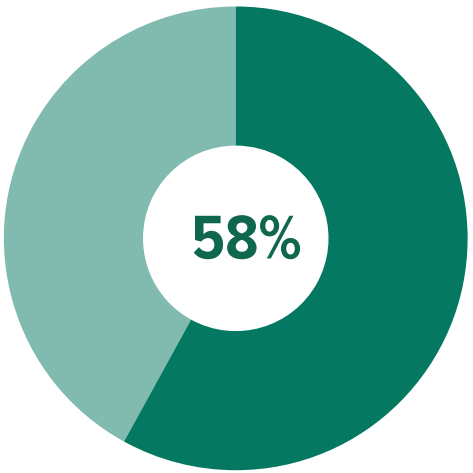
Memorial Sloan Kettering Cancer Center utilized rigid containers in 73 percent of its 21,000 procedures in 2015. The organization saved $165,613 from the avoided purchase of blue wrap, and saw an additional avoided waste disposal savings of $2,217. Choosing rigid containers over disposable sterile wrap had a significant environmental benefit as well—diverting over 23 tons of plastic from the landfill. The storage of the more durable rigid containers freed up four square feet of storage (with space in the OR department at a premium, this is significant) and saved staff an estimated 20 minutes daily, amounting to an added labor savings of $1,452 annually. Total savings for the organization in 2015 was $169,281.

Members of Memorial Sloan Kettering's Green Team pose with the hospital's 2015 Top 25 Environmental Excellence Award.

Hospitals that transition to rigid sterilization containers typically do so gradually, as funds become available for the purchase of the reusable containers. Reusable sterilization containers can also be stacked to free up inventory storage space. The payback is short with hospitals typically seeing a one to one-and-a-half year payback on the purchase through avoided purchase costs for disposable blue wrap and avoided waste costs for disposal of blue wrap. Other cost reductions not typically tracked but that contribute to payback include a potential reduction in ergonomic wrapping injuries for sterile processing staff, costs for flash sterilization from torn kits and reduction in replacement costs for lost instrumentation. Of the hospitals that report using rigid sterilization containers, only 48 percent provided data on the percent of kits transitioned to reusable containers. The median percentage of kits transitioned to reusable sterilization containers was 58 percent (Figure 4.7).

Figure 4.7: Reusable Sterilization Containers

Median percent of kits in reusable sterilization containers.



In aggregate, Practice Greenhealth hospitals reported saving nearly $1.1 million on avoided supply costs and avoided waste costs by transitioning to reusable sterilization containers with less than 20 percent of hospitals that use reusable containers tracking any savings. The average savings per facility for avoided supply costs from transitioning to reusable containers was $36,761 annually while the average savings per facility for avoided waste costs was $1,144, for an average total of $37,905 saved annually per facility.

Fluid Management Systems

Fluid management systems are a key mechanism to reduce the volume of RMW coming out of the OR. A fluid management system automatically drains liquid surgical waste into the sanitary sewer, eliminating the need to place heavy suction canisters in the red bag or manually empty canisters to the drain. Fluid management systems reduce OR turnover time, minimize the risk of occupational exposure to bloodborne pathogens and/or chemical solidifiers for OR staff while also eliminating the cost of PPE, chemical solidifiers and leak-proof labeled bags and containers. Seventy percent of hospitals reported using a fluid management system in at least some of their operating rooms. Of those, two-thirds (67 percent) use a reusable canister fluid management system, meaning the hospital also eliminates the front-end supply cost of disposable suction canisters and only needs to purchase a disposable manifold per patient. The three well-known reusable canister systems on the market offer better patient monitoring than disposable canister systems and have some options for smoke evacuation as well.

Participating hospitals reported total savings of over $2.5 million from using fluid management systems due to the avoided cost of disposable canisters, chemical solidifiers and avoided waste disposal fees. Annual average savings per facility was $33,000 due to avoided cost of disposable canisters, $18,000 for avoided cost of chemical solidifiers, and $22,000 for average avoided cost of waste disposal—nearly $73,000 in savings per facility. At the same time, these savings do not account for the risk avoidance of a bloodborne pathogens exposure incident. One serious bloodborne infection (such as Hepatitis B, C or HIV) can cost more than a million dollars for medications, follow-up laboratory testing, clinical evaluation, lost wages, and disability payments.[5] And sadly, far too many hospitals are still asking clinical staff to manually dump the contents of suction canisters down the drain. Reusable canister fluid management systems offer a win-win approach to staff and patient safety while significantly reducing environmental impact and cost.

Regions Hospital

In 2015, Regions Hospital continued with their award-winning greening the OR initiatives, including reprocessing SUDs, collection of most recyclables including blue wrap, and the continued use of reusable sharps and hazardous waste containers. In addition, they established enhanced recycling capabilities for central core materials management staff so they have an outlet for all of the recyclable materials they unwrap in preparation for surgical cases.

5 Bartlett, T. Tortorice, J. OSHA: Occupational Exposure to Blood Borne Pathogens. CEUFast website. https://ceufast.com/course/osha-occupational-exposure-to-blood-borne-pathogens/ Accessed on October 4, 2016.

Medical Device Reprocessing

Third-party reprocessing of certain FDA-approved single-use medical devices offers huge benefits to the hospital in driving down RMW tonnage and disposal fees while also dramatically reducing the up-front purchase cost for a reprocessed versus a virgin device (often by around 50 percent). It is important to note that there are two aspects to a reprocessing program—the collection of devices bound for reprocessing and the subsequent buy-back of the reprocessed devices. While the collection of devices for reprocessing can offer significant avoided waste tonnage, the bulk of the cost savings and environmental impact reduction is in the buy-back of reprocessed devices. Medical device reprocessing has continued to grow within Practice Greenhealth member hospitals as evidenced by the yearly savings and tonnage growth indicated in Figure 4.9.

Figure 4.8: Medical Device Reprocessing

Percentage of facilities that have implemented a single-use device (SUD) reprocessing program by an FDA-approved third-party reprocessor.

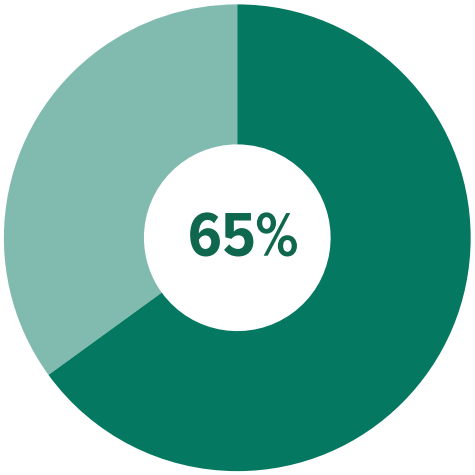
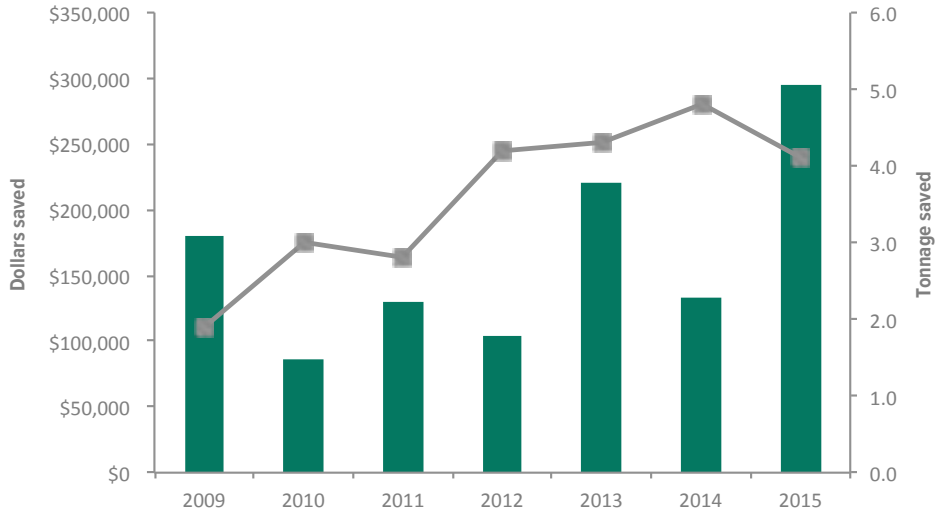


Figure 4.9: Medical Device Reprocessing Yearly Growth



Sixty-five percent of participating hospitals report having a medical device reprocessing program in place at their institutions.[6] Of those reporting, virtually all (97 percent) collect reprocessed devices in the OR and most (85 percent) purchase back at least some reprocessed devices in the OR. We are generally seeing an increase in the tonnage of devices reprocessed, and the purchase/waste disposal cost savings per facility.

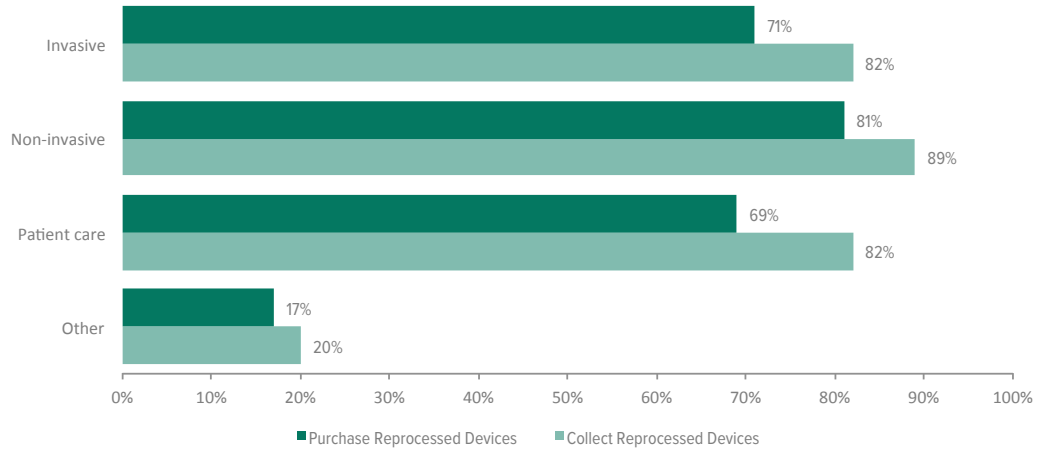
Many hospitals find that there is an education and engagement challenge in getting clinicians and surgeons to understand the safety parameters of reprocessed medical devices. Purchasing reprocessed devices also requires considerable negotiation with suppliers—some of whom insert carefully written contract requirements for a certain portion of virgin devices that must be purchased for every reprocessed device bought back. Knowledgeable supply chain leadership is key in negotiating these contracts. So while collection of devices is fairly straightforward, the buy-back can sometimes be a slower implementation process. The data also demonstrates that there tends to be a lag on the buy-back of invasive (71 percent) versus non-invasive (81 percent) devices—although buy-back has steadily grown as clinicians to become more familiar with the benefits of the program, the safety protocols and as cost pressures increase.

Hospitals are reprocessing medical devices beyond the OR—items like pulse oximetry probes are used across different patient care areas. Electrophysiology (EP) catheters are also another major reprocessing opportunity, so many hospitals extend these programs to their EP/cath labs. The OR, however, is typically where this program is spearheaded because of the sheer volume of devices. Participating hospitals saved an aggregate $30.5 million in combined savings between purchase and avoided waste disposal fees on medical device reprocessing, with average facility savings of $295,238 annually.

6 The percentage of hospitals reprocessing fell from 85 percent in 2014 to 65 percent in 2015 within the data set. One reason for this misleading decline is the huge increase in the number of Veterans Affairs (VA) hospitals in the data set (from 17 in the 2015 data set to 60 in this year's data set). VA hospitals are currently unable to implement medical device reprocessing programs due to internal policy. And as mentioned previously, the data set broadened this year to include more hospitals that are earlier in their sustainability journey which has caused a slight decline in many of the metrics medians.

The metric Practice Greenhealth uses to evaluate performance on medical device reprocessing is the percentage of devices bought back out of those eligible for buy-back—called reprocessing compliance, efficiency or variance. The goal is to purchase back as close to 100 percent as possible. In 2015, participating hospitals achieved a median 57 percent variance rate. It is important to note that although this number is commonly reported on vendor invoices, only 52 percent of hospitals that utilize medical device reprocessing were able to provide a number.

Figure 4.10: Medical Device Reprocessing Activities



THE University of Vermont MEDICAL CENTER

The University of Vermont Medical Center implemented their reprocessing program in the OR in 2015. Overall, it continues to display tremendous growth. They currently reprocess 44 items and will continue to grow as they expand into new product lines and categories. The total reprocessing program (OR, Cath, and EP Lab) prevents an average of 1284 pounds. of waste/month. This represents more than 20 percent growth over last year.

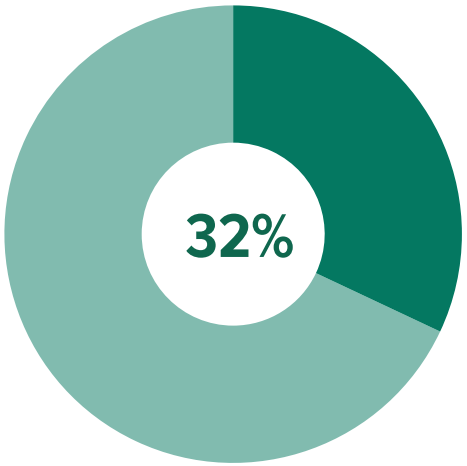
> "Through surgeon and staff engagement and education we have been able to quickly expand our reprocessing program within perioperative services. From supply chain to frontline staff, I am so impressed by the time and effort everyone has invested; further proof of our ongoing commitment to sustainability and overall 'greenhealth.'"
>
> BROOKE STAHLE, DIRECTOR OF PERIOPERATIVE SERVICES
> THE UNIVERSITY OF VERMONT MEDICAL CENTER

Energy Management

In addition to the considerable contributions ORs make to the waste streams of hospitals, ORs also use a substantial amount of energy. They require high air exchange rates, have stringent temperature, pressurization and humidity requirements, and require significant plug and lighting loads. Practice Greenhealth's application focuses on two primary strategies for reducing energy usage in the OR: HVAC setback and LED lighting.

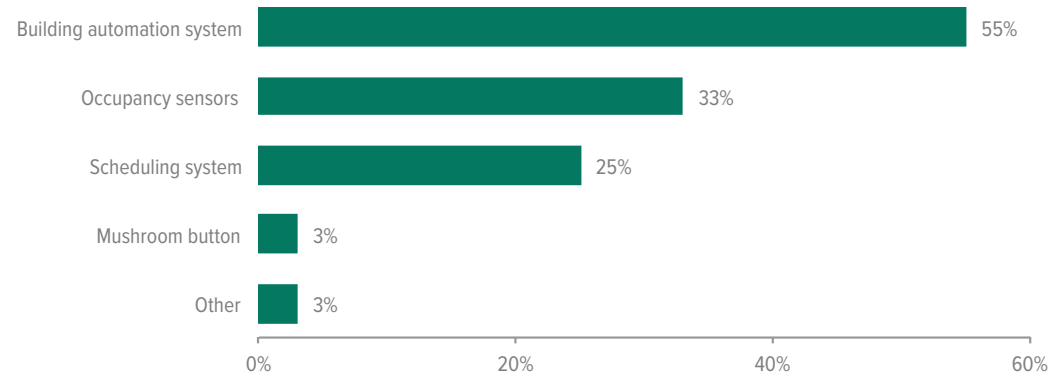
Figure 4.11: Utilize HVAC Setback

Percentage of facilities that have programmed the HVAC system to reduce air changes per hour (HVAC setback) when the ORs are unoccupied to reduce energy consumption.



HVAC setback is an energy saving strategy used when the OR is unoccupied that reduces the number of air exchanges per hour and allows the temperature and humidity to drift within a specified range while still maintaining positive pressure relationships. HVAC setback strategies can provide significant energy savings (estimated at $2,000 to $3,200 per operating room[7]), as the demands on the HVAC system when in use can be substantial, including high air change rates, high percentages of outside air, and exacting cooling and humidity requirements.[8] Reducing air changes per hour can also reduce wear and tear on the HVAC system—increasing its lifespan. Despite these significant potential savings, only 32 percent of reporting facilities program their HVAC system to reduce air changes per hour when the ORs are unoccupied. Of those that use HVAC setbacks, most use a building automation system to achieve this (Figure 4.12).

Figure 4.12: Mechanisms to Control HVAC Setback



HVAC setback programs remain an untapped opportunity for many hospitals. Some of the challenges facilities face in implementing this program can be due to how their HVAC system was initially designed, clinician pushback around perceived infection prevention risks, confusion around code requirements, and the notion that "more is more" in terms of higher air exchange rates equal better patient outcomes or less chance of surgical site infections—which is not supported by the scientific literature. Some facilities have also questioned whether the ORs can be brought quickly and effectively back online should they be needed in an emergency. While only seven hospitals reported actual cost savings from HVAC setback programs, the savings were substantial with an average savings of over 50,438 kWhs and $3,283 per operating room annually. For a mid-sized hospital with 15 ORs, this would mean savings of 756,570 kWhs and $50,000 annually.

7 Doyle, D., Villani, J. and Chan, Y. Energy Efficiency Opportunities in the OR presentation. Greening the OR Symposium. September 11, 2014.
8 Operating Room HVAC Setback Strategies." The American Society for Healthcare Engineering (ASHE) of the American Hospital Association, 2011.

Using LED lighting in the OR consumes less energy than conventional halogen surgical lighting. It also generates significantly less heat in the surgical field—improving clinician comfort while allowing higher temperature set points in the OR. Higher temperature set points can make it easier to maintain patient normothermia—a risk factor for surgical site infections. Clinicians also report an improved visual field with LED surgical lighting. Given the clear advantages of LED lighting, it is a common strategy—63 percent of facilities, or 75% of all of the ORs in the data set utilize LED surgical lighting.

In addition to utilizing LED lighting, facilities can take other steps to reduce the energy usage of their lighting systems, including setback/turning off lights when not in use, turning settings to standby mode, and using occupancy sensors. Nineteen percent of reporting facilities use occupancy sensors for ambient lighting to reduce energy consumption when the ORs and other work and storage areas are unoccupied.

Figure 4.13: LED Surgical Lighting

Percentage of facilities that utilize LED surgical lighting.

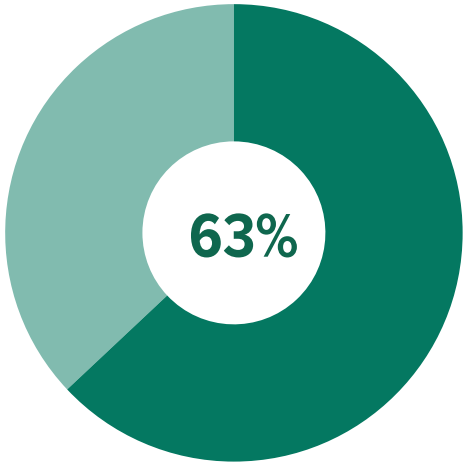
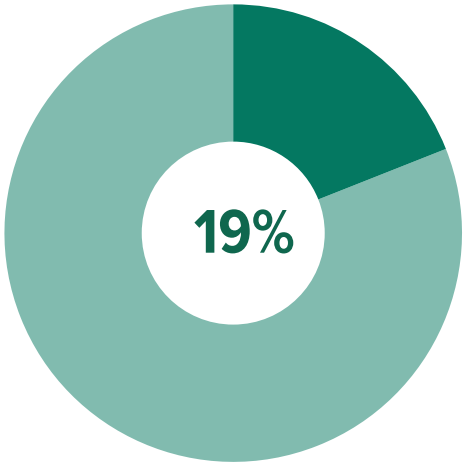
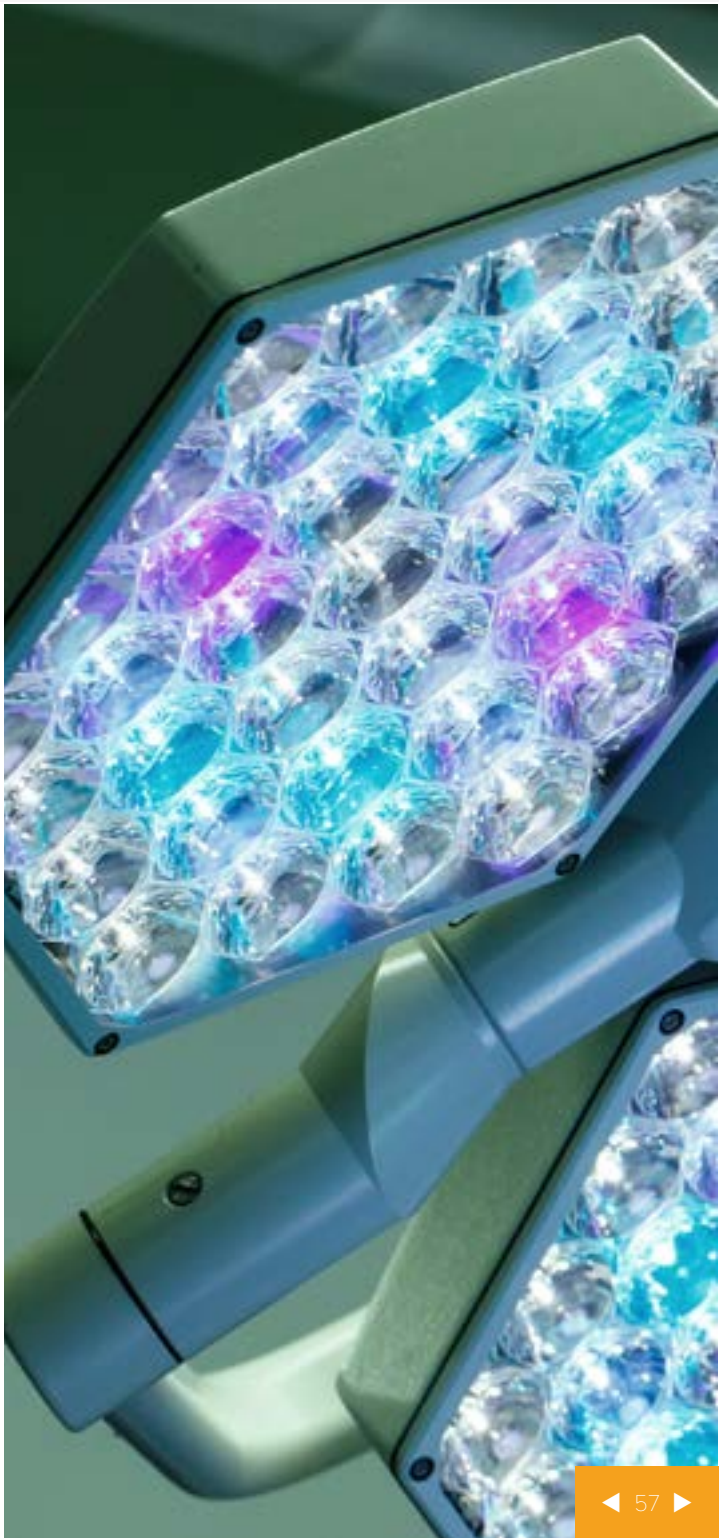


Figure 4.14: Occupancy Sensors

Percentage of facilities that utilize occupancy sensors for lighting to reduce energy consumption when the OR is unoccupied.





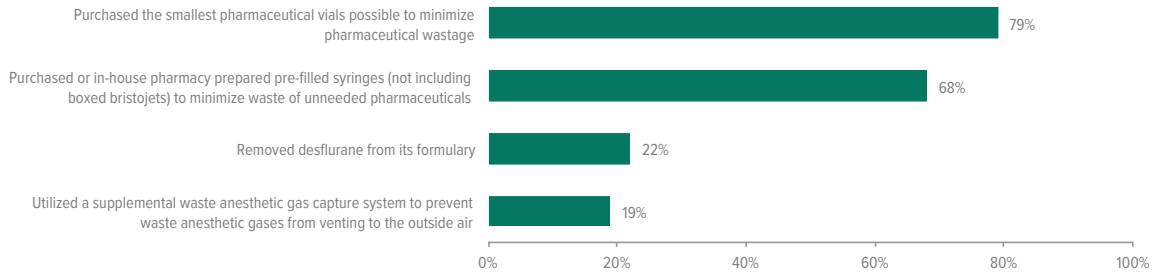
Anesthesia Usage

Many health care institutions are unaware that inhaled anesthetics are potent contributors to climate change. When anesthesia is administered, only a small portion of the anesthetic is absorbed by the patient; the rest is exhaled as waste anesthetic gases or WAGs. Because exposure to WAGs have been found to have serious health impacts for perioperative and PACU staff, WAG scavenging systems are used universally to pull these WAGs out of the immediate patient care environment. The scavenged gases are then vented directly into the atmosphere. While the WAGs dissipate in outdoor air and are not a direct inhalation risk for communities, they persist in the atmosphere and contribute to global climate change. The primary anesthetic gases used in patient care (Isoflurane, sevoflurane, desflurane and nitrous oxide) persist in the atmosphere for years (between 1.2 and 114 years) and have significant global warming potential, meaning they contribute to climate change at many times the rate of straight carbon dioxide. Desflurane, for example, is more than 3,500 times as impactful as CO_2 at trapping atmospheric heat[9]—and as such, is a significant contributor to an acute-care hospital's carbon footprint. The National Health Service (NHS) in the United Kingdom found that WAGs comprised approximately five percent of its total carbon footprint.[10]

Because the provision of anesthesia and analgesia is considered medically essential, this is an often overlooked area for potential mitigation of GHG emissions or environmental impact. There are a range of ways that anesthesia teams can reduce their environmental and carbon footprint while still ensuring high-quality and clinically appropriate care. Practice Greenhealth began asking hospitals to report on their usage of different anesthesia practices in 2014, to increase awareness and create a baseline for action. Figure 4.15 highlights a range of mechanisms for monitoring and minimizing waste from anesthesia usage:

- Purchase or prepare in-house pre-filled syringes to minimize waste of unneeded pharmaceuticals.
- Purchase the smallest pharmaceutical vials possible to minimize pharmaceutical waste.
- Utilize a supplemental waste anesthetic gas capture system to prevent waste anesthetic gases from venting to outside air.
- Remove desflurane from the formulary.
- Remove unnecessary desflurane vaporizers.

Figure 4.15: Sustainable Anesthesia Practices



9 Ryan, SM. Nielsen, CJ. Global warming potential of inhaled anesthetics: application to clinical use. Anesth Analg. 2010 Jul; 111(1):92-8. doi: 10.1213/ANE.0b013e3181e058d7. Epub 2010 Jun 2.

10 Sustainable Development Unit. Carbon Footprint from Anaesthetic gas use. December 2013. http://www.sduhealth.org.uk/areas-of-focus/carbon-hotspots/anaesthetic-gases.aspx Accessed on October 5, 2016.

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Seattle Children's Hospital & Regional Medical Center tracked its greenhouse gas emissions from anesthesia for the first time in 2015. The pharmacy provided the purchasing numbers for isoflurane, sevoflurane and desflurane cylinders and sizes. The hospital's medical gas vendor provided the data for the nitrous oxide cylinders. The hospital then used the anesthetic gas calculator from the UK's National Health Service (NHS), and worked with the author of the tool on the nitrous oxide calculation, which had some complexities. The calculated total for anesthetic gas emissions (CO_2 equivalent) in 2015 was 692 $MTCO_2e$—which represented 5.6 percent of the hospital's Scope I (direct) greenhouse gas emissions. Seattle Children's Hospital is a 2016 Climate Circle of Excellence winner for its leadership on weaving climate mitigation strategies across its other environmental program areas—such as the operating room.

The most common strategy used by reporting facilities is to purchase the smallest pharmaceutical vials possible to minimize pharmaceutical waste (79 percent). The majority of facilities also purchase or prepare in-house pre-filled syringes to minimize waste of unneeded pharmaceuticals (68 percent). Many hospitals are also now recycling the glass vials from anesthesia carts, and ensuring pharmaceutical waste is segregated into the proper container (RCRA vs. non-RCRA).

Because an understanding of the climate impact of WAGs is relatively new, there is a significant opportunity for facilities to learn how to create accurate anesthesia baselines and determine the strategies with the best potential to significantly reduce the impact of anesthetic waste. While a number of hospitals have attempted to provide some data on anesthetic usage, key pieces of data are often still missing or misreported—such as nitrous oxide usage. Part of this confusion arises from the need to collect data from two different internal stakeholders. Pharmacy or supply chain can typically share data on usage of volatile anesthetic agents sevoflurane, isoflurane and desflurane. In order to capture information on annual nitrous oxide usage, the key data source is typically the hospital's medical gas supplier and can often be accessed through clinical engineering. Only 11 percent have calculated the carbon footprint of their anesthetic gas emissions; 60 percent of Greening the OR Circle of Excellence winners have done this calculation.

About a third of reporting facilities (34 percent) have begun to engage their anesthesia providers and have provided or held anesthesia staff education on the environmental impacts of inhaled anesthetics and reduction strategies for clinicians.

There are a number of prevention tactics that clinicians can evaluate including:

- Avoid nitrous oxide as a carrier gas unless there is a clinical reason to administer it.[11]
- Evaluate whether desflurane can be replaced with other inhaled anesthetics while still meeting clinical needs.
- Consider whether local or regional anesthesia could be clinically indicated.
- Avoid unnecessarily high or prolonged FGF rates, particularly when using desflurane. However, what constitutes high FGF rates needs to be defined.[12]

In 2015, 22 percent of facilities reported removing desflurane from formularies.

One newer mitigation strategy to prevent GHG emissions from inhaled anesthetics is to capture rather than release waste anesthetic gases to outside air. Currently, 19 percent of facilities reported using a supplemental waste anesthetic gas capture system to prevent waste anesthetic gases from venting to the outside.[13]

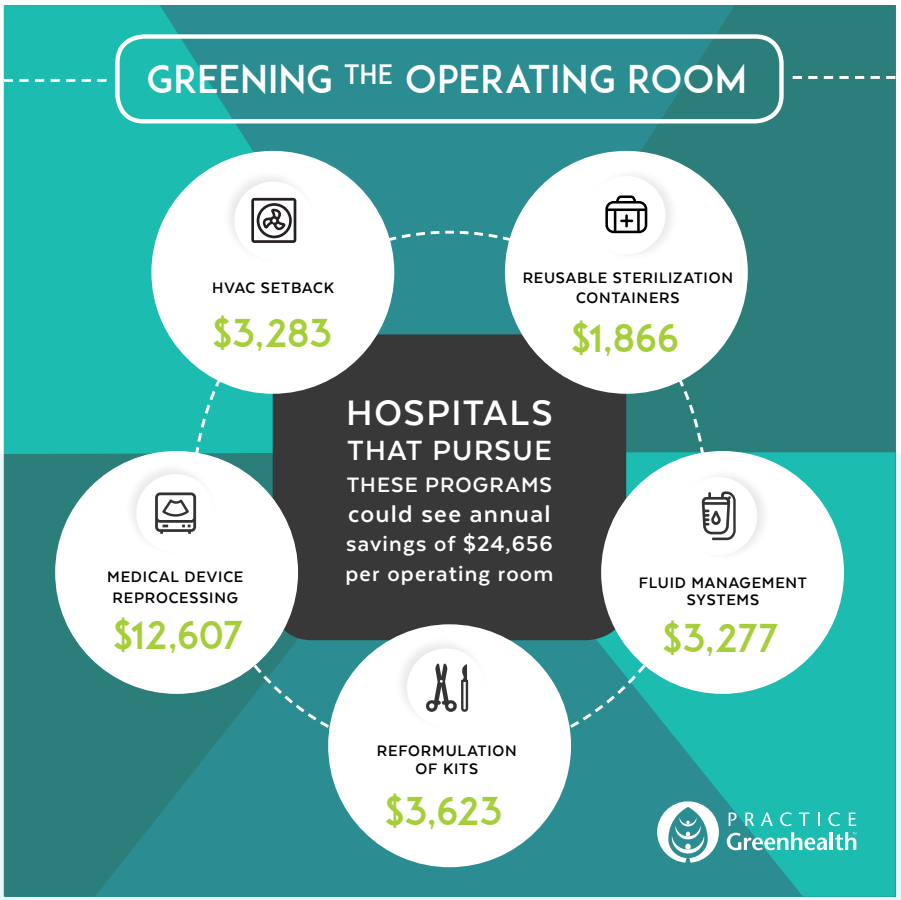
11 Cited from Ryan, SM. Nielsen, CJ. Global warming potential of inhaled anesthetics: application to clinical use. Anesth Analg. 2010 Jul;111(1):92-8. doi: 10.1213/ANE.0b013e3181e058d7. Epub 2010 Jun 2.

12 Cited from Ryan, SM. Nielsen, CJ. Global warming potential of inhaled anesthetics: application to clinical use. Anesth Analg. 2010 Jul;111(1):92-8. doi: 10.1213/ANE.0b013e3181e058d7. Epub 2010 Jun 2.

13 The application asks about the use of a supplemental waste anesthetic gas capture system. This is different from a waste anesthetic gas scavenging systems used in most operating rooms which evacuates waste anesthesia gas from the OR and vents it atmospherically. Because the technology for WAG capture/sequestration is so new, it is unlikely that nearly 20% of the data set has the technology in use—the data point is likely over-reported in error.

Conclusion

Participating facilities continue to make progress in greening the OR and there are huge cost-saving opportunities embedded in many of these strategies. In aggregate, participating hospitals saved $41.7 million on sustainability initiatives in the surgical department in 2015, avoiding 2,150 tons of waste and more than nine million kWhs of energy. A growing number of facilities are adopting these strategies, but progress requires continuous education, communication, and engagement. It can still be challenging for facilities to track and report their efforts and results specific to the OR. This is especially true for energy savings and avoided waste costs; separating these costs departmentally from the rest of the facility can be a substantial challenge. Opportunities for growth include closing the gap between collection and buy-back of reprocessed devices, increasing HVAC setback practices, and increasing awareness and action to reduce the environmental footprint of anesthesia. Hospitals that pursue a core set of these programs could see annual savings of $24,656 per operating room—or nearly $370,000 in annual savings for a typical hospital with a 15 OR surgical suite.



Resources

Greening the Operating Room Initiative

Greening the OR Resources

Memorial Sloan Kettering Cancer Center Greening the OR Resource Library

Healthy Food

Thinking about food in a systematic, holistic way is emerging as an important component of a hospital's sustainability programs. A focus on more sustainable food systems means providing healthier options for patients and staff, as well as thoughtful purchasing and sourcing. Sustainable food programs consider the entire lifecycle of the food offered to patients and staff—including how it is produced, processed, and transported (and how far it had to travel). There are several steps hospitals can take to craft food programs that support public and environmental health and fulfill the nutritional needs of patients and staff. Participating hospitals are implementing food purchasing practices and policies to decrease sugar and meat consumption, support local and sustainable farming operations, reduce antibiotic exposure in meat and poultry, and more conscientiously manage food waste.

Practice Greenhealth is challenging its members to take the Healthier Hospitals' Healthier Food Challenge, which provides a framework for hospitals to serve healthier foods to improve the health of patients, staff, and communities. Hospitals can leverage their purchasing power to increase the availability of local, sustainable foods, and as part of their mission of healing—hospitals can model healthier eating behavior.

This chapter summarizes the innovative programs and practices that participating Practice Greenhealth hospitals are implementing to lead the way in providing food options that are healthy for their patients, staff and the environment. The data was reported in 2016 but reflects information from the 2015 fiscal or calendar year data. Only about half of the participating hospitals reported on metrics for this section; therefore, the results featured are a conservative estimate of the impact of these efforts, but more likely they represent the leaders in the field.

This year's Healthy Food highlights include:

Almost 2/3
of participating hospitals have developed policies and plans for serving healthy and sustainable foods.

Half
of facilities have reduced the amount of meat and poultry purchased, and purchase at least some of their food from local farmers.

81%
of facilities have increased healthier beverage options with a median spend of 57% of their beverage budget on healthier options.

Half
of facilities have a food waste reduction program in place.

Roof garden at University of Vermont Medical Center

2016 Healthy Food Circle of Excellence Winners

The Food Circle of Excellence highlights leaders in sustainable food services, capturing leadership in meat and sugar-sweetened beverage reduction, healthier meat procurement, local sourcing and food waste prevention and management. Winners have written policies and an educational strategy that addresses the food system as a critical component in an overall sustainability plan—for human and planetary health.

Littleton Adventist Hospital
Littleton, CO

Dartmouth-Hitchcock Medical Center
Lebanon, NH

Hudson Hospital and Clinics
Hudson, WI

Kaiser Permanente San Jose Medical Center
San Jose, CA

MedStar Franklin Square Hospital Center
Baltimore, MD

Memorial Sloan Kettering Cancer Center
New York, NY

University of Vermont Medical Center
Burlington, VT

University of Vermont Medical Center Fanny Allen Campus
Colchester, VT

University of Washington Medical Center
Seattle, WA

Yale-New Haven Hospital
New Haven, CT

100%

of Circle of Excellence winners have signed the Healthy Food in Health Care Pledge, have developed and adopted a sustainable food service policy, and have developed and implemented a comprehensive nutrition policy.

100%

of Circle of Excellence winners have reduced the amount of meat and poultry purchased, have increased healthy beverage options, and purchase locally and/or sustainably grown and produced foods at almost double the rate of other facilities.

Westfields Hospital Green Team

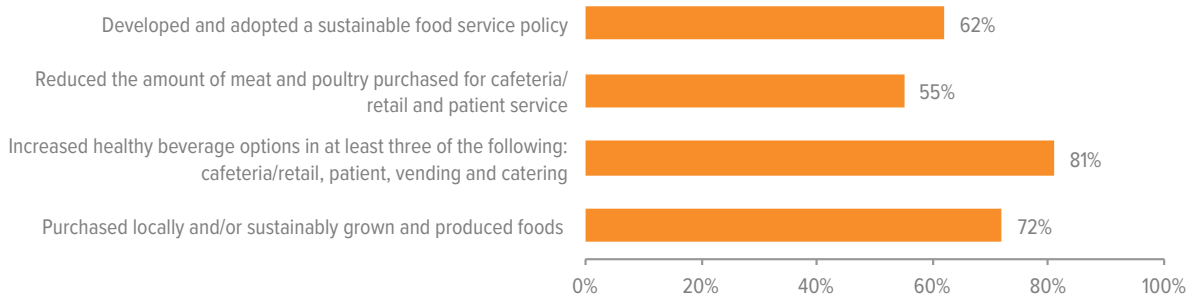
Sustainable Food

Hospitals can take several steps to create more sustainable food programs in their facilities, and offer healthier options to their patients and staff. Practice Greenhealth focuses on the following four areas of sustainable food programs:

1. **Sustainable Food Policy**
   Does the facility have a sustainable food policy?
2. **Less Meat, Better Meat**
   Has the facility taken steps to reduce meat consumption? Are meat and poultry options raised without the use of routine, non-therapeutic antibiotics?
3. **Healthier Beverages**
   Is the facility reducing sugary beverages and offering healthier options?
4. **Local and/or Sustainably Produced Food**
   Is the facility purchasing local and/or sustainable food options?

These areas connect directly to important environmental and health concerns. For example, recent scientific evidence has shown that certain classes of pesticides play a role in the increased incidence of neurological disorders such as attention deficit hyperactivity disorder, autism, and developmental delays.[1] Research has also shown the direct contribution of sugary drinks to higher rates of obesity.[2] This section summarizes the steps participating hospitals have taken to address these four crucial areas of food sustainability. More than half of hospitals in the data set have implemented all four of these strategies.

Figure 5.1: Sustainable Food Practices

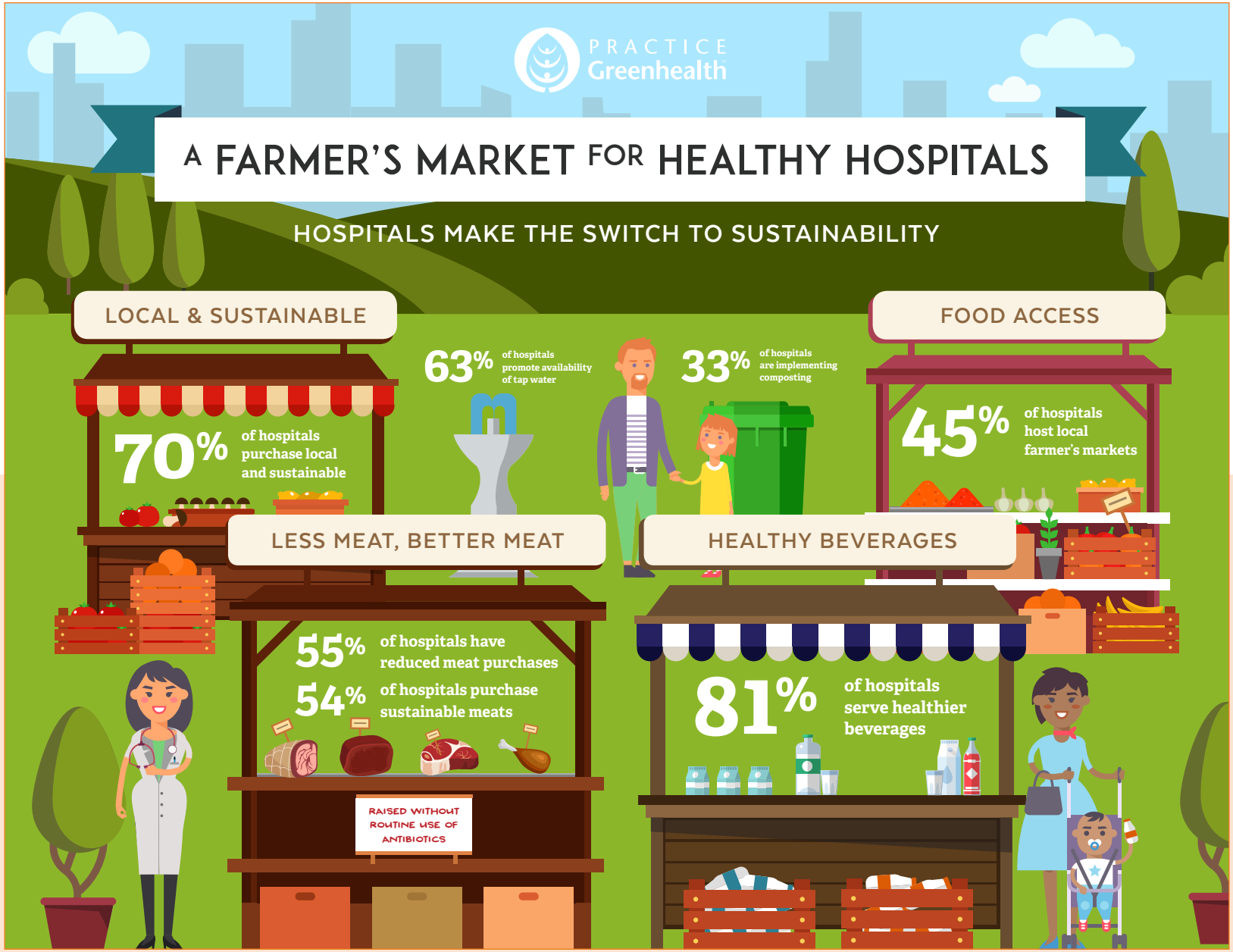


MedStar Good Samaritan Hospital garden

1 "Pesticide-Induced Diseases: Learning/Development Disorders." *Beyond Pesticides.* http://www.beyondpesticides.org/resources/pesticide-induced-diseases-database/learningdevelopmental

2 "Sickly Sweet: Why the Focus on Sugary Drinks." *Public Health Law* Center. https://noharm-uscanada.org/sites/default/files/documents-files/1058/PHLC Sickly Sweet Apr 3.pdf

Figure 5.2: Hospitals Make the Swith to Sustainability



Sustainable Food Policy

Adopting a sustainable food policy can be a foundational first step for hospitals in moving toward more environmentally sound sourcing and healthier food and beverage options in the facility. In 2015, a growing number of facilities have developed and adopted a sustainable food service policy (62 percent; Figure 5.3). The majority of facilities have also developed and implemented a comprehensive nutrition policy (71 percent).

Health Care Without Harm has a "Healthy Food in Health Care" pledge that outlines steps for the health care industry to take to improve the health of patients, communities, and the environment. It asks signatories to commit to "first, do no harm" and treat food and its production and distribution as preventive medicine. This includes working with local farmers and community-based organizations/food suppliers to increase the availability of locally-sourced food; encouraging vendors to supply food produced without synthetic pesticides, hormones, or routine non-therapeutic antibiotics; increase the offering of healthy foods and beverages; and adopt sustainable food procurement. Sixty percent of the hospitals in the data set have signed the Healthy Food in Health Care Pledge (Figure 5.3).

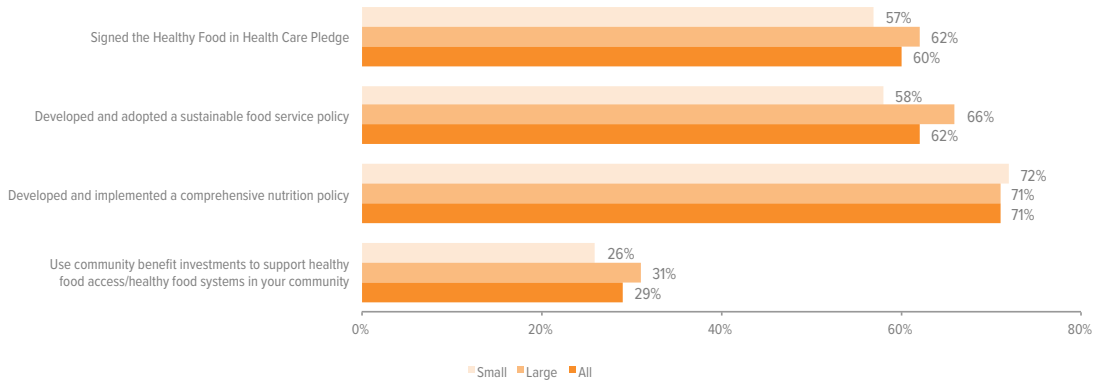
As hospitals make the transition to a focus on population health, healthier food systems are an important strategy. A small but growing number of hospitals are considering how to deploy community benefit resources to support healthier food systems in the community (29 percent, Figure 5.3).

Community Benefits Investments

Recent changes to the ways nonprofit health care facilities can address public health issues through their community benefit obligations provide an opportunity for hospitals to address nutritional deficiencies and diet-related health issues. There is now a focus on preventing illness, ensuring adequate nutrition, and addressing social, behavioral, and environmental factors that influence health in the community. Although still a new and emerging area, already 29 percent of participating hospitals are leading the way by using community benefit investments to support healthy food access and healthy food systems in their communities.

In the U.S., diet-related diseases are crippling families and communities by driving up unsustainable medical costs and setting up young people for a lifetime of health problems. At the same time, dysfunctional food production, distribution, and consumption systems result in both food insecurity and obesity, particularly for vulnerable communities. Several provisions of the Affordable Care Act (ACA) sought to promote an important shift in focus for the U.S. health care community—from treating sickness and disease to promoting prevention and wellness. Recent changes under the ACA to IRS regulations governing the community benefit obligations of tax-exempt hospitals build on a movement by health industry leaders to promote greater community engagement and a population health orientation in community benefit practices. There is now a powerful new opportunity for non-profit hospitals to collaborate with other stakeholders to implement community health improvement plans that address social determinants of health such as housing, environmental and safety conditions, and the availability of quality, affordable food. Health Care Without Harm is currently conducting a national study, funded by the Robert Wood Johnson Foundation, to examine non-profit hospitals' community benefit practices related to improving access to healthy food, reducing the risk of diet-related disease, and promoting healthier food systems. The project will engage hospitals and other stakeholders and will develop tools and resources to support hospital community health improvement initiatives. Results from the national survey will be shared in March 2017 and findings from the full study will be disseminated in August 2017.

Figure 5.3: Sustainable Food Policies



The majority of hospital food service programs used to be self-operated, but that balance is shifting, as hospitals zero in on perceived opportunities to standardize, build economies of scale, and identify new revenue sources. In 2015, about half of the participating hospitals outsource their food service programs (48 percent). Of those that outsource, 62 percent have developed and implemented a policy, contract, and/or RFP language that includes local and/or sustainable food purchasing and other environmental stewardship goals with food vendors (Figure 5.4). Another 70 percent of participating hospitals encourage their food suppliers to improve tracking systems for local and sustainable foods (Figure 5.5). These are important steps to ensure that hospital food sustainability specifications are followed by vendors.

Figure 5.4: Food Vendors or Contractors

Percentage of facilities that have developed and implemented a policy, contract and/or RFP language that includes local/sustainable food purchasing and other environmental stewardship goals with food vendors.

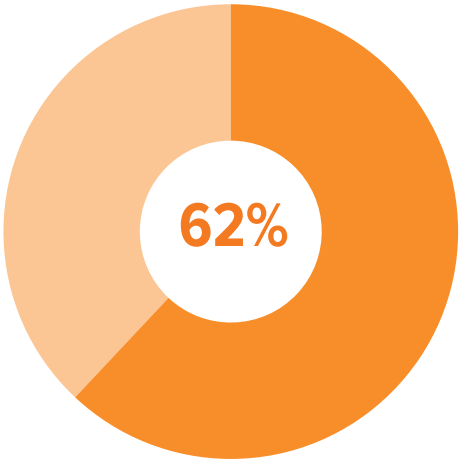
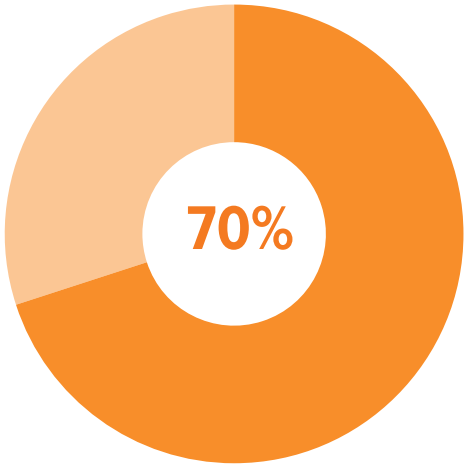


Figure 5.5: Tracking and Traceability

Percentage of facilities that have encouraged their food suppliers to improve tracking and traceability of local and sustainable foods in their ordering, invoicing, and reporting systems.



Yakima Valley Memorial Hospital vegetable garden

Less Meat, Better Meat

Another key focus area is to commit to buying less meat, and to buy healthier, more sustainable meat. Overall, 59 percent of participating facilities are working to achieve the Less Meat, Better Meat goal of the Healthier Hospitals Healthier Food Challenge.

The first component of the Challenge is to purchase and serve less meat within the hospital. The focus is to reduce the risk of cardiovascular disease and obesity through healthier eating, and to emphasize less environmentally intensive food sources like vegetables, legumes and whole grains. Meat requires a substantial amount of resources (such as water, energy, land) to produce. For example, recent proceedings of the National Academy of Sciences found that beef requires 28 times the average land, 11 times the average irrigation water, generates five times the average greenhouse gases (GHG), and six times the average reactive nitrogen than a selection of plant crops. Non-beef categories of meat require on average six times the average land, one and a half times the average irrigation water, and generates two times the average GHG emissions, and three times as much reactive nitrogen respectively than plant crops to produce.[3] Half of participating facilities have reduced the amount of meat and poultry purchased for cafeteria, retail, and patient service (55 percent; Figure 5.6). Hospitals working on meat reduction achieved a median meat reduction of 16 percent in 2015.

The second important focus is to shift current meat and poultry purchases to "better meat," meaning the purchase of meat and poultry raised without the routine use of non-therapeutic antibiotics. Two million illnesses per year are attributed to antibiotic-resistance, and 80 percent of all antibiotics consumed in the United States are fed to livestock.[4] While many hospitals have antibiotic stewardship programs based in clinical areas and the pharmacy, the focus on reducing the use of antibiotics in food is newer for many institutions. About half of facilities are working to preferentially purchase some meat and poultry produced without the use of routine non-therapeutic antibiotics (54 percent; Figure 5.7).

In 2015, hospitals purchased a median of 32 percent of their meat and poultry raised without the use of routine non-therapeutic antibiotics.

Figure 5.6: Meat Reduction

Percentage of facilities that have reduced the amount of meat and poultry purchased for cafeteria/retail and patient service.

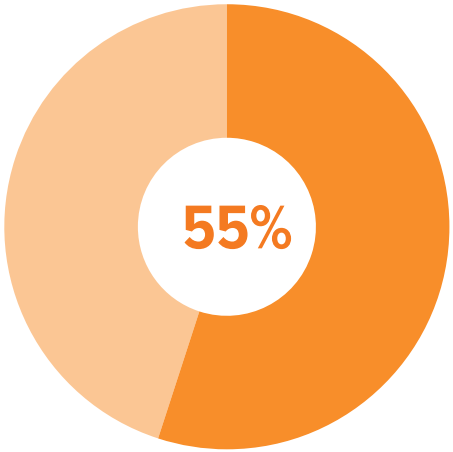
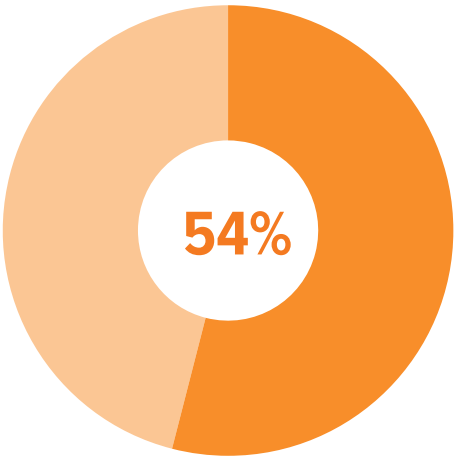


Figure 5.7: Meat & Poultry Raised without Routine Antibiotics

Percentage of facilities that purchase some portion of their meat and poultry produced without the use of routine non-therapeutic antibiotics.



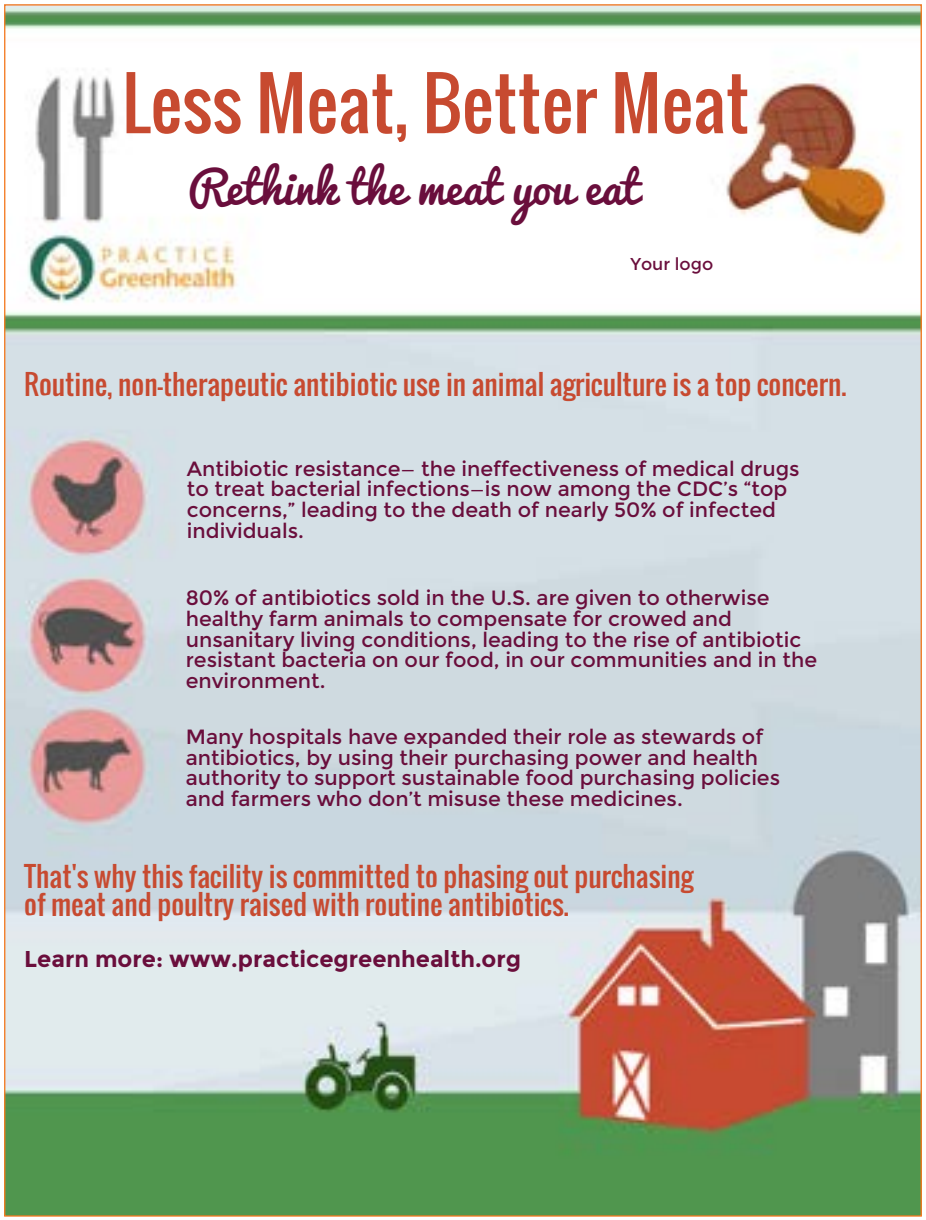
3 Gidon, Eshel; Alon, Shepon; Makov, Tamar; and Milo, Ron. "Land, irrigation water, greenhouse gas, and reactive nitrogen burdens of meat, eggs, and dairy production in the United States." Proceedings of the National Academy of Sciences of the United States of America. Vol. 111, No. 33., 11996-12001, June 23, 2014. http://www.pnas.org/content/111/33/11996.full

4 Healthier Hospitals Program of Practice Greenhealth. "Healthier Foods: An Overview." http://healthierhospitals.org/hhi-challenges/healthier-food. Accessed on August 22, 2016.

Around 23,000 Americans die from antibiotic resistant infections each year and thousands more succumb to longer, riskier, and more expensive hospital stays. Antibiotic resistance costs the United States billions of dollars annually in direct health care expenses and lost productivity. Antibiotics are an essential part of health care, yet 80 percent of those sold in the United States—the same medicines used to treat human infections—are used in industrial animal agriculture as a stopgap against crowded and unsanitary conditions. Because the health care sector is such a large part of the economy, hospitals can help shift the entire marketplace, benefiting public health and making products safer for all consumers.

Practice Greenhealth and Health Care Without Harm are helping aggregate and amplify the voice of health care in the demand for meat and poultry raised with the use of routine, non-therapeutic antibiotics. Together, they have brought together a coalition of leading hospitals and health systems to strategize on how to work collaboratively with food service providers, distributors and producers to help the health care sector "walk the talk" and demonstrate its commitment to combating antibiotic resistance through the purchase of safer meat and poultry products.

The goal is to not only work with individual hospitals and health systems to set and achieve reasonable targets for percent of spend on meat/poultry raised without routine antibiotics, but also to help support the industry in making these products more accessible and cost-effective for large scale purchasers. The sample poster to the right is one example of promotional materials provided to hospitals to help educate and engage their patients, visitors and staff.



Healthier Beverages

Another area of focus for improving the health of patients and staff is offering healthier beverage options and reducing the availability of sugar-sweetened beverages. The focus is to promote access to tap water and minimize the purchase of sugar-sweetened beverages as a means of reducing the risk of obesity and diabetes and to model healthy eating behaviors amongst patients, staff and visitors. About half of facilities have signed on to the Healthier Beverage goal of the Healthier Hospitals Healthier Food Challenge (47 percent; Figure 5.9). However, 81 percent of participating facilities have increased healthy beverage options in at least three of the following: cafeteria/retail, patient, vending, and catering. In addition, for those facilities that have increased healthier beverage options, the median spend was 57 percent of their beverage budget on healthier options. Bottled water[5]—while healthier than sugar-sweetened beverages—comes with its own environmental footprint.

Littleton Adventist Hospital

Centura Health

At Littleton Adventist Hospital in Denver, Colorado the hospital has invested considerable time and effort in educating its staff, patients and visitors on the health risks of sugary beverages as well as the alternative benefits of tap water. Littleton has not only decreased its sales of sugar-sweetened beverages, it has set up filtered water stations for fill-ups of reusable bottles or patient cups, and offers flavored "spa" waters at catered events around the hospitals. A poster campaign in the cafeteria highlighted the "Leverage your Beverage" campaign, and "10 Ways to Drink Water."

Figure 5.9: Healthier Beverages

Percentage of facilities that have increased healthier beverages.

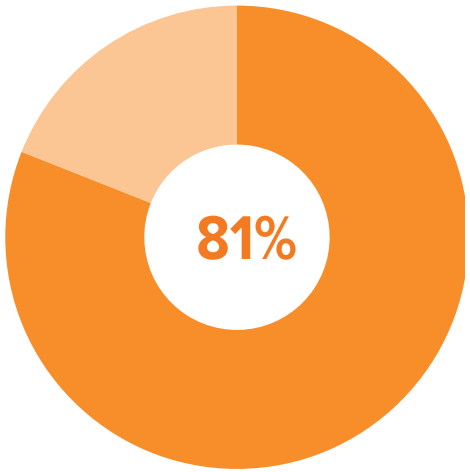
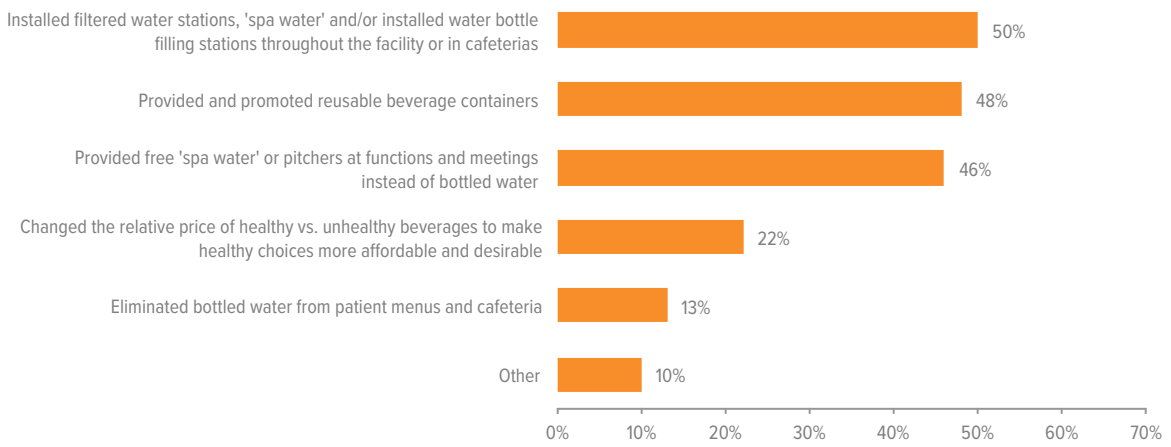


Figure 5.10: Promoting the Use of Tap Water

Percentage of facilities that have implemented the following activities to increase access and promote the use of tap water.



5 When hospitals move away from selling bottled water in favor of providing filtered water stations or flavored waters, it can skew the healthier beverage metric as a result. Less bottled water being sold means that even a reduced volume of sugary beverages will comprise a larger percentage of total beverages sold—because the filtered water is free.

Local and/or Sustainably Produced Food

Buying local and/or sustainable foods is an investment in the well-being of communities and the environment. Specifically, it reduces the transportation miles that food travels while strengthening local economies; and reduces the use of toxic pesticides, additives and the use of non-therapeutic antibiotics in agriculture while also supporting animal and worker welfare. Overall, 43 percent of participating facilities have committed to the Local and Sustainable Foods goal of the Healthier Hospitals Healthier Food Challenge; while 88 percent of Top 25 award winners and 100 percent of Circle of Excellence winners have taken on this challenge (Figure 5.11). Seventy percent of participating hospitals reported they had purchased locally and/or sustainably grown and produced foods. Local is defined as grown/raised and processed less than 250 miles from the facility. Sustainable is defined as a product that has an allowed sustainability certification or label claim, and/or meets the definition of local. It can be challenging initially for hospitals to track the purchase of local and sustainable foods as many of the hospital purchasing platforms have not built in an attribute for local/sustainable. It can be a painstaking process to identify which SKUs qualify as local/sustainable and begin to track spend. Despite the short-term challenge, hospitals are working hard to pursue this challenge, with participating hospitals spending more than $44 million on local and sustainably grown and produced foods. There remains a lot of opportunity in this area, with the median percent spend on local and sustainable products (out of all food and beverage products) at just 15 percent in 2015. Food Circle of Excellence winners achieved a median of 22 percent spend on local/sustainable.

Fifty-two percent of participating hospitals reported purchasing food from local farmers through a variety of avenues including food hubs, farmer cooperatives, or farm-direct purchasing (Figure 5.12; Figure 5.13). Sourcing and tracking food in this manner allows hospitals to use their purchasing power most effectively to improve individual, environmental and broader community health.

Figure 5.11: Local and Sustainable Foods

Percentage of facilities reporting they are purchasing local and/or sustainably grown and produced foods.

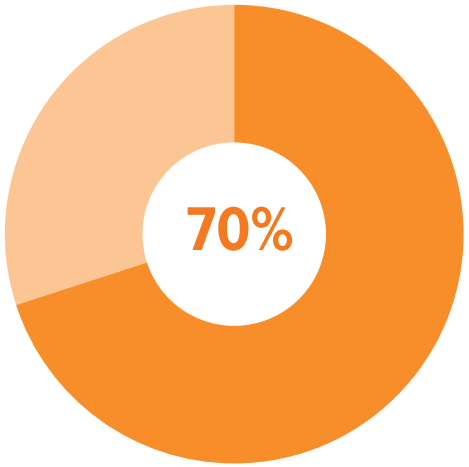
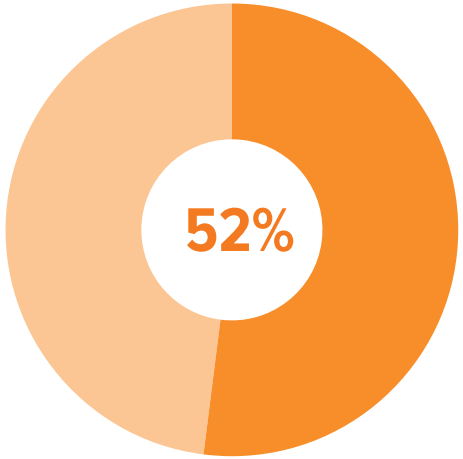


Figure 5.12: Supporting Local Farms

Percentage of facilities that purchase food from local farmers (local is defined as less than 250 miles).



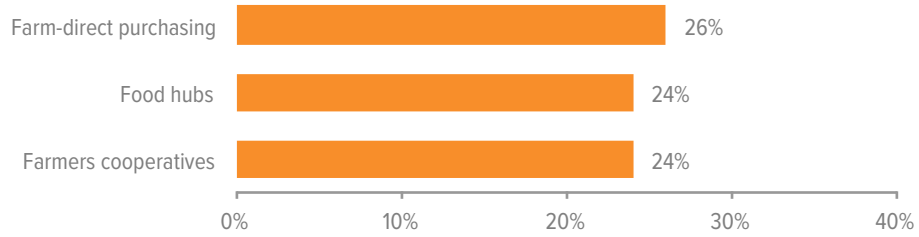
University of Chicago Medical Center Farmers Market

Baystate Health

Baystate Medical Center, a 745-bed hospital located in Western Massachusetts, has invested considerable time in building its capacity to bring in healthy, local and sustainable foods. The hospital achieved an impressive 17.8 percent spend on local and sustainable foods, and works hard to engage clinicians and staff in these efforts. Baystate partners with local food producers including a memorandum of understanding to purchase from the Wellspring Cooperative hydroponic greenhouse and collaboration with the Community Involved with Sustainable Agriculture (CISA)—a local non-profit. Baystate co-chairs the Health Care Without Harm Greater Massachusetts Healthy Food Work Group. They also work closely with their GPO, Premier, to increase their access to contracted local/sustainable products.

Figure 5.13: Local Farm Purchases

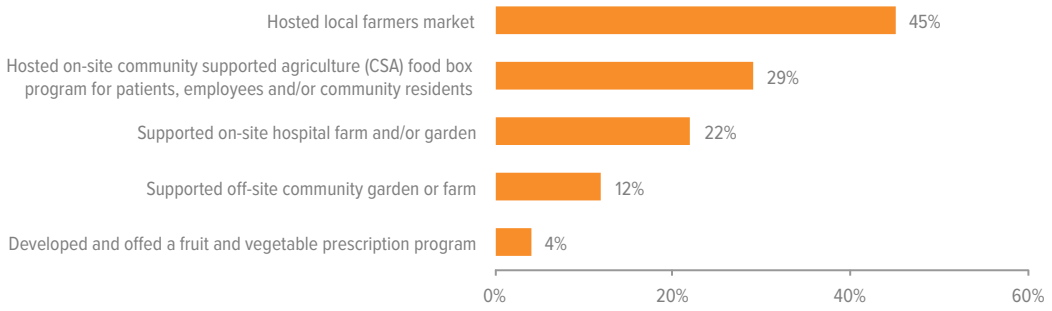
Percentage of hospitals using different strategies to purchase food from local farmers.



In addition to purchasing food from local farmers for patient meals and cafeteria, hospitals can also increase access to healthy, locally-produced food in other ways (Figure 5.14). A common strategy at a growing number of hospitals is to increase access to local produce by hosting (or supporting) local farmers markets—45 percent of hospitals in the data set now host local farmers markets. Twenty-nine percent of participating facilities are also hosting onsite community supported agriculture (CSA) food box programs where hospital employees buy a share and receive a box of fresh local and seasonal produce each week during the growing season. Another emerging strategy is the use of fruit and vegetable prescription programs. While few participating hospitals reported using this newer approach (four percent), it is an innovative example of preventative care to change eating behaviors.

Figure 5.14: Increasing Access to Healthy Food

Percentage of facilities using key strategies to increase access to healthy food.



The majority of facilities also use strategies for promotion and placement of healthy and sustainable food options to increase their sales (70 percent; Figure 5.15). Product placement of healthier food options was the most used strategy at 91 percent (Figure 5.16). Forty-nine percent reference eco-labels and foods grown locally/regionally on menu labeling for meals served in retail or patient food service as a mechanism to educate and engage people. And 63 percent of participating facilities (and 100 percent of Top 25 award winners and Circle of Excellence winners) have conducted a facility-wide education campaign that improves the visibility of healthy beverages and/or tap water choices (Figure 5.17). These are just a sampling of the strategies being used by leading hospitals in the dataset to drive positive change in eating behaviors.

Figure 5.15: Promotion and Placement of Healthful Options

Percentage of facilities that use strategies for promotion and placement of healthy and sustainable food options to increase sales.

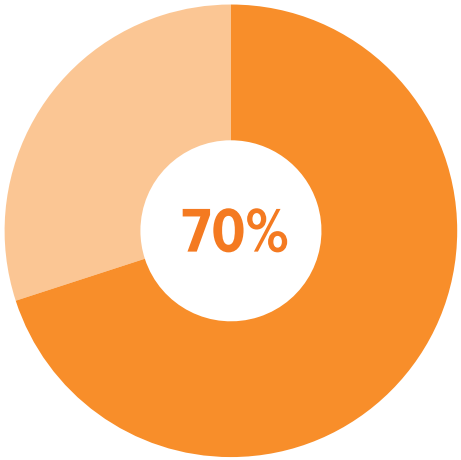


Figure 5.16: Food and Beverage Education and Promotion

Percentage of facilities using key strategies for promotion and placement of healthy and sustainable food options to increase sales.

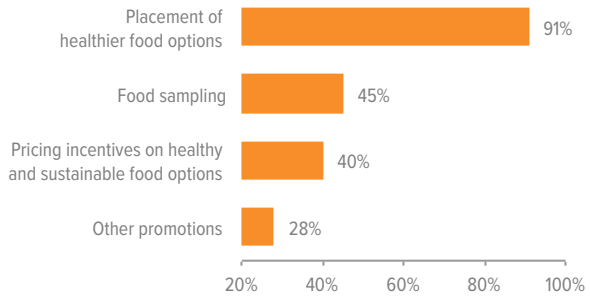
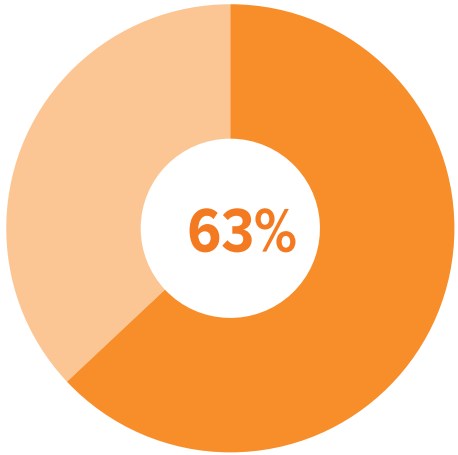


Figure 5.17: Education Campaigns

Percentage of facilities that have conducted a facility-wide education campaign that improves the visibility of healthy beverages and/or tap water choices.



Food Recovery

The EPA estimates over 133 billion pounds of food is wasted or lost each year in the United States. Nearly a quarter of waste produced by hospitals is from food and food services and a growing number of hospitals are exploring ways to reduce the waste impacts of food service. Introduced in June of 2016, Practice Greenhealth's new Less Food to Landfill initiative is a call to action for hospitals and health systems to join together around food waste prevention, donation, and landfill avoidance. EPA's Food Recovery Hierarchy (Figure 5.17) helps highlight prioritized strategies for action. While about half of the participating hospitals reported having a food waste reduction/prevention policy or plan in place (53 percent), only 12 percent currently have a food waste donation policy or plan (Figure 5.18; Figure 5.19). Food waste reduction can include reviewing ordering habits, noting the proportion of food that expires before use and careful planning to reduce overage.

Figure 5.17: US EPA Food Recovery Hierarchy

Figure 5.18: Food Waste Recovery

Percentage of facilities with a food waste donation policy/ plan that is being implemented and tracked.

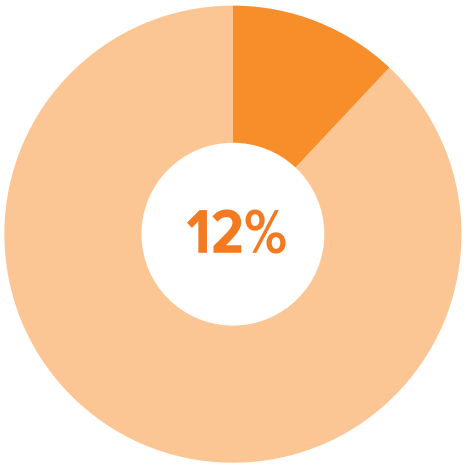
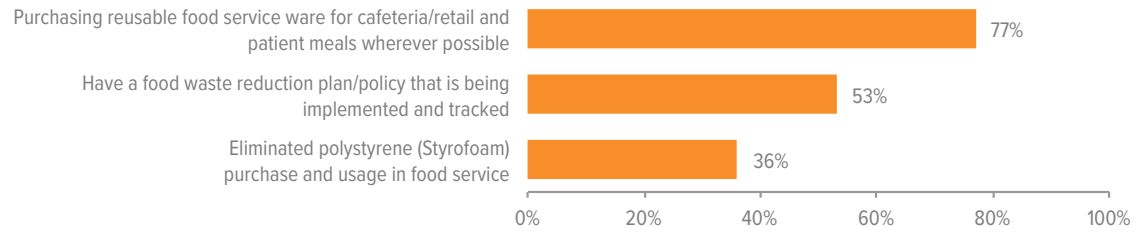


Figure 5.18: Food Waste Reduction



Montefiore

Montefiore Medical Center's New Rochelle and Wakefield campuses have diverted almost 250,000 pounds of food waste from the landfill since installing an onsite digester in the kitchens in September 2014 that turns food waste into sewer-safe graywater. The onsite digester breaks down food waste through a combination of continuous mechanical processing of food waste, in tightly controlled environmental conditions to maintain aerobic decomposition and hyperacceleration of the decomposition process. By eliminating the need to haul the organic waste, Montefiore has avoided 15,923 $MTCO_2e$ of carbon emissions, 233,086 pounds of waste and saved almost $15,000 in pickup charges since the 2014 installation.

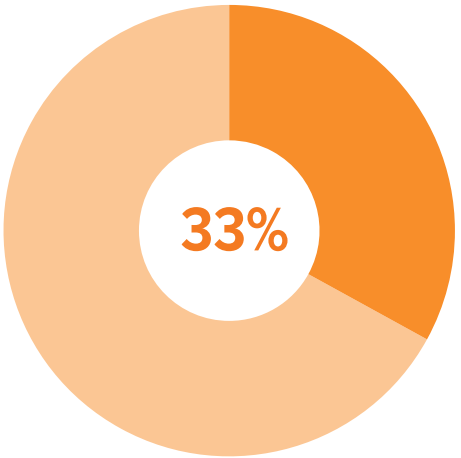
Notably, larger hospitals reported substantially higher implementation of food waste reduction plans than smaller facilities (60 percent versus 45 percent). On the donation end, Practice Greenhealth has partnered with the non-profit Feeding America to help educate hospitals on the safety of food donation and to partner with hospitals to increase food donation to local food banks. Learn more in Practice Greenhealth's Less Food to Landfill Toolkit.

Another aspect to reduce waste generated from food service operations includes the use of reusable food serviceware to replace disposables. Two-thirds of facilities purchase reusable food serviceware (77 percent), and 57 percent are using either recyclable or compostable disposable food serviceware options. Interestingly enough, while many facilities are offering these options, only 34 percent of hospitals providing compostable serviceware actually compost these items, and only 75 percent provide recycling options for recyclable food serviceware onsite, undermining their sustainable benefits. Approximately one-third have eliminated polystyrene usage in food service (36 percent).

Beyond avoidance, composting food waste is an effective way to reduce landfill emissions of methane, a potent greenhouse gas that contributes to climate change. One-third of facilities have a food waste composting program and tracking system (33 percent; Figure 5.20). The majority of those facilities track the weight or volume of compost (89 percent), with a cumulative total of 6,315 tons (Figure 5.21). This equates to an avoidance of 5,466 metric tons of carbon dioxide equivalent.[6] Some hospitals send food waste for animal feeding or anaerobic digestion, as alternatives where composting is limited or not an option. All of these strategies achieve the intended purpose of avoiding the disposable of food waste to the landfill.

Figure 5.20: Compost Programs

Percentage of facilities that have a food waste composting program and tracking system.



6 Waste Reduction Model (WARM), U.S. Environmental Protection Agency, Version 13, 3/15). https://www3.epa.gov/warm/Warm_Form.html. Accessed on August 23, 2016.

Conclusion

The data demonstrates that participating hospitals see sustainable food as an important area of focus, indicated by the fact that the majority of facilities have some plan in place to address the issue. Hospitals can benefit from exploring the community benefit aspects of developing sustainable food systems that model healthy eating behaviors and support food security in the community. While a large percentage of participating hospitals reported that they purchase some locally and/or sustainably grown and produced food, there is room for improvement. Farm to hospital relationships are still in initial or growth stages, and some facilities struggle with operationalizing the definitions of "local" or "sustainable."[7] There are data collection challenges inherent in using a blended definition of local and/or sustainable, which has led Practice Greenhealth to tease this data set apart into two separate categories in the 2017 award application cycle.

Only half of facilities have really engaged on meat reduction or have begun purchasing meat and poultry raised without the routine use of non-therapeutic antibiotics. Of those hospitals that reported yes for these measures, there are still reporting errors for meat reduction due to ongoing challenges with the definition of meat products and some inconsistencies in identifying the correct number of meals served year-to-year. Likewise, lack of careful auditing of labels and definitions may have led to some overreporting of meat and poultry raised without the use of non-therapeutic antibiotics in 2015. And while many hospitals have made strong initial progress on healthier beverages, working through the economics of offering healthier beverages or replacing beverages with tap water can be tricky—albeit a clear opportunity to practice prevention.

Food waste reduction and diversion from landfill are important components of a sustainable food program. There is still considerable opportunity for hospitals to improve practices in these areas. While the prevention and segregation measures are not difficult in and of themselves, finding accurate ways to measure or estimate food waste that are not staff-intensive and the perceived challenges in setting up a composting program or lack of local haulers may make these programs challenging initially. And food donation is a major opportunity for hospitals that are looking for ways to improve food security and promote health in their communities.

7 Waste Reduction Model (WARM), U.S. Environmental Protection Agency, Version 13, 3/15). https://www3.epa.gov/warm/Warm_Form.html. Accessed on August 23, 2016.

Resources

Practice Greenhealth Healthier Beverages Challenge

Healthier Hospitals' Less Meat, Better Meat Challenge

Healthier Hospitals' Local/Sustainable Food Purchasing Challenge

Practice Greenhealth Less Food To Landfill Goal and Toolkit

Environmentally Preferable Purchasing

The health care sector buys enormous quantities of goods and services, with health care spending accounting for 17.8 percent of the gross domestic product (GDP) in the U.S. by some estimates. These goods and services have large environmental and human health impacts when considered over their full life cycle—from resource extraction, manufacturing, and use to end-of-life disposal.

What hospitals buy matters. Environmentally preferable purchasing, or EPP, incorporates environmental and human health priorities into purchasing decisions to minimize negative impacts. EPP represents a key opportunity to align procurement processes with sustainability goals, while often reducing the total cost to the organization and providing safer products and services for patients and staff. It can also deepen hospitals' ties to their local communities as they source more locally produced goods and services; and build the market for greener and healthier products and services.

This year's EPP highlights include:

80%
of facilities have engaged their supply chain (purchasing) leadership in sustainability activities at some level.

68%
of facilities have an EPP policy that identifies specific environmental attributes of concern to consider when making purchasing decisions.

67%
of facilities have reviewed upcoming contracts (that will expire or be renewed in the next 6 to 12 months) to identify EPP opportunities or savings.

Most Common EPP Goals
across facilities are avoiding chemicals of concern, energy efficiency, and waste minimization.

Purchasing products and services with a reduced impact on human health and the environment takes into account one or more environmental attributes. For example, EPP can include restricting chemicals of concern, purchasing renewable energy, buying cleaning products that have less impact on indoor air quality, and buying goods that can be recycled, re-manufactured or otherwise safely disposed of at the end of their useful life. EPP can also encompass social and economic issues, such as buying from local vendors, ensuring products are not made in a manner that harms people or the environment, or giving preference to small and medium enterprises and/or women, veteran and minority-owned vendors. Many hospitals purchase goods through a group purchasing organization (GPO)—by some estimates, about 72 percent of purchases that hospitals make are done using GPO contracts.[1] Hospitals can take advantage of GPOs' pricing and efficiency, as well as available green product selection tools and supplier engagement practices.

Integrating EPP practices into existing supply chain procurement cycles and contracts, however, can be a long-term endeavor. Contracts and commercial relationships cannot be quickly changed, and it takes resources to identify EPP criteria and attributes, update verification requirements, find products and services that meet these requirements, engage suppliers, and keep track of spending. Such EPP activities may also require forging new partnerships inside and outside the facility.

Practice Greenhealth and Health Care Without Harm have been at the forefront of helping hospitals come together to leverage their purchasing spend to drive the market for the creation of safer, more environmentally preferable products and services. Together, the organizations have created working groups to transform the market, and have coalesced around a set of leading health systems to drive demand for products that meet a set of core environmental criteria (The Standardized Environmental Questions for Medical Products). Two current areas of focus are *meat and poultry raised without routine antibiotics* and *furniture/furnishings that avoid key chemicals of concern*. The working groups facilitate conversations between leading health care purchasers and groups of relevant suppliers—helping them work together to identify barriers and shift the market towards the preferred practice.

Purchasing touches every department within the organization. EPP can support hospital sustainability initiatives such as reducing waste, conserving water and energy, using safer chemicals, and supplying healthier, more sustainable foods. Results shown in this chapter include information on various EPP-related activities and questions embedded in other chapters of the Benchmark Report. The data in this report was reported in 2016 but reflects information from the 2015 fiscal or calendar year data. This chapter also includes a discussion of key trends in EPP for participating hospitals, ands notes key differences between smaller and larger facilities.

1 HSCA, 2016: The GPO Primer. http://c.ymcdn.com/sites/www.supplychainassociation.org/resource/resmgr/research/gpo_primer.pdf

Leveraging Buying Power to Drive Market Transformation: **Greenhealth Exchange**

In May of 2016, Practice Greenhealth and Health Care Without Harm began the next phase of their EPP journey—launching Greenhealth Exchange, a purchasing cooperative focused on sourcing only products and services that meet stringent environmental criteria while driving down price and making these products accessible at the volumes necessary for large buyers.

"Greenhealth Exchange is a market differentiator and provides a competitive advantage for the participating organizations," said John Messervy, AIA, Corporate Director of Design and Construction for Partners HealthCare. *"Acting as an agent of change to bring an added level of transparency, buying and performance assessment, and reporting of innovative products and services will simplify the matter of 'green' purchasing and support our mission to tackle health care's toughest challenges."*

GX GREENHEALTH EXCHANGE

Learn more about Greenhealth Exchange at: www.greenhealthexchange.com.

2016 EPP Circle of Excellence Winners

The EPP Circle of Excellence celebrates the best in environmentally preferable purchasing (EPP) programs. Facilities were evaluated on their supporting policies, interactions with GPOs and suppliers, environmentally preferable contracts and use of environmental attributes in RFPs and business reviews.

Advocate Health System
Chicago, IL

Cleveland Clinic
Cleveland, OH

Dartmouth-Hitchcock Medical Center
Lebanon, NH

Fairview Ridges Hospital
Burnsville, MN

Hackensack University Medical Center
Hackensack, NJ

Harborview Medical Center
Seattle, WA

Johns Hopkins Hospital
Baltimore, MD

Kaiser Permanente San Jose Medical Center
San Jose, CA

Seattle Children's Hospital & Regional Medical Center
Seattle, WA

Virginia Mason Medical Center
Seattle, WA

100%

of EPP Circle of Excellence winners have a process to include environmental considerations in their sourcing practices (such as an RFIs and RFPs, value analysis, or using GPO data).

90%

of EPP Circle of Excellence winners have reviewed upcoming contracts to identify EPP opportunities or savings.

90%

of EPP Circle of Excellence winners track and report metrics on dollars spent on environmentally preferable products and have committed to at last one of the Healthier Hospitals Smarter Purchasing challenges.

Policies, Leadership and Prioritization for EPP

A policy and high-level commitment to EPP helps to anchor, direct, and prioritize EPP activities, which intersect with so many functional areas of the hospital and different sustainability initiatives. Policies and commitments also drives GPOs, suppliers and service providers to understand (and respond to) the demand for safer, healthier products and services.

Sixty-eight percent of facilities now have an EPP policy that identifies specific environmental attributes of concern; there is no significant variation in small and larger hospitals in the data set (Figure 6.1). Leaders in hospital sustainability are utilizing EPP, and have anchored that work in a policy: Twenty-four of the Top 25 award winners, and nine out of 10 EPP Circle of Excellence winners have an EPP policy in place.

Undertaking EPP requires participation by internal and external stakeholders to the sustainability team—including supply chain and procurement departments, GPOs, facilities and operations staff, and suppliers.

Engaging clinical champions in EPP is critical, as they have the ability to influence the purchasing of environmentally preferable products in some of the more challenging categories, such as medical devices.

Educating and engaging supply chain leaders within hospitals on the rationale for and benefits of EPP is critical to gaining success in this area. Supply chain leaders are typically incentivized to focus on lowering costs while maintaining quality, safety and reliability. EPP initiatives therefore need to prove that they do not typically add cost or complexity to this process, and this can be a challenge. Nonetheless, many participating hospitals are already starting the conversation, with 80 percent of all participating hospitals reporting they have engaged their supply chain leadership in EPP (Figure 6.2). There were no significant differences between small and large hospitals. One hundred percent of the Top 25 award winners and EPP Circle of Excellence winners have engaged supply chain leaders on EPP.

> At Kaiser Permanente, we're continually researching and sourcing safer alternatives to products such as cleaners, solvents, disinfectants, plastics used in medical devices and building materials, flame retardants, and formaldehyde. Our 2025 goal is to increase our purchase of products and materials meeting environmental standards to 50 percent.

Figure 6.1: EPP Policies

Percentage of facilities with an EPP policy identifying specific environmental attributes.

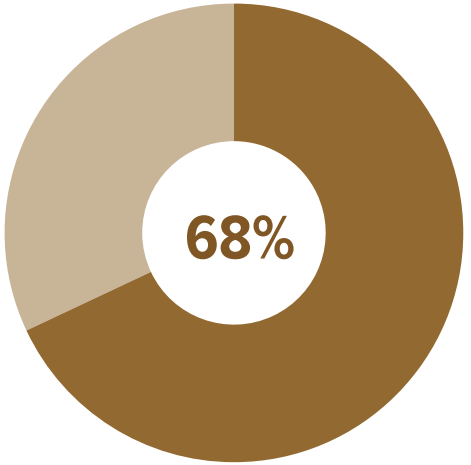
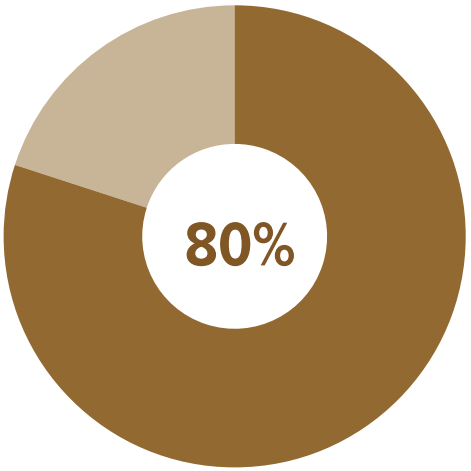


Figure 6.2: Engagement of Supply Chain Leadership

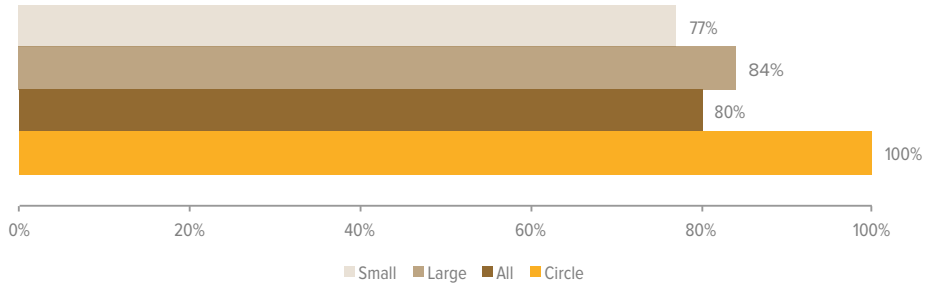
Percentage of facilities that have engaged supply chain leadership in sustainability activities at the hospital level.



The list of potential hospital goods and services that could be modified to reduce environmental impacts is long. The number of EPP attributes and social issues potentially tied to suppliers and supply chains is also extensive. Therefore it is important to set priorities to focus EPP efforts, and ensure that they align with overall sustainability and organizational goals. In 2015, 80 percent of participating hospitals set priorities for purchasing environmentally preferable products, which grew from 70 percent in 2014 (Figure 6.3). A greater proportion of larger hospitals have set EPP priorities (84 percent as compared to 77 percent for smaller hospitals), possibly due to the larger scale of the products and services they purchase and the ability to leverage demand to drive down pricing.

Figure 6.3: Setting Priorities for EPP

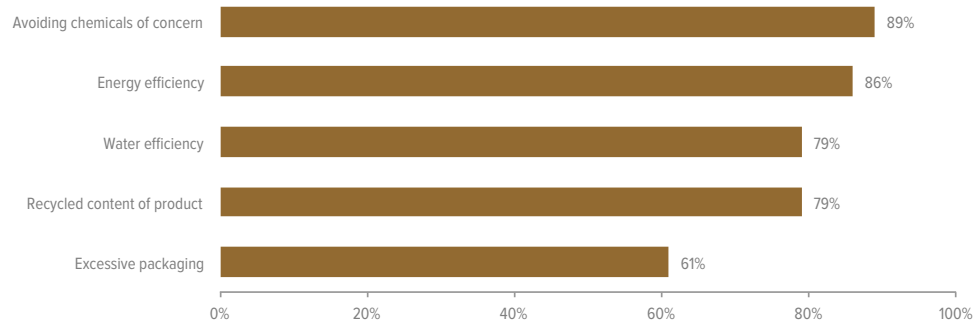
Percentage of facilities that have set priorities for purchasing environmentally preferable products.



EPP Attributes

EPP criteria can include a range of different environmental and social attributes to support facilities' sustainability goals. Of the 68 percent of facilities reporting an EPP policy, the top five attributes most commonly included in the policy are shown in Figure 6.4.

Figure 6.4: Top Five Attributes Cited in EPP Policies



Cleveland Clinic

Cleveland Clinic purchases thousands of different products each year that are utilized to directly and indirectly support the care of its patients. In 2015, Cleveland Clinic signed Practice Greenhealth's EPP pledge. To enable its supply chain to purchase products based on environmentally preferable attributes which minimize potential harm to patients and the environment, the organization embedded language in its standard RFP template which requires all vendors to report information on energy, waste/recycling, local foods, chemicals, water utilization and healthier foods. A scorecard was utilized at a monthly meeting called the "Strategic Sourcing Table" where each vendor and product was reviewed for its sustainability performance and its impact on supplier diversity goals.

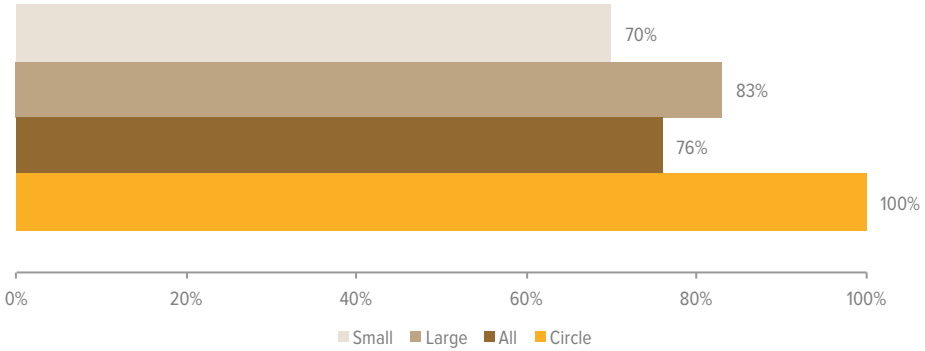
> "This commitment and discipline is helping to deepen the impact of sustainability in our supply chain."
>
> JON UTECH, SENIOR DIRECTOR OF THE OFFICE FOR A HEALTHY ENVIRONMENT AT CLEVELAND CLINIC

Integrating EPP into Procurement Processes

To be successfully implemented, EPP considerations need to be integrated into typical purchasing and supply chain processes, and work within the timing and performance expectations embedded into those processes. Seventy-six percent of all participating hospitals have a process to include environmental considerations in the sourcing process, including integrating EPP requirements into an RFI/RFP process, integrating environmental attributes into the value analysis process, or reviewing data on greener products provided by their GPO. Important in this process is engagement with vendors, where hospitals communicate their expectations to vendors about different product and service attributes. Larger facilities have done more work on this than smaller facilities, 83 percent and 70 percent respectively; all of the Top 25 award winners and all ten Circle of Excellence winners have also integrated EPP into their standard procurement processes (Figure 6.5).

Figure 6.5: Including EPP in the Sourcing Process

Percentage of facilities that have a process to include environmental considerations in the sourcing process (RFI/RFP, value analysis, or through data provided by GPO).



Sometimes legal and commercial constraints can pose barriers to integrating EPP into existing contracts. For example, contracts can only be updated with EPP criteria when they are due to be re-negotiated, and it can be difficult to impose them on an existing contract. However, hospitals working with GPOs have found some work-arounds to this barrier; for example, by conducting new product requests or value analysis, or having their GPO create a contract for the alternative products and services.

JOHNS HOPKINS MEDICINE
THE JOHNS HOPKINS HOSPITAL

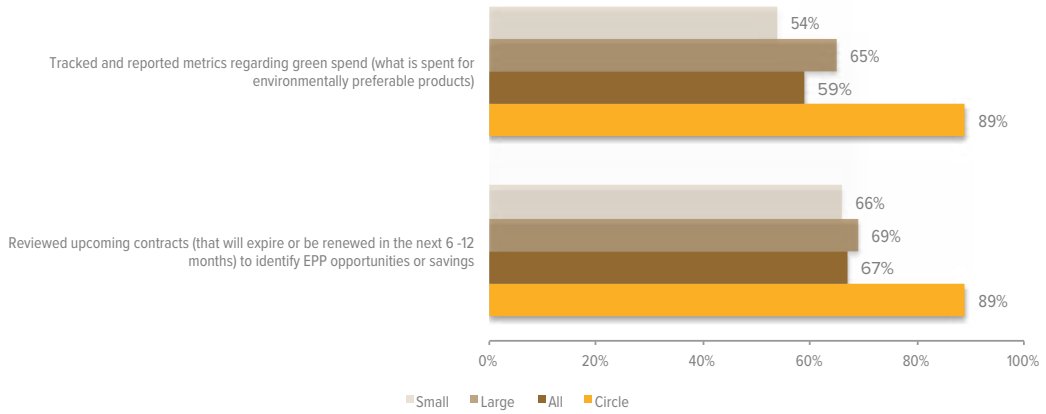
Johns Hopkins Hospital (JHH) has instituted a robust thrid-party reprocessing program for invasive and non-invasive medical equipment. By choosing to reprocess a portion of their medical devices with a third-party reprocessor instead of buying virgin devices from the original equipment manufacturer, JHH and other hospitals are reducing the environmental impact of product manufacture and disposal while also driving down both purchase and disposal costs. In 2015, JHH purchased reprocessed pulse-oximetry devices, ECG Wires, ultrasonic scalpels, burrs/bits/blades, endoscopic trocars, tourniquet cuffs, endoshears, EP catheters and cables through Stryker Sustainability Solutions, saving $1.1 million through the purchase of reprocessed devices in 2015, and increased total savings by $26,761 from FY14 to FY15.

Advocate Health Care

Advocate primarily tracks its green spend through inclusion of metrics on its Healthy Environment Dashboard that is reported out quarterly. In 2015, purchasing metrics included percentage of cleaning chemical spend on green cleaners, percentage of beverage spend on Healthier Hospitals-defined healthy beverages, savings through purchasing reprocessed items, as well as a paper purchasing metric to measure spend on paper per adjusted patient day. Other environmentally preferable purchasing data was gathered and shared with key stakeholders in 2015, including percentage of furniture free of chemicals of concern (shared quarterly with Interiors Division), percentage of meat raised without routine antibiotics, and PVC/DEHP-free medical products—all of which are slated to be included on the health system's new data watchlist for 2016. Other data is pulled and evaluated on a periodic basis, annually for awards submission, or during quality improvement projects.

Sustainability staff should work with procurement staff to review upcoming contracts, find contractual solutions, and identify opportunities for integrating EPP criteria. Sixty-seven percent of participating hospitals have reviewed upcoming contracts for this purpose, and 66 percent of all facilities have specified their organizations' commitment to EPP in contract templates and other supplier outreach materials (Figure 6.6). While this is a critical step, there may also be procurement options through value analysis for new products and contract "carve-outs" for alternatives with a GPO, particularly for innovative products.

Figure 6.6: Reviewing Contracts for EPP Opportunities

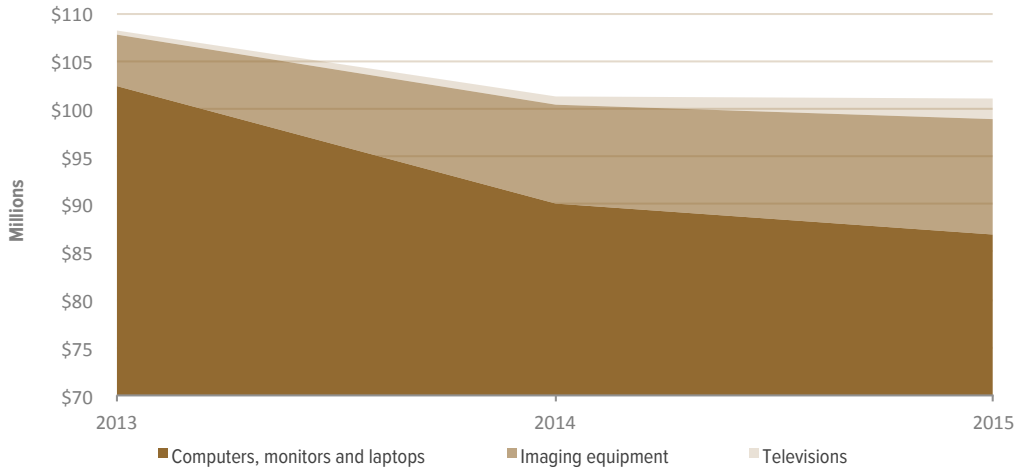


EPP Actions: Buying Greener Products and Services

The Environmental Excellence Award application asks hospitals to report on their purchasing of a set of environmentally preferable products and services. One such set of products purchased by all institutions is single-use medical devices—many of which have been approved for third-party reprocessing by the FDA. Practice Greenhealth tracks not only the annual spend on reprocessed devices, but also the percentage of reprocessed devices purchased out of the total available for purchase—as a means of assessing uptake. Learn more about purchasing reprocessed medical devices in the Greening the OR chapter of this report. Another category purchased by all institutions is IT equipment. The leading third-party rating system for IT equipment is the EPEAT Registry, which verifies products against the ANSI accredited IEEE 1680 family of standards.[2] EPEAT currently covers computer monitors and laptops, imaging equipment (such as copier machines), and televisions; and in the future will also cover mobile phones and servers. EPEAT criteria address the full life cycle of these products, from extraction of materials of concern (i.e., mining rare earth metals) all the way through to end of life issues (i.e., unsafe electronics disassembly in developing nations).

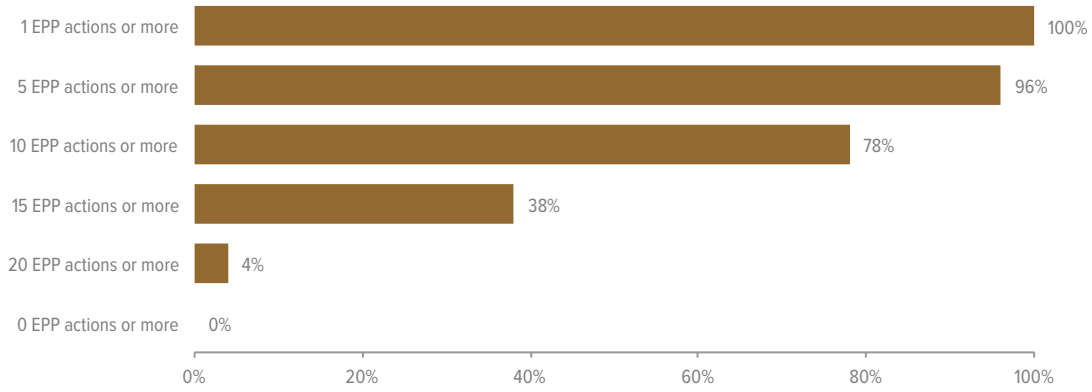
In 2015, 75 percent of all facilities reported purchasing EPEAT-registered products. Spending on EPEAT-registered products has also increased since 2013. For the 208 participating hospitals that reported spending figures for EPEAT products, the spend totaled $101 million in 2015 across the three EPEAT product categories (Figure 6.7). It should be noted that purchasing patterns can have significant swings across years when it comes to equipment, including IT. For example, facilities will purchase a large quantity of television monitors in one year, then none for several more years while they are in use. Aggregate trend data does not always capture these large variations in purchasing volumes well.

Figure 6.7: EPEAT Spending



Recognizing that EPP supports many different sustainability initiatives within hospitals, this chapter consolidates specific EPP actions being reported by hospitals in other benchmarking report chapters. Figure 6.8 shows that 100 percent of facilities had undertaken at least one of the EPP activities highlighted; and at least one facility had done 21 of the 22 actions. The full set of actions, broken out by chapter theme (Safer Chemicals, Energy, Food, Water, Waste, Climate and OR) are provided in the appendix.

Figure 6.8: Number of EPP actions Taken by Facility



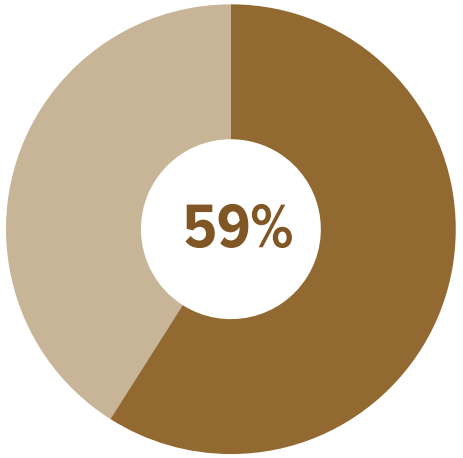
Tracking Spending on EPP

Tracking "green spending" (i.e., spending on environmentally preferable products) is critical to understanding if the hospital or health system is making progress toward EPP policies and goals. Obtaining spend data can be challenging, as data may be difficult to obtain from suppliers and GPOs unless tracking systems are in place. As the Affordable Care Act drives hospitals to depend on purchasing to achieve economies of scale, it is becoming more challenging to track spending on a particular product at the hospital level—data is often captured centrally and in aggregate at the health-system level. Even the basic process of tagging a product with an environmental attribute in internal purchasing software so that spend analysis can be undertaken can be a herculean task for certain hospitals in the early stages of their EPP journey.

Given these barriers, the fact that 59 percent of all facilities are tracking and reporting on some elements of their green spending, and nine out of 10 EPP Circle of Excellence winners track and reported metrics on dollars spent on environmentally preferable products, should be considered a leading indicator for the growing maturity of EPP work in hospitals (Figure 6.9). Larger hospitals were again slightly ahead with 65 percent tracking versus 54 percent for smaller hospitals.

Figure 6.9: Tracking and Reporting on Green Spending

Percentage of facilities tracking and reporting green spend metrics.



Calculating the Total Cost of Ownership

By looking beyond the initial purchase price, purchasers can identify cost savings to their organization. Many of the financial savings inherent in EPP are found through reducing the lifecycle costs of a product or service. For example, two products may have a similar purchase price but the total cost to the organization for using that product may include a range of other line items—such as air monitoring if it contains an OSHA-regulated chemical, or waste handler training and disposal costs if it contains a hazardous component. The total cost to the organization over the life of the product after it's purchased may be considerably higher with one product versus another based on these costs to own—which have not historically been a key aspect of the value analysis process.

There are several tools now available to support this work, such as the newly launched Practice Greenhealth Cost of Ownership (GCO) Calculator (see sidebar) that helps facilities look at and compare costs beyond the price tag—to evaluate the total cost of ownership—factoring in the use, maintenance and disposal costs of products and services it buys. These are true costs to an organization over time, and the calculator provides a framework to compare products to identify the most cost saving option.

Outcomes or Benefits Achieved with EPP

Measuring and communicating the outcomes of EPP activities can help to demonstrate the contribution that EPP is making to sustainability goals of the hospital. Figure 6.10 shows some highlights and examples of cost savings and business benefits being achieved by participating hospitals through their EPP programs.

Figure 6.10 Highlights of Outcomes Achieved with EPP

The University of Vermont Medical Center	Reprocessing of single use devices achieved significant growth in 2015. Grew from $674,914 in reprocessed device savings in 2014 to $1,024,273 in 2015.
Sonoma Valley Hospital	Purchasing more LED bulbs and getting rebates for doing so. In 2015, received approximately $240.00 in rebates, with the average rebate being $2.00-$6.00 per bulb.
Johns Hopkins Hospital	Due to invasive and non-invasive reprocessing programs, saved a total of $1,120,030 (and increased total savings by $26,761 from FY14 to FY15) by purchasing back reprocessed items including pulse-oxs, ECG wires, ultrasonic scalpels, burrs/bits/blades, endoscopic trocars, tourniquet cuffs, endoshears, EP catheters and cables.
Memorial Sloan-Kettering Cancer Center	In 2015, 42 percent of $2,912,424 office supply spend was categorized as "green spend" by Office Depot's GreenerOffice program (this does not include EPEAT electronics purchases).
The Valley Hospital	In 2015, had a service that was changing out soaked wicks that were placed in the public bathrooms to assist with odor. The service was costing $400 per week and was not a very safe chemical. So to better protect patients, family members and staff, found an organic mint oil that did not need changing for 2-months at the cost of $365 per visit. Huge savings and safer product for bathroom visitors.
Mayo Clinic - Jacksonville	Supply chain utilizes an e-waste recycler for all electronic office equipment (computers, copiers, fax machines, televisions, etc.). In 2015, the hospital diverted 93,053 pounds from landfills and received $27,600 in payment for this effort from the recycler.
University of Minnesota Medical Center, Fairview - West Bank	Signed a system contract to resell any unused or unexpired medical supplies. In 2015, the hospital resold $59,000 worth of medical supplies.

Greenhealth Cost of Ownership Calculator (GCO Calculator)

Practice Greenhealth introduced the new Greenhealth Cost of Ownership Calculator in September 2016 to assist hospital purchasers in comparing the total costs of ownership of various health care products. The calculator supports hospitals and GPOs in identifying hidden costs, such as energy, water and waste, and allows a standard framework for purchasers to compare the cost of ownership data to ultimately find products with the lowest cost and least environmental impact. For example, the calculator can compare and identify the cost savings between a conventional product and an energy efficient product. While the energy-efficient product may cost more upfront, it may actually save money in the long run.

For more details, visit www.practicegreenhealth.org/gco.

Conclusion

While many participating hospitals are in the early stages of implementing a comprehensive EPP program, the 2015 data show significant progress in this arena. Nearly all facilities are integrating EPP into procurement and their overall sustainability planning. Many are finding ways to develop and integrate EPP criteria into procurement by working with their GPOs and supply chain leadership teams. The continued challenge is to find ways to educate and engage supply chain professionals about the myriad of benefits that EPP can reap in a time of increasing cost pressures and competing priorities.

Joining forces with other organizations through collaborations like the working groups convened by Practice Greenhealth to transform health care markets or Greenhealth Exchange helps to reduce some of the complexity in implementing EPP and also improves harmonization in EPP criteria, which makes it easier for suppliers to comply with EPP criteria. Adopting the Standardized Environmental Questions for Medical Products and developing clear, common, and verifiable criteria also increases the likelihood suppliers will make environmental and social improvements to the products and services in the most cost-effective manner.

Resources

ENVIRONMENTAL PURCHASING PROGRAM

Getting Started (EPP Policies, etc.)

Engaging Leadership in EPP (Sample Resources)

EPP Case Studies

Where to Find Green Products

EPP Specifications and Resources Guide

Greenhealth Cost of Ownership Calculator v1.0

GREENING THE SUPPLY CHAIN INITIATIVE

Standardized Environmental Questions for Medical Products, v1.0

EPP Pledge

Leaner Energy

The health care sector in the United States uses a huge amount of energy. As a whole, inpatient health care uses 549 trillion Btus of energy per year, using more total energy than all but four commercial users in the U.S. On a per-square foot basis, inpatient health care uses more energy than any other non-industrial use except for food service. This is not surprising, given the strict environmental control requirements and energy-intensive equipment that are part and parcel of modern medicine. Even within these constraints, the data demonstrates room for participating hospitals to reduce energy use through efficiency measures, and to mitigate the impacts of energy use by switching to renewable sources.

Conventional, fossil-fuel based building heating and cooling, as well as electricity generation and use, contribute to human health problems. The use of coal to generate electricity is the most dominant impact. Although usage has dropped substantially in recent years, coal still accounts for one-third of all electricity generated in the United States. Emissions from coal-fired power plants cause respiratory disease, asthma, and premature death. Fossil-fuel based energy use is also the primary contributor to U.S. greenhouse gas (GHG) emissions, creating substantial indirect health impacts through its contribution to climate change.

Reducing energy use and/or switching to renewable sources can help hospitals promote the fundamental goal of protecting human health. But energy efficiency is also a smart financial decision, generating substantial, ongoing cost savings—often for a relatively modest upfront investment and a relatively short payback period. Many efficiency measures can be implemented with low or no upfront cost. The barriers to implementing these actions are not necessarily financial, but are often informational, organizational, and behavioral.

This year's Leaner Energy highlights include:

70 billion kBtu

of energy were used by participating hospitals in 2015—the equivalent of nearly two million homes. One hundred percent of facilities provided data on their energy use for major fuel types.

1.3 billion kBtus

of energy savings was achieved by this group from energy efficiency projects, equivalent to 1.9 percent of their total consumption. This accrued to more than $23.7 million in combined financial savings in 2015.

$75,100

per year was the median cost savings per facility for hospitals reporting efficiency measures.

233 kBtus/sq ft

is the median energy use intensity for participating hospitals—improved from 237 in 2014.

This chapter focuses directly on hospitals' efforts to reduce energy use and move to cleaner energy sources. Energy is also discussed in the climate change, green building and greening the operating room chapters of this report—as energy reduction is a major focus for reducing greenhouse gas emissions, a key strategy for designing greener buildings, and the OR is a major user of energy.

The data collected for this section of the Practice Greenhealth application includes some yes/no questions regarding the energy efficiency and renewable energy strategies being undertaken, but other questions call for reporting substantial quantitative data, particularly on participating hospitals' energy use by major fuel type. Practice Greenhealth has been collecting much of this information in the same way since 2014, meaning some data is available on trends over time. As a group, large hospitals perform somewhat better than small hospitals in the data set. There are likely economies of scale that allow larger facilities to have proportionally lower energy use. Large hospitals may also have energy managers and other staff devoted to managing energy systems at higher rates than smaller hospitals, which may lead to better performance. In aggregate, participating hospitals achieved 1.3 billion kBtus in energy savings in 2015, which yielded a combined financial savings of $23.7 million annually. It is important to note that only 109 out of 322 facilities (34 percent) reported any energy savings at all, suggesting substantial under-reporting; thus, the actual savings realized from efficiency measures in these hospitals is significantly higher than shown in the data.

The figures in this chapter present a subset of the available data on energy, additional detailed data tables and results can be found in the appendix.

Figure 7.1: Energy Use and Savings

Energy Use and Savings	All Facilities
Consumption	
Total aggregate energy use	**70,850,864,628 kBtus**
Median energy use intensity (EUI)	**233 kBtus/sq ft**
Savings	
Total aggregate energy savings from energy efficiency projects	**1,334,797,598 kBtus**
Total aggregate financial savings from energy efficiency projects	**$23,658,514**
Median financial savings for hospitals reporting energy efficiency projects	**$75,100**

Facilities team at Cleveland Clinic-Medina Hospital

2016 Energy Circle of Excellence Winners

The Energy Circle of Excellence highlights leading hospitals that have made significant strides in driving down organizational energy use and moving to more renewable energy sources as a means of reducing the human health impact of energy production. Winners have written policies and plans to address energy reduction, have conducted audits and have gained executive buy-in and support for energy reduction and renewables.

Advocate Illinois Masonic Medical Center
Chicago, IL

Gundersen Health
La Crosse, WI

James E. VanZandt VA Medical Center
Altoona, PA

Mayo Clinic Health System - Eau Claire
Eau Claire, WI

NYU Langone Medical Center Main Campus
New York, NY

Skokie Hospital
Skokie, IL

University of Washington Medical Center
Seattle, WA

VA Caribbean Healthcare System
San Juan, PR

VA Western New York Healthcare System at Buffalo
Buffalo, NY

Virginia Mason Medical Center
Seattle, WA

90%
of Circle of Excellence winners have conducted a baseline energy audit and 100% of Circle of Excellence winners have a written energy plan.

90%
use ENERGY STAR Portfolio Manager to track their energy use.

Circle of Excellence winners have a median
EUI of 159.4 kBtus per square foot,
30% below
the median for all applicants.

12.7%
is ihe median percent of renewable energy used or generated by Circle of Excellence winners, as compared to 4.7% for all participating hospitals.

Energy Use Intensity

For hospitals to set appropriate goals and take effective action regarding their energy use, it is important to both understand their baseline energy usage and understand how their energy use profile compares to similar facilities. Practice Greenhealth collects and analyzes energy use data using a number of different metrics to assist hospitals in this benchmarking exercise, as well as to track the evolution of energy performance for the health care sector as a whole. This section presents key results from that effort.

A hospital's total energy use depends largely on its size, larger facilities almost invariably use more energy than smaller ones. Energy use is typically discussed in normalized terms, and square footage is the most statistically significant normalizer—putting energy consumption in the context of hospital size. Energy use intensity (EUI or kBtus per square foot) is the most common metric used, along with weather-normalized EUI (which adjusts for weather-related differences in energy consumption). Practice Greenhealth also annually evaluates energy use against other normalizers specific to the health care sector (Figure 7.2), such as energy use per OR and per adjusted patient day. While statistical analysis shows that the correlation is not quite as strong for these factors as it is for size, there is nonetheless a clear relationship to overall energy use.

Analysis of the energy data showed that differences in square footage can explain 89 percent of the variation in total energy use between hospitals, making it by far the best indicator examined. However, this also means that the remaining variation (11 percent) cannot be explained by square footage. Presumably, the variation in this remaining amount, though not necessarily all of it, is due to the impacts of energy efficiency measures. Certain hospitals have measurably lower energy use than others, even after accounting for factors such as square footage or FTEs—that is likely due in part to those facilities' energy efficiency efforts.

Academic medical centers have higher median energy use intensities than non-academic facilities (with a median EUI of 242 vs. 223 kBtus per square foot). Academic medical centers that reported having onsite research labs reported an even higher median EUI, at 258 kBtus per square foot, demonstrating that research laboratories have a significant impact on hospital energy use that needs to be looked at in isolation. Readers should refer to the Academic Medical Centers chapter of this report for more detail on how the performance of these facilities differs from non-academic facilities, and the factors that may contribute to those performance differences.

While Practice Greenhealth was unable to calculate median weather-adjusted EUI for participating hospitals, the application did ask participants to report this metric if they utilize ENERGY STAR Portfolio Manager for benchmarking. Sixty-eight percent of hospitals reported benchmarking with Portfolio Manager. Thirty-eight percent provided weather-adjusted EUIs from Portfolio Manager, with a median weather-adjusted EUI for 2015 of 238 kBtus per square foot.

The median weather-adjusted EUI (from Portfolio Manager) for participating hospitals was

238 kBtus

per square foot for 2015.

Figure 7.2: Energy Use and Savings

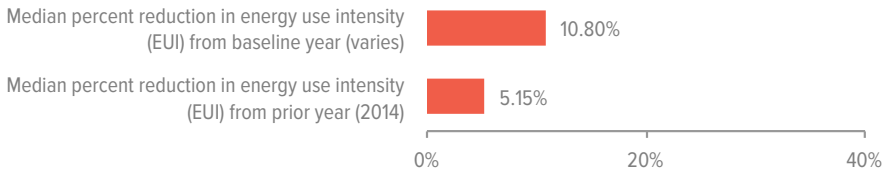
Normalized Energy Use	All	Small	Large
Total kBtus used per square foot per year	232.5	235.8	227.4
Total kBtus used per FTE per year	97,734	102,304	92,786
Total kBtus per OR per year	11,846,367	11,156,100	13,375,907
Total kBtus used per adjusted patient day	1,483	1,555	1,432
Total kBtus used per patient day	3,121	3,954	2,633

Notes: APD has an R-squared value of 0.69 and patient day has an R-squared value of 0.67, meaning that 69 percent and 67 percent respectively of the difference in energy use between facilities can be explained by these metrics. Ordinarily, Practice Greenhealth does not present metrics with R-squared values below 0.7. In this case, however, Practice Greenhealth provides the figures for reference, because numerous Practice Greenhealth members track these figures internally for their own purposes, and may find an external benchmark useful.

Change in Energy Use

Participating hospitals were asked to provide energy information for baseline and previous year as well as 2015. Many of these hospitals have also been tracking their energy use over a longer period of time. Figure 7.3 shows the reduction in EUI from 2014 to 2015, and from hospitals' baseline year (which varies from hospital to hospital).

Figure 7.3: Change in Energy Use Intensity



The median reduction in EUI from 2014 to 2015 was 5.15 percent. This shows substantial improvement over last year, when the median reduction (from 2013 to 2014) was just 0.1 percent. Part of this improvement may reflect the fact that this year, Practice Greenhealth has begun reporting data for all award applicants, whereas results for prior years reflected award winners only. Non-award and lower-level award winners had poorer energy performance in prior years than award winners, meaning that it would have been easier for them to achieve a larger reduction over time (since there is more "low-hanging fruit" available in terms of efficiency measures not yet undertaken).

Hospitals in the data set also reported median energy use reductions of 10.8 percent below their baseline year. Again, this shows an improvement from last year, when the reduction was 2.6 percent. In this case, Practice Greenhealth would expect to see continued improvement over time. Since most facilities' baseline years remain the same over time, every year that passes represents an opportunity for further reduction below a fixed target.

On both of these metrics, the top performers demonstrated their leadership. Facilities in the 90th percentile have shown much more dramatic reductions than the median figures shown here, lowering their energy use by 17 percent below the previous year and 27.6 percent from their baseline years. Similarly, Circle of Excellence winners have reduced their energy use by 23.8 percent below their baseline years.

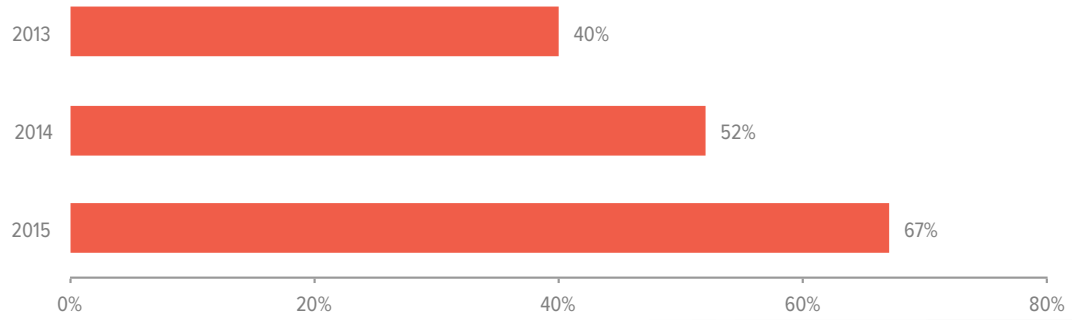
UW Medicine
UNIVERSITY OF WASHINGTON MEDICAL CENTER

The University of Washington Medical Center—the anchor institution for the UW Medicine health system, is a standout on the energy front. The hospital boasts an impressive energy use intensity of 138 kBtus per square foot for a 1.5 million square foot facility, underpinned by a holistic approach of providing energy savings through infrastructure upgrades. UW Medical Center has conducted a series of energy audits, and has completed two project phases of major improvements with a 2.7 percent energy reduction in 2015 alone. The hospital is well into a third phase of improvements in 2016. These upgrades are incorporated and funded through a number of avenues, including specific capital requests, Washington State Commerce grants, and large capital improvement projects. The hospital has partnered with the State of Washington, and is using the state's ESCO services to provide the contract oversight of its approved ESCO service provider. And it has aggressively set energy goals, which can be scaled and adjusted to meet the changing needs of the Medical Center.

Energy Benchmarking

ENERGY STAR's Portfolio Manager is perhaps the most widely-used platform for facilities to track their energy use and benchmark energy performance compared to others. Figure 7.4 shows participating hospitals' reported use of Portfolio Manager over time.

Figure 7.4: Use of ENERGY STAR Portfolio Manager



Use of Portfolio Manager has increased substantially over the past few years, with two-thirds of facilities using it to benchmark their performance against other hospitals, up from 40 percent from the 2013 data. In the 2015 data, large hospitals were somewhat more likely to use Portfolio Manager than small hospitals (83 percent vs. 73 percent), and to use it for benchmarking purposes (70 percent vs. 64 percent). It is also worth noting that 11 percent of hospitals reported using Portfolio Manager, but not doing any benchmarking; this represents a missed opportunity for these facilities to better understand their energy use within a broader context.

An ENERGY STAR score of 50 represents the median for all hospitals nationwide that have calculated their ENERGY STAR scores. Among participating facilities using Portfolio Manager, the median ENERGY STAR score was 45. Small and large hospitals performed similarly (median scores of 45 and 46 respectively). There was minimal change from last year.

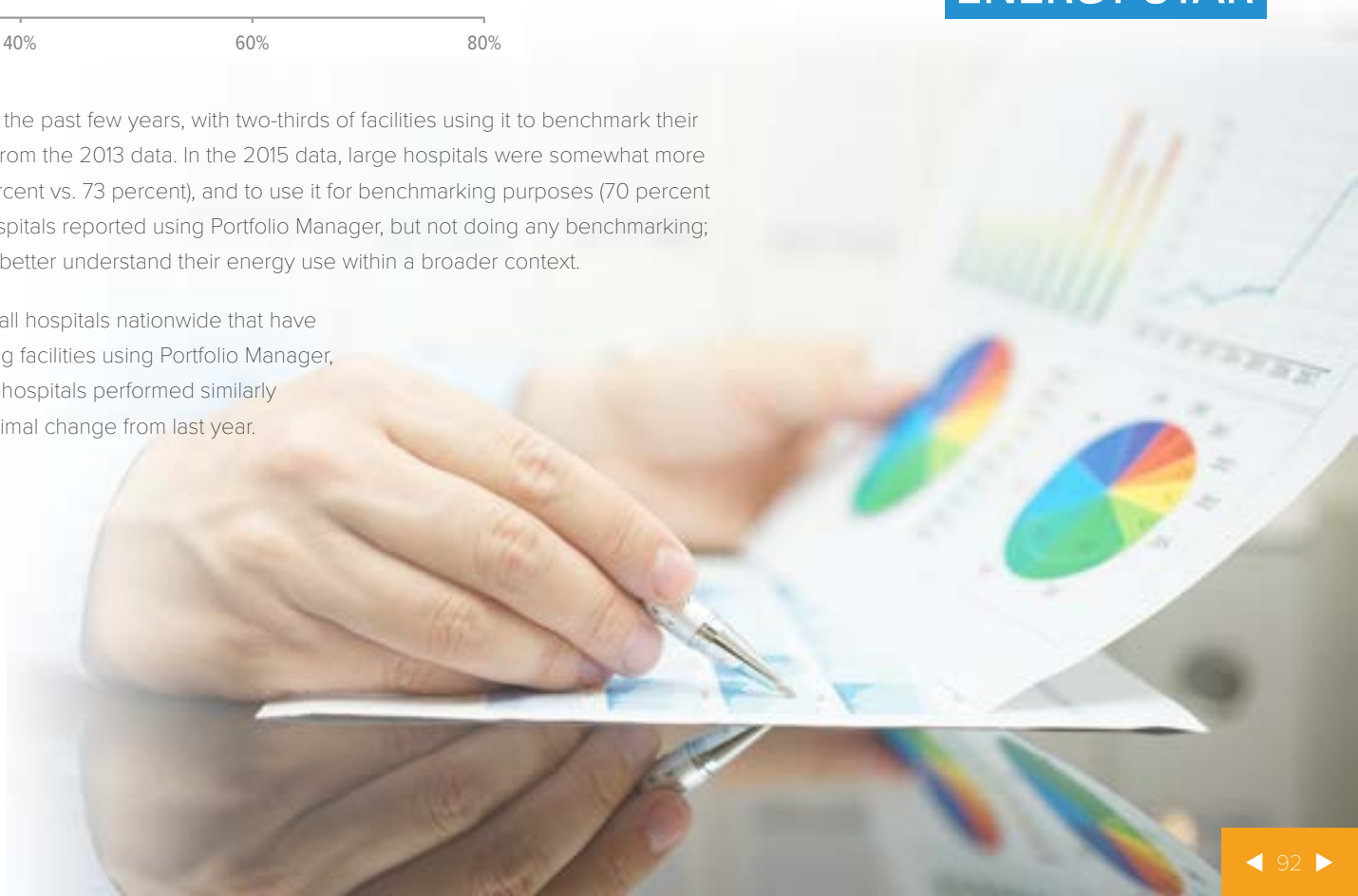
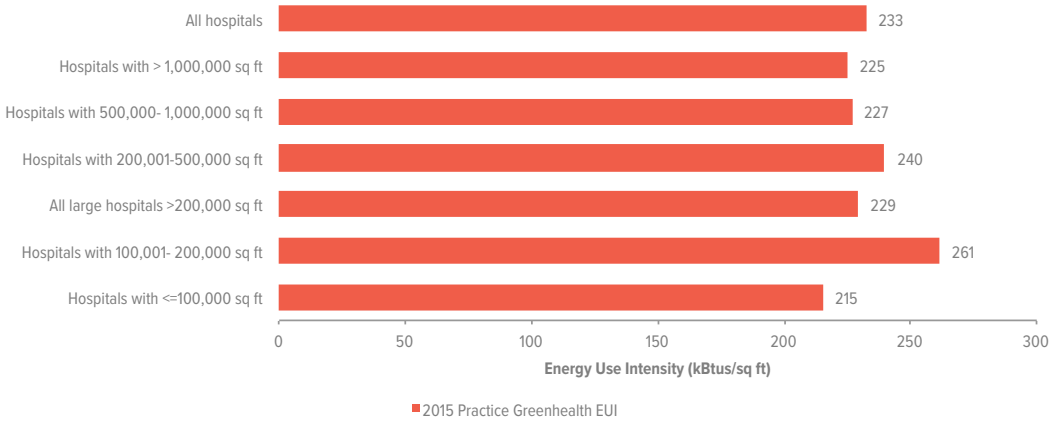


Figure 7.5 shows how participating hospitals' energy use varied by size class. The smallest hospitals (those with ≤100,000 square feet of space) had the lowest EUI, but among the rest, larger hospitals generally had lower EUI than smaller ones. The prevalence of an energy manager role at larger hospitals likely influences the EUIs of larger institutions.

Figure 7.5: Energy Use Intensity by Size



Another useful way to evaluate the data is to look at hospitals' energy use in the context of their regional climate zone. Heating and cooling energy demands vary widely based on regional climate, such that all else being equal, Practice Greenhealth would expect hospitals in locations with more extreme temperatures to have higher energy use than facilities in more temperate areas. Given this, it can be useful to look at performance within climate zones, rather than across them.

The Commercial Building Energy Consumption Survey (CBECS) conducted by the U.S. Energy Information Administration, historically defined five different climate zones, based on the number of cooling degree days and heating degree days. In the 2012 survey, CBECS switched to a new system, using climate zones as defined by the Department of Energy's Building America program. Figure 7.6 illustrates the climate zones used by CBECS and by Practice Greenhealth to examine energy usage.

Figure 7.6: Map of CBECS Climate Zones

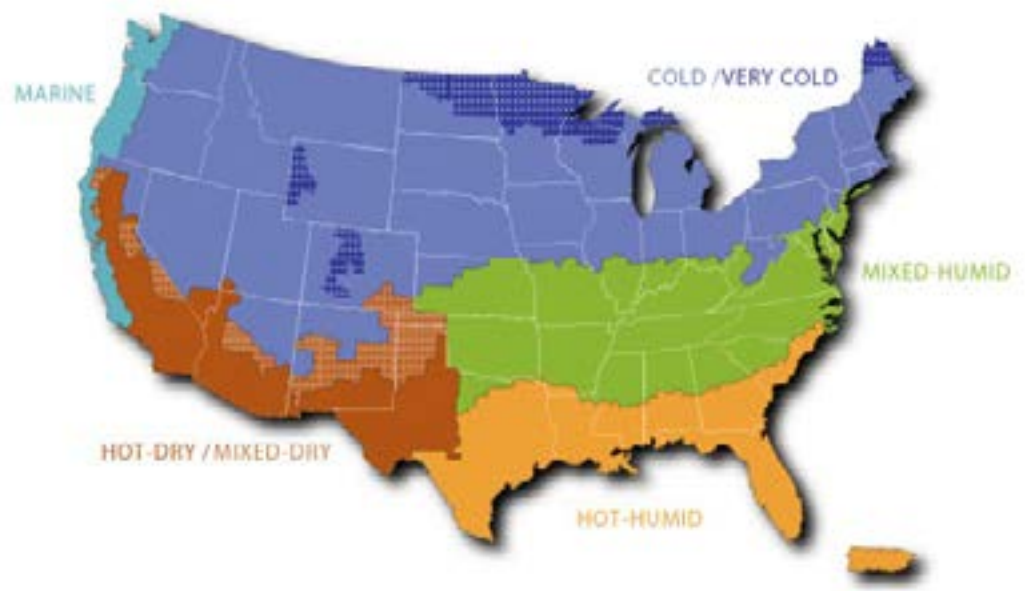
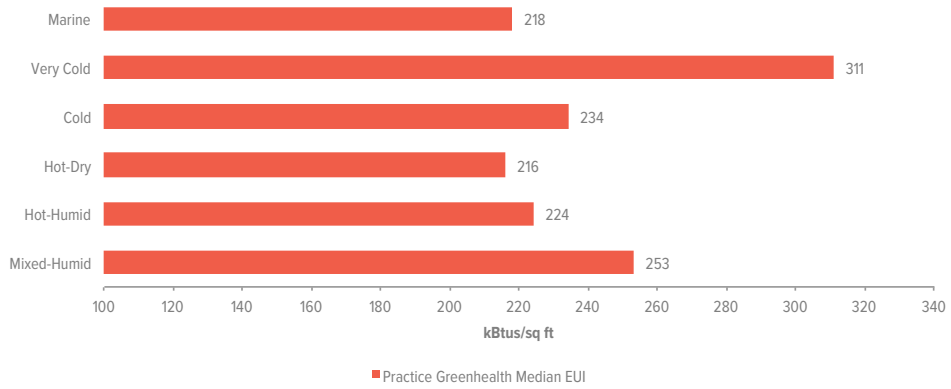


Figure 7.7: Climate Zones

Climate Zone	Key Characteristics	Number of Hospitals	Median EUI
Mixed-humid	≥ 20 in. of annual precipitation ≤ 5,400 heating degree days Average temperature ≤ 45°F in winter	65	253
Hot-humid	≥ 20 in. of annual precipitation ≥ 67°F wet bulb temperature for 3,000 or more hours during the warmest 6 consecutive months of the year; and/or ≥ 73°F wet bulb temperature for 1,500 or more hours during the warmest 6 consecutive months of the year.	25	224
Hot-dry	< 20 in. annual precipitation Average temperature > 45°F year-round	18	216
Mixed-dry	< 20 in. annual precipitation ≤ 5,400 heating degree days Average temperature ≤ 45°F in winter	0	-
Cold	5,400 – 9,000 heating degree days	130	234
Very cold	9,000 – 12,600 heating degree days	1	311
Sub-arctic	> 12,600 heating degree days	0	-
Marine	Mean temperature of coldest month is 27°F - 65°F Mean temperature of warmest month < 72°F Mean temperatures of at least four months > 50°F Has dry season in summer	30	218

Figure 7.8 shows how participating hospitals' energy use varied by climate zone.

Figure 7.8: Energy Use Intensity by Climate Zone

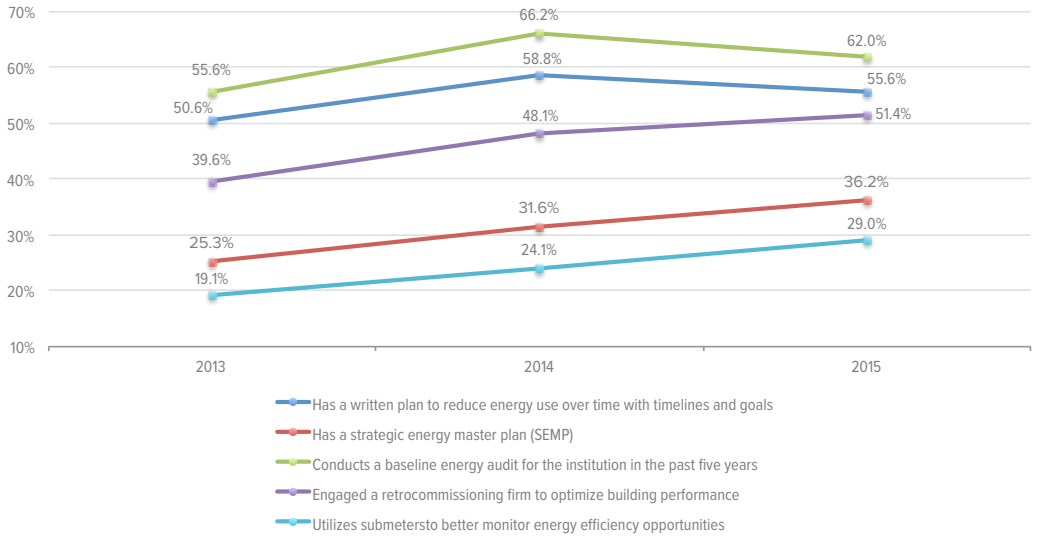


Energy Efficiency Planning and Strategy

Benchmarking energy use is an important first step, but it may provide only a relatively high-level picture of a hospital's energy use. Audits, retrocommissioning, and submetering are all means to highlight specific areas where energy use is outside of expected ranges, which can in turn point to specific measures that hospitals can take to effectively reduce energy use. Meanwhile, establishing broader energy plans is an important means to establish goals and create accountability.

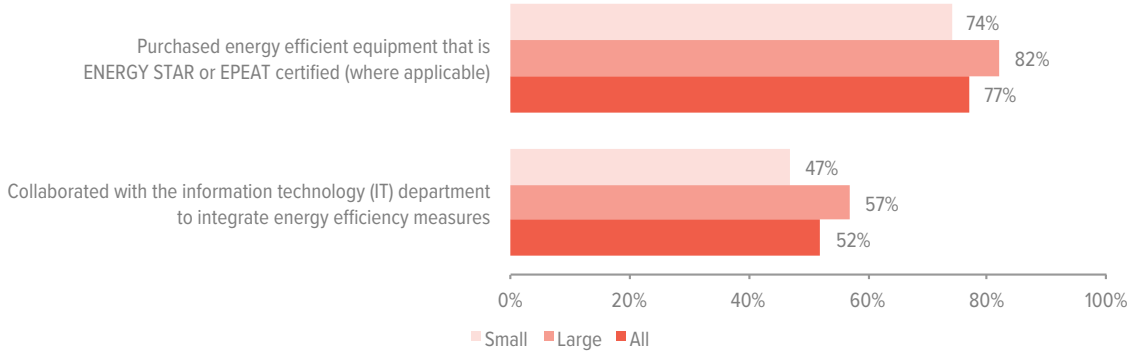
As shown in Figure 7.9, participating hospitals have generally become more engaged in energy efficiency planning and strategy over the last two years, although there was a slight downturn in the use of some practices over the past year. Sixty-two percent of hospitals have conducted a baseline energy audit—an important first step in understanding energy usage outliers across the facility. The majority of hospitals have written a plan to reduce energy (55.6 percent), which takes energy savings opportunities from concept to completion. And 51.4 percent of hospitals engaged a retrocommissioning firm. Smaller numbers of facilities use submeters or have developed a strategic energy master plan (SEMP), but the trends for these items are strongly positive, with significant improvements over the past two years.

Figure 7.9: Energy Efficiency Planning and Strategy



Information technology (IT) uses a significant amount of energy, both through plug loads, and from data centers, which require special space cooling. Thus, it represents an area worthy of particular focus for energy reduction. There are several energy efficiency measures aimed specifically at IT, such as purchasing energy efficient computers and other equipment, using power management options on plug loads, and adjusting temperature and humidity set points in data centers. Many participating hospitals are exploring these options.

Figure 7.10: Energy Efficiency in Information Technology



More than three-quarters of facilities (77 percent) reported purchasing energy-efficient equipment, such as ENERGY STAR or EPEAT, indicating this is a mainstream practice. Given the ubiquity of ENERGY STAR and EPEAT electronics products, which are typically available with little to any additional upfront cost, this represents a missed opportunity for easy, cost-effective energy savings for the 23 percent of participating hospitals that are not already doing this.

Just over half of facilities are collaborating with their IT department regarding efficiency measures (52 percent), demonstrating that many participating hospitals still have room for improvement. Large hospitals are pursuing these collaborations at a significantly higher rate than small facilities. A range of energy-saving strategies, such as implementing protocols to power down equipment during non-business hours, are easy to put in place and require only behavioral changes, with no new technology or upfront capital investment needed. However, these strategies can only be implemented with the cooperation and buy-in of IT managers. Hospitals should make it a priority to approach these key stakeholders to explore energy efficiency options.

Virginia Mason™

Virginia Mason Seattle Hospital & Medical Center has created an energy and water efficiency master plan that quantifies past and current utility performance and uses this information to construct progressive goals to reduce energy and potable water consumption that are inline with aggressive 2030 Seattle district energy goals. The plan includes fifty different energy efficiency measures to reduce energy consumption by 18 percent and potable water use by 20 percent from their 2014 levels. The 2030 Seattle District Energy goals said Virginia Mason had to decrease their energy consumption by 31 percent from 2014 usage, 18 percent of which must come from onsite energy efficiency or renewables. In 2015, 60.7 percent of Virginia Mason's energy portfolio came from renewable energy.

NorthShore University Health System

NorthShore University Health System signed a new electric energy procurement agreement in 2015 that included 11 percent renewable energy credits, which will account for approximately eight million kWhs annually. This will help NorthShore exceed the current Illinois state mandate that requires 10 percent of energy to come from renewable sources. This brings the total electricity from renewable sources to 21 percent of the system's energy portfolio, or roughly 16 million kWhs—equivalent to powering 1,300 homes annually. Skokie Hospital, a NorthShore affiliate and Energy Circle of Excellence winner in 2015 had 7.7 percent of their energy portfolio comprised of renewable energy in 2015.

Renewable Energy Use and Alternative Energy Systems

Renewable energy use is increasing, both in the health care sector and more broadly. The International Energy Agency recently announced that the world's capacity to generate electricity from renewable sources has now overtaken coal's capacity. Among hospitals, the increase in renewable sources of energy is being driven by several factors, including the recognition that burning fossil fuels for heat and electricity contributes to health problems and climate change; the desire to develop onsite power generation options to maintain the ability to deliver key health care services during weather emergencies; and improving economics as renewable sources of power (in particular solar) become more affordable.

In 2015, 38 percent of facilities reported that they purchased or generated a portion of their energy from renewable sources. There were minimal differences between small and large facilities. Among those facilities reporting any purchase or generation of renewable energy, the median level of renewable energy used was 4.7 percent of total energy use. Most of this came from offsite renewable energy sources. Large facilities produced much higher levels of renewable energy onsite than small facilities. And the median renewable energy use for Circle of Excellence winners was an impressive 13 percent.

Figure 7.11: Renewable Energy Use

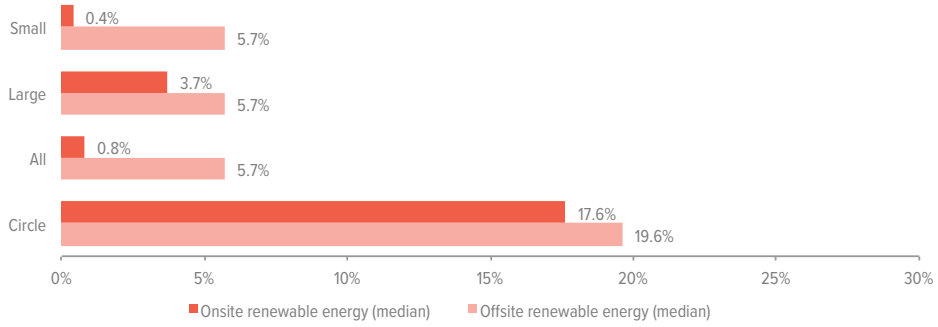
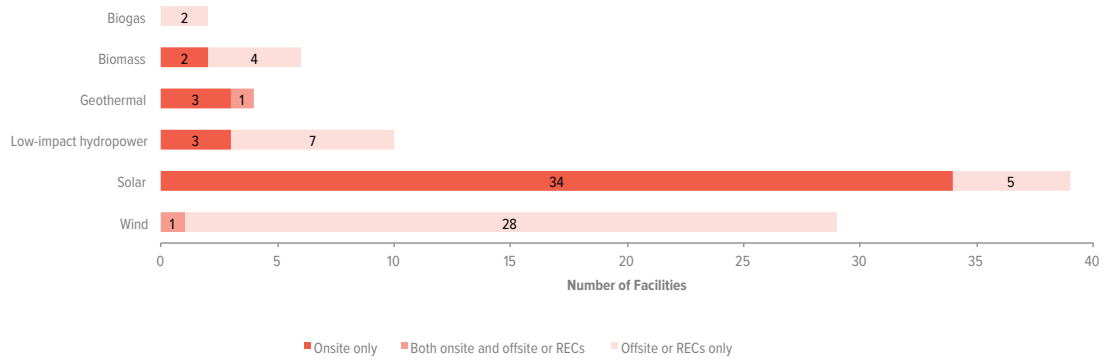
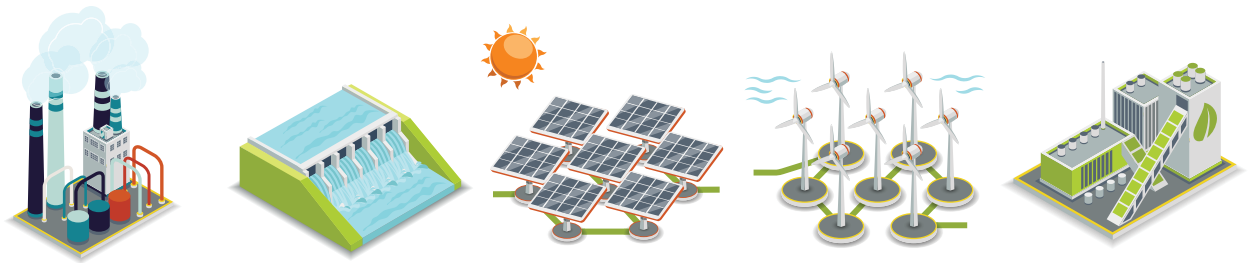


Figure 7.12 shows the specific types of renewable energy being used and the numbers of participating hospitals. Mirroring the overall market landscape of renewable energy use in the United States, wind and solar are by far the most commonly-used options, with wind representing the most popular choice for offsite renewable energy and solar the most frequently used onsite energy source. Other options were used much more rarely.

Figure 7.12. Renewable Energy Use by Energy Type



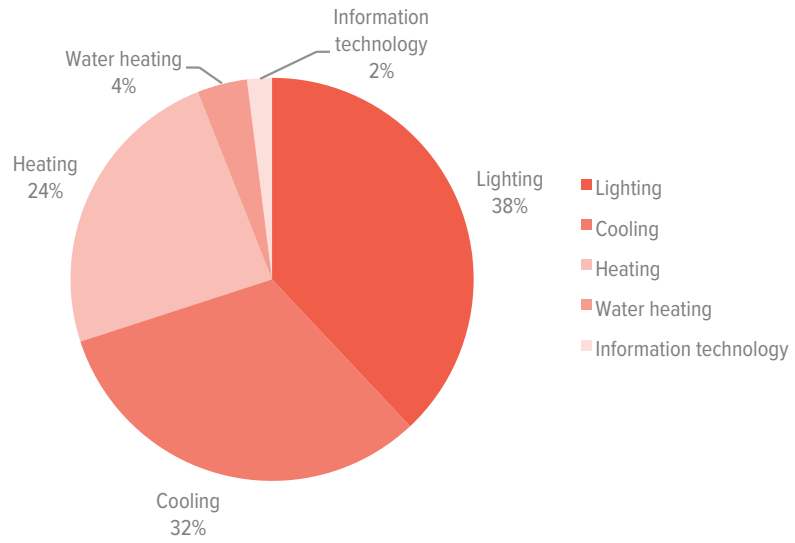
In addition to renewable sources of energy, six percent of hospitals in the data set have installed a combined heat and power (CHP) or cogeneration project within the past five years. Depending on the specific fuel used, CHP may not be a renewable energy source. Nonetheless, CHP represents an onsite power generation option that can significantly reduce overall energy consumption (compared to generating heat and power separately) and thus mitigate energy-related environmental and health impacts.



Energy Efficiency Projects: Outcomes and Benefits

Beyond measuring energy reduction metrics, hospitals provided information on energy-saving efforts that took place in 2015. Lighting upgrades were the most common kind of project tackled by hospitals, at 38 percent of the 320 projects shared. LED lighting has a strong ROI and can reduce facility maintenance labor costs as well as energy dollars. Cooling upgrade projects were the next most commonly cited project type. Figure 7.13 highlights the project breakdown by type.

Figure 7.13: Energy Efficiency Projects by Type

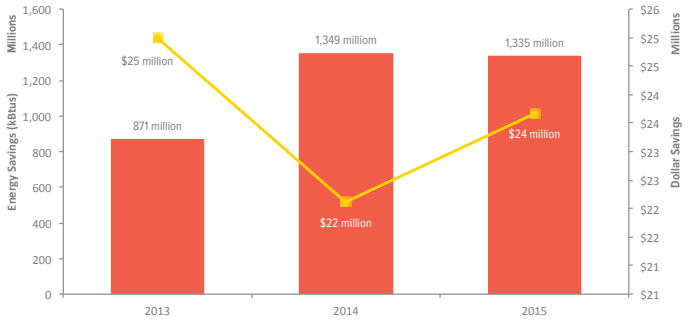


Advocate Health Care

In 2015, the facilities and engineering department of Advocate Illinois Masonic Medical Center, led by their energy-saving champions, replaced more than 1,000 light fixtures on their medical campus with LED fixtures. Now, 20 percent of their fixtures are LED and the goal is to transition to 100 percent LED by 2020. Overall, these 1,000 fixtures will save approximately 25 kilowatts/hour. In addition, they have reduced the cooling load on their main chiller by at least five percent over the last three years due to a reduced heat load from fluorescent lights.

Figure 7.14 highlights the aggregate energy and cost savings from reported projects over the last three years. The data shown in Figure 7.14 is incredibly conservative, with only 57 percent of hospitals reporting any energy savings projects despite energy metrics that demonstrate that significant savings occurred. Many facilities were not able to estimate energy savings or share energy and cost savings specific to their projects, and some facilities may have had more projects than they were able to include in the five slots in the application. Furthermore, the data for 2013 and 2014 represent savings only from Partner for Change award winners or higher level awards, but did not include all applicants or Partner Recognition winners. Even so, the savings realized over time are significant. The reported savings from 2013 to 2015, which total more than 3.5 billion kBtu, are equivalent to the annual electricity use of more than 95,000 homes. In 2015, reported energy reduction projects generated $23.7 million in annual savings.

Figure 7.14: Savings from Energy Efficiency Efforts



Conclusion

Trends in energy use among participating hospitals are moving in the right direction. Energy use intensity is improved from last year, and the cost savings from reduction projects continues to grow. Even so, the enormous energy consumption by the health care sector overall points to the need for hospitals to continue to drive down their energy usage. The level of energy coming from renewable sources remains quite modest, but should grow as transactional and soft costs continue to drop and deal structures improves.

All of this points to the need for health care executives to make energy a key priority. As described in the Leadership chapter, one way to promote ongoing investment in energy efficiency is through the creation of a green revolving fund, which is an internal fund that provides financing to parties within an organization to implement energy efficiency, renewable energy, and other sustainability projects that produce cost savings over time. Savings are tracked and, over time, used to replenish the fund to finance the next round of investments. These funds also do not typically compete with clinical capital—driving up the likelihood that energy improvement and infrastructure projects get funded. Several participating hospitals have created green revolving funds, with promising results. Whether through this or other means, the opportunity for meaningful environmental and financial benefits makes energy use a key area for health care facilities to prioritize moving forward.

Resources

Advanced Energy Retrofit Guide for Healthcare Facilities

Healthcare Energy Impact Calculator

Healthier Hospitals Program Leaner Energy How-to Guide

Portfolio Manager Data Collection Sheet

Less Water

The availability of clean, fresh water remains a challenge for the world's population; almost one-fifth of the world's population lives in areas with water scarcity.[1] In the U.S., the Government Accountability Office found that 40 of the 50 states expect water shortages in the next ten years due to the impacts of climate change and extreme weather events.[2] The World Economic Forum's 2016 Global Risk Report states:

> "... the failure of climate change mitigation and adaptation has risen to the top and is perceived in 2016 as the most impactful risk for the years to come, ahead of weapons of mass destruction, ranking second, and water crises, ranking third."

By 2030, studies show that global water supplies will meet just 60 percent of total demand. Despite the fact that most of the U.S. is either currently facing or will face water shortages in the near future, water remains highly subsidized and undervalued.[3] This makes it difficult to motivate reductions in water consumption for those that use financial outcomes as the only measure for decision-making.

This year's Less Water highlights include:

15%
is the median reduction of water use intensity from baseline achieved by participating hospitals in 2015.

28%
of participating hospitals have a written plan to reduce water use.

47.2 gallons
per square foot is the median amount of water used by participating hospitals in 2015.

1 "International Decade for Action 'Water for Life' 2005-2015." United Nations, Accessed on September 4, 2016. http://www.un.org/waterforlifedecade/scarcity.shtml.

2 "Freshwater: Supply Concerns Continue, and Uncertainties Complicate Planning." U.S. Government Accountability Office, GAO-14-430, May 22, 2014. http://www.gao.gov/products/GAO-14-430

3 "Water: The most undervalued resource." Hargreaves, Steve. Fortune.com, April 14, 2010. http://fortune.com/2010/04/14/water-the-most-undervalued-resource/

Hospitals are the most water-intensive facilities in the country, with seven percent of all commercial and institutional use (EPA, 2014). Hospitals can also potentially be inadvertent water polluters through poor control of pharmaceuticals, laboratory waste and hazardous materials. Hospitals use water for a range of critical functions, from sterilization to surface cleaning to handwashing. While utilizing water to keep patients and staff healthy and safe is paramount, there are several steps that hospitals can take to become more aware of their water consumption and to conserve water. Hospitals are implementing innovative projects, such as irrigation savings measures, rain water capture, steam trap monitoring, and sterilization equipment upgrades. Practice Greenhealth participating hospitals are beginning to take a variety of steps to reduce water consumption.

Most participating hospitals did not track or report water conservation measures and outcomes in 2015, as doing so can be difficult without submetering. Only 29 percent of hospitals reported having submetering in place for major equipment or activities. Therefore, if a water-savings project was implemented in one area of the hospital, it would be difficult to track the specific savings from that project. This is a common challenge—in ENERGY STAR Portfolio Manager, the U.S. Environmental Protection Agency found in 2012 that only 40 percent of all building owners and operators track a combination of indoor and outdoor water use,[4] and that landscaping water use for hospitals averages seven percent of total water use.[5] This chapter summarizes the conservation efforts of participating hospitals.

4 "ENERGY STAR Portfolio Manager Data Trends: Water Use Tracking." U.S. Environmental Protection Agency, October 2012. https://www.energystar.gov/ia/business/downloads/datatrends/DataTrends_Water_20121002.pdf?2003-40fb

5 "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities." EPA WaterSense. EPA 832-F-12-034, October 2012, p.5-4. https://www3.epa.gov/watersense/docs/ws-at-work_bmpcommercialandinstitutional_508.pdf

Native prairie plantings at Hudson Hospital in Hudson, Wisconsin

2016 Water Circle of Excellence Winners

The Water Circle of Excellence recognizes hospitals for exemplary programs in water conservation and efficiency. These early adopters boast fewer gallons of water consumption per square foot, tracking of implemented conservation projects, written plans to reduce water consumption over time and have water tracking mechanisms in place.

Audie L. Murphy VA Hospital
San Antonio, TX

Erie VA Medical Center
Erie, PA

James E. Van Zandt VA Medical Center
Altoona, PA

Kaiser Permanente Irvine Medical Center
Irvine, CA

Kaiser Permanente San Jose Medical Center
San Jose, CA

Littleton Adventist Hospital
Littleton, CO

Mayo Clinic Health System - Eau Claire
Eau Claire, WI

Seattle Children's Hospital
Seattle, WA

Virginia Mason Seattle Hospital & Medical Center
Seattle, WA

William S. Middleton Memorial Veterans Hospital
Madison, WI

30%

percent fewer gallons of water per square foot are used by Circle of Excellence winners compared to other participating facilities. They have also achieved water use reductions more than double that of other participating facilities (38% vs. 15%).

100%

of Circle of Excellence winners have a written plan to reduce water use over time and benchmark their water usage.

90%

of Water Circle of Excellence winners use alternative landscaping methods that reduce the need for irrigation at their facilities.

80%

of Water Circle of Excellence winners submeter their water usage, an important step in understanding consumption patterns and opportunities for reduction strategies.

Storm water retention at Erie VA Medical Center in Erie, Pennsylvania

Water Use Intensity

The first step in reducing water consumption is to understand how much water is actually being used at a facility. To do this, hospitals must measure their baseline usage—how many gallons of water are consumed before conservation efforts begin. Practice Greenhealth's Less Water toolkit first asks facilities to determine their water usage baseline by measuring the gallons of water used in their facility, normalized by square feet of gross floor area. Normalizing data allows the reader to compare metrics between different hospitals, regardless of size or the volume of patient activity. To normalize data is to determine how water usage is affected by other variables. The most reliable metric for normalizing water data according to Practice Greenhealth's statistical analysis is gallons per cleanable square foot. This is less commonly tracked than gallons per gross square feet (the second most highly correlated normalizer) because many hospitals are either not utilizing cleanable square feet in their program monitoring or facilities are utilizing slightly different definitions for cleanable square feet.

Gallons per gross square feet is the most commonly used metric for water utilization, but there are several complexities worth noting in measuring and tracking water consumption and recovery. Many hospitals do not currently submeter their water use. The data collected from 2015 for this report does not differentiate between indoor and outdoor (for example, irrigation) water usage.[6] Comparing gallons per square foot (or cleanable square foot) may not capture the true area over which water consumption is applied at each facility. For example, a hospital with a larger percentage of irrigated landscape could appear to use more water per square foot since the square footage for the facility excludes that outdoor space.

The primary way to differentiate indoor from outdoor water use is by submetering potable water used for irrigation purposes. As noted previously, only 29 percent of participating hospitals reported using submeters. Of the participating hospitals who reported using submeters, the most common uses were for irrigation water, cooling tower make-up, boiler make-up and chiller make-up water. Other areas where facilities submeter include, sterilizers, and laundry. Meters can also be installed to monitor purified water systems (reverse osmosis/de-ionized), water use in the dietary department, laundry, laboratories, central sterile and processing locations, physio and hydrotherapy treatment areas, and surgical suites. Finally, facilities can also submeter any condensate recovery measures, which can reduce potable water usage. Both irrigation water and condensate collected from cooling towers can often be subtracted from the sewer discharge portion of hospital water bills, lowering costs. Local municipalities and/or city authorities can work with facilities to accomplish this, for example through leasing meters for this purpose (wherein the authority reads the meter and subtracts the metered gallons from the facility's monthly bill). Hospitals can incorporate these submetering efforts into master planning, renovations, and expansions, to make them a standard feature, not an option.

Figure 8.1 highlights the different normalized metrics for water use intensity, listed in order from most statistically correlated to least. For this year's report, Practice Greenhealth is using gallons per square foot as the primary indicator to assess water use intensity, recognizing the above limitations of the data set, and that there were considerably more data points available for gross square feet than for cleanable square feet making the medians more accurate.

Figure 8.1: Water Consumption Normalized

Annual Water Consumption (Median)	All	Small	Large	Circle	90th
Gallons per cleanable square foot	**51.80**	45.70	57.80	33.20	23.80
Gallons per gross square foot	**47.20**	43.60	47.70	33.20	22.20
Gallons per FTE	**19,945**	19,439	20,432	11,962	8,229
Million gallons per OR[7]	**2.56**	2.12	2.93	2.22	1.02

6 Practice Greenhealth's 2017 application will attempt to capture both indoor and outdoor water use from participating hospitals.

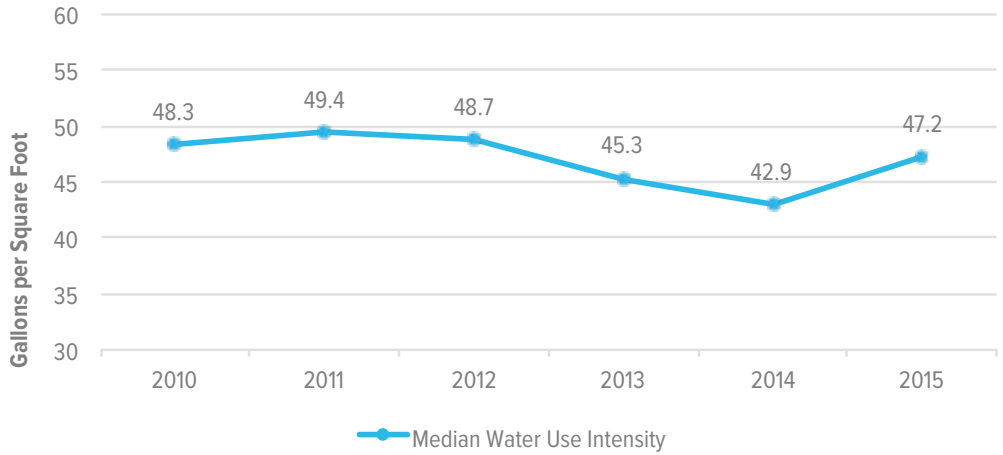
7 Statistical correlation for gallons of water per operating room was significantly lower than for the other three variables considered (R-squared value of 0.60) and should not be considered a primary indicator for water usage.

Overall, smaller hospitals consume less water per cleanable square foot and per gross square foot than larger hospitals in the data set. Water Circle of Excellence winners consume 36 percent fewer gallons per cleanable square foot and 30 percent fewer gallons per gross square foot than the remaining facilities. Median overall gallons per square foot for all facilities in 2015 was 47.2 gallons.

Practice Greenhealth also found that gallons of water per full-time employee (FTE) per year is a relevant normalizing factor. The median gallons per FTE in 2015 was 19,900 gallons per FTE annually. It is plausible that the number of employees would influence the amount of water used for flush and flow purposes. The number of FTEs may also indirectly connect to patient volume or hospital throughput—as ostensibly, a larger staff would ideally be an indicator of a larger patient volume or a higher acuity patient population that may require more water utilization.

Practice Greenhealth member hospitals have continued to improve their water use intensity over time. Between 2010 and 2014, hospitals in the data set have seen continual improvement with an 11 percent decrease in water use intensity. In 2015, water use intensity rose again slightly. Part of this shift could be attributable to the different composition of the data set (all award participants versus Partner for Change award winners and above in previous years), but 2015 was also the warmest year on record since global record keeping began in 1880.[8] Warmer temperatures means more cooling capacity and/or landscape irrigation for many facilities.

Figure 8.2: Median Water Use Intensity (2010-2015)

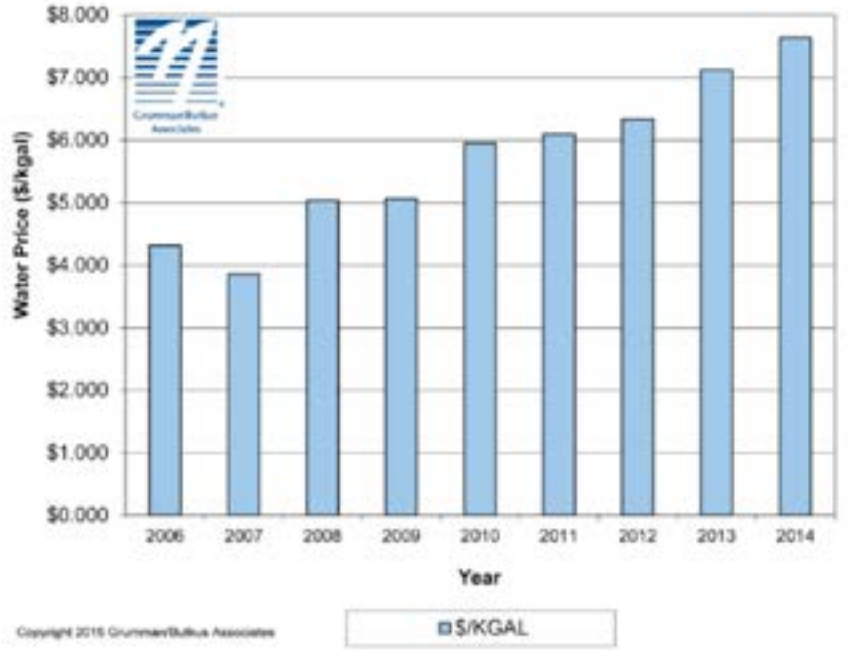


Mayo Clinic Health System in Eau Claire, Wisconsin
Dunlap Cancer Center

8 NASA, NOAA Analyses Reveal Record-Shattering Global Warm Temperatures in 2015. Press Release. January 20, 2016. http://www.nasa.gov/press-release/nasa-noaa-analyses-reveal-record-shattering-global-warm-temperatures-in-2015. Accessed on October 14, 2016.

The 2015 increase notwithstanding, Practice Greenhealth's results are similar to those identified in the 2015 Hospital Benchmarking Survey produced by Grumman Butkus Associates (G/BA), an engineering firm based in the Chicago area with large numbers of hospital participants in Illinois and Wisconsin. Their survey highlighted water usage numbers from 88 hospitals based on 2014 data and found an average water use intensity of 50 gallons per square foot. It is important to note that there is some variation between median (used by Practice Greenhealth) and average (used by G/BA). While water usage is slowly falling, cost of water/sewer use per square foot is slowly rising. Practice Greenhealth found that hospitals were paying a median of $5.90 per 1,000 gallons of water in 2015, which was consistent with the 2014 water cost data at $6.10 per 1,000 gallons of water. G/BA was able to demonstrate that water pricing has continued to rise every year since 2006. As hospitals struggle with making a business case for water improvements, this trend should be a red flag that water pricing is on the rise and will likely continue to rise as the climate continues to warm and significant weather events impact water availability.

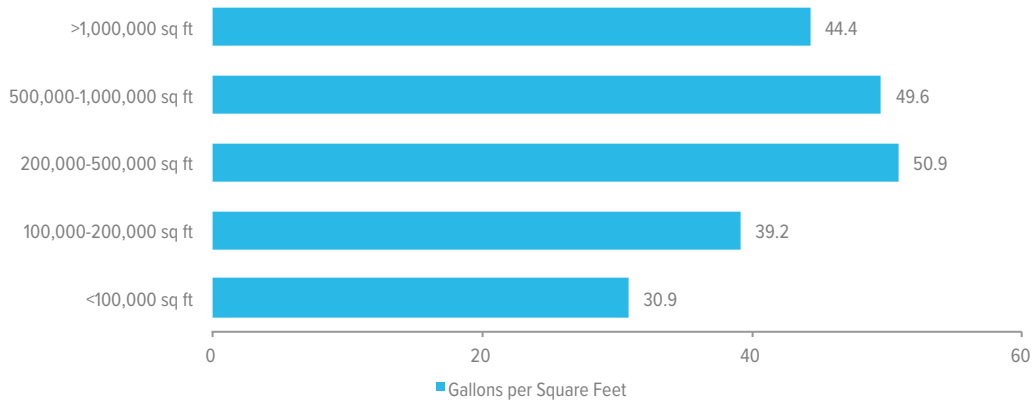
Figure 8.3: Grumman Butkus Associates Survey Results



Building Size

Another way to compare water use is by building size categories—essentially taking the square footage of the facility and putting buildings into size groupings; this allows for comparing the consumption of those groupings to other hospitals in the industry.

Figure 8.4: Water Consumption by Hospital Area



Smaller hospitals have the least water use per square foot at 30.9 and 39.2 gallons per square foot for the two smallest size categories. One key factor may be that smaller facilities typically have very few operating rooms and likely less of a sterile processing load. Likewise, smaller facilities are less likely to have onsite laundry facilities. The highest water consumption for participating hospitals were those between 200,000 and 1,000,000 square feet. Water use then decreased slightly in the largest hospitals. Many large hospitals have access to an energy manager role who often manages water use as well. This specialized attention to resource consumption can often drive usage down in the largest facilities.

Climate Zone

The Commercial Building Energy Consumption Survey (CBECS) conducted by the U.S. Energy Information Administration, historically defined five different climate zones, based on the number of cooling degree days and heating degree days. In the 2012 survey, CBECS switched to a new system, using climate zones as defined by the Department of Energy's Building America program. Figure 7.6 illustrates the climate zones used by CBECS and by Practice Greenhealth to examine energy usage. In addition to the size of the facility, the geographic location of the facility also can have a significant impact on water consumption. Practice Greenhealth utilized climate zones as defined by the Department of Energy's Building America program—which is used by the Commercial Building Energy Consumption Survey (CBECS)—to demonstrate how water use intensity varies by region. There is not recent climate zone data for water use comparison. CBECS looked at water use in large hospitals in 2007—but that data is nearly ten years old and not suitable for comparison.

Not surprisingly, hospitals in hot-dry climates had the highest water usage at 61.96 gallons per sq ft—an obvious impact of additional cooling requirements, which can be water intensive. Hospitals in cold climates, which comprised 46 percent of the data set, had the lowest water use intensity at a median of 42.13 gallons per square foot. Cooler temperatures contribute to reduced water use in that there are fewer cooling requirements and these climate zones tend to require less irrigation water than hotter zones.

Figure 8.5: Water Use by Climate Region

Climate Zone	Key Characteristics	Number of Hospitals	Median Gallon/ Sq Ft
Mixed-humid	≥ 20 in. of annual precipitation ≤ 5,400 heating degree days Average temperature ≤ 45°F in winter	65	56.22
Hot-humid	≥ 20 in. of annual precipitation ≥ 67°F wet bulb temperature for 3,000 or more hours during the warmest 6 consecutive months of the year; and/or ≥ 73°F wet bulb temperature for 1,500 or more hours during the warmest 6 consecutive months of the year.	28	53.13
Hot-dry	< 20 in. annual precipitation Average temperature > 45°F year-round	23	61.96
Mixed-dry	< 20 in. annual precipitation ≤ 5,400 heating degree days Average temperature ≤ 45°F in winter	0	-
Cold	5,400 – 9,000 heating degree days	125	42.13
Very cold	9,000 – 12,600 heating degree days	2	44.09
Sub-arctic	> 12,600 heating degree days	0	-
Marine	Mean temperature of coldest month is 27°F - 65°F Mean temperature of warmest month < 72°F Mean temperatures of at least four months > 50°F Has dry season in summer	26	44.41

Federal Facilities

Leading the Way

While the high subsidization and undervaluing of water has led to difficulties in creating incentives for water reduction, Practice Greenhealth can report greater progress for participating federal hospitals. Practice Greenhealth federal hospitals have a median water use reduction of 30 percent, as compared to a median 15 percent reduction for all other participating hospitals. This may be due to federal requirements as laid out by Executive Order 13693, Planning for Federal Sustainability in the Next Decade.[9] This Executive Order calls on all federal agencies, including VA hospitals, to improve water use efficiency and management by:

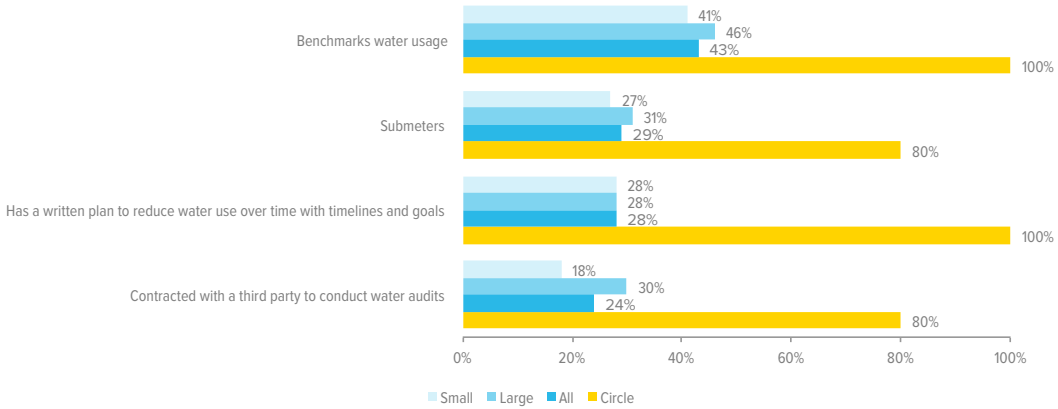
- Reducing potable water consumption intensity measures in gallons per gross square foot by 36 percent by fiscal year 2025 through reductions of two percent annually relative to a baseline of the agency's water consumption in fiscal year 2007.
- Installing water meters and collecting and utilizing building and facility water balance data to improve water conservation and management.
- Reducing industrial, landscaping, and agricultural water consumption (ILA) measured in gallons by two percent annually through fiscal year 2025 relative to a baseline of the agency's ILA water consumption in fiscal year 2010.
- Installing appropriate green infrastructure features on federally owned property to help with stormwater and wastewater management.

Executive Order 13693 builds on Executive Order 13423: Strengthening Federal Environmental, Energy, and Transportation Management—enacted in 2008, which set a target of two percent reduction annually or 16 percent reduction by end of FY 2015.

Water Reduction Planning and Strategy

A water audit is typically a first foundational step in understanding the opportunities to increase water efficiency. A water conservation goal and corresponding strategic plan are the next logical step—if the hospital hopes to see its water use decrease.

Figure 8.6: Water Reduction Planning and Strategies



Overall, less than half of the participating facilities are implementing these water strategies. Less than a third of hospitals conduct audits, have a written reduction plan, or submeter their consumption (meter different parts of the facility separately). Audits and submetering are important for identifying water inefficiencies, a fundamental component of a water reduction plan. Auditing helps hospitals identify the opportunities for the largest reductions in consumption. While participation in basic water reduction planning is lagging, a large number of hospitals are benchmarking their water use. Forty-four percent of facilities reported benchmarking their water usage—with the majority of these hospitals benchmarking at least once within the past four years. All of the federal health care facilities were required to develop a water baseline for FY2007 per the onset of Executive Order 13423, and benchmark water reduction annually to meet federal reporting requirements.

Larger hospitals in the data set generally outperform smaller hospitals in terms of planning for conservation projects, whereas smaller hospitals to date are showing more progress in actual water use reduction. Water Circle of Excellence winners are demonstrating strong leadership in this category—100 percent of Circle of Excellence winners have a written water reduction plan and benchmark their water usage, while 80 percent submeter and conduct audits (Figure 8.6).

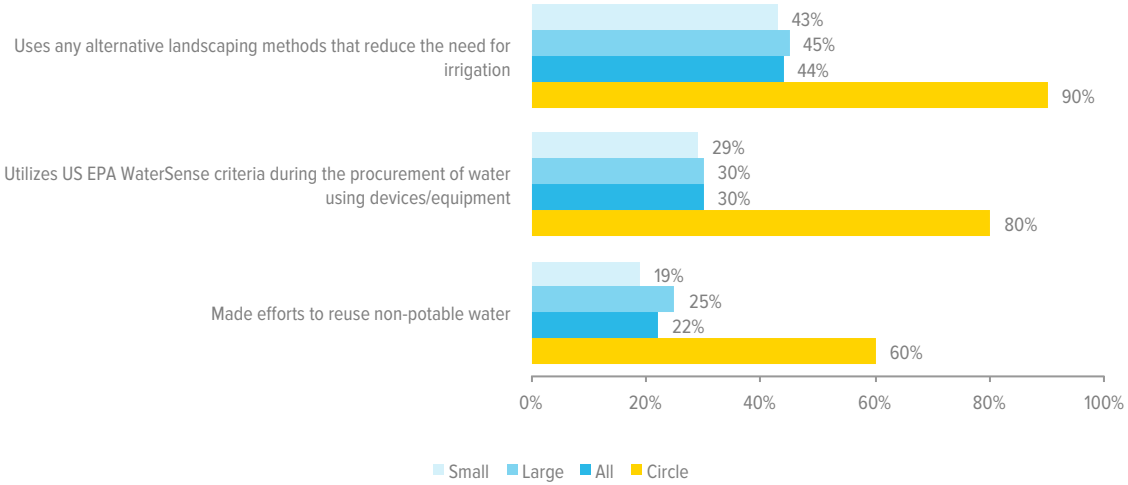
Audie L. Murphy Memorial VA Hospital

Audie L. Murphy VA Hospital is a Water Circle of Excellence award winner and has achieved an impressive water use intensity of 27.3 gallons per square foot. In its continued pursuit of water efficiency, the hospital has completed a design for the installation of non-potable water lines that tie-in to the San Antonio Water System recycled water system. San Antonio has the largest direct recycled water delivery system in the United States with 130 miles of pipelines dedicated to delivering high quality recycled water to commercial entities for appropriate purposes. When Audie L Murphy VA Hospital activates the construction program in 2017, it will supply recycled water for a large portion of campus irrigation use—reducing the hospital's reliance on potable water for irrigation.

Other water savings efforts have included the use "zero" scape landscaping that has replaced grass with crushed granite, eliminating the need for mowing, fertilizing and watering. The hospital has also implemented telematics in the form of advanced metering which allows real time monitoring (every 15 minutes) of potable water use and allows the facility to quickly identify abnormal use for corrective actions.

Moving from water efficiency planning to reduction projects, different categories of strategies for conservation include the reuse of non-potable water for irrigation and or other appropriate uses, using alternative landscaping methods that reduce the need for irrigation, and using U.S. EPA WaterSense criteria during the procurement of water-using devices and equipment. The U.S. EPA WaterSense program identifies water-efficient products that have been independently tested and certified to meet program criteria for efficiency and performance.[9]

Figure 8.7: Water Efficiency Measures



Overall, there are still opportunities for growth in the uptake of these measures—fewer than half of participating facilities reported using them. For the participating hospitals that reported water savings from reduced irrigation efforts, the average per facility savings was 825,000 gallons. Large hospitals are slightly more likely overall to tackle these efficiency measures than smaller hospitals.

9 The U.S. EPA WaterSense program aims to save water and protect the environment by choosing WaterSense labeled products in the home, yard, and business and taking simple steps to save water each day. The program identifies water-efficient products that have been independently tested and certified to meet program criteria for efficiency and performance.

KAISER PERMANENTE®

Between 2013 and 2015, Kaiser Permanente achieved a 15 percent reduction in water use intensity across the health system—a savings of 240 million gallons a year through rainwater harvesting, low flow sinks and toilets, grey water re-use, and drought-resistant landscaping. The system has also set a bold goal to reduce the amount of water it uses by 25 percent per square foot of buildings by 2025. Kaiser Permanente Irvine Medical Center and Kaiser Permanente San Jose Medical Center are both 2016 Water Circle of Excellence recipients, and are helping deliver these savings. In 2015, Kaiser Permanente Irvine implemented a water reduction project that included upgrading and replacing irrigation sprinkler controls, the use of drought-tolerant plants, installing drip systems for irrigation, and complementing that with decorative bark and rock. The projected water savings for these measures in 2016 were nearly 9.1 million gallons per year.

Water Savings

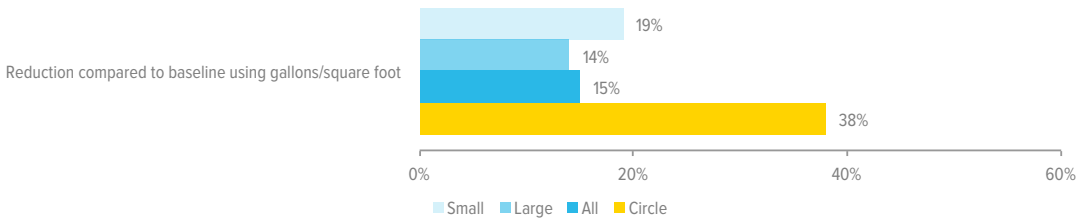
Participating hospitals were asked to report on water savings projects that had taken place in 2015. While 85 percent of hospitals in the data set reported their annual water consumption and 68 percent reported their annual water costs, only 17 percent reported the annual gallons saved and just 16 percent reported their cost savings from water conservation projects. Because this report can only summarize results for a small portion of participating facilities, total water savings and total water cost savings will be very conservative estimates due to underreporting.

Figure 8.8: Total Water Savings

Water Conservation	All
Total gallons saved through water reduction projects	**254.8 million**
Total savings from water reduction projects	**$2.1 million**
Median gallons saved per square foot	**0.74**
Median savings per square foot	**$0.006**

Participating hospitals reported a total of 254.8 million gallons and $2.1 million saved through water reduction efforts (for 56 and 52 participating hospitals, respectively). Overall, the median water use reduction from participating hospitals is 16 percent from baseline.[10] Smaller hospitals achieved greater reductions than larger hospitals, with 19 percent and 14 percent respectively. Circle of Excellence winners and the top 90th percentile achieved far greater reductions, with 38 percent and 40 percent respectively.

Figure 8.9: Median Water Use Reduction



10 Baseline is self-reported; facilities report consumption at the beginning of the year in which they initiated their water conservation project and consumption at the end of the project.

Conclusion

While progress is being made in the water conservation arena, there are still considerable opportunities for improvement. Hospitals in the data set are beginning to take steps to understand their water consumption and develop plans for water conservation. Audits, water goals and project planning are all critical to taking water reduction from aspirational to actual. Fewer than half of participating facilities reported implementing water-efficiency measures in their facilities, which points to a definitive need to help hospitals make (and strengthen) the business case for water improvements. On the other hand, Practice Greenhealth Water Circle of Excellence winners are leading the way in every aspect of this category—both in understanding and benchmarking their consumption, as well as in taking measures to increase efficiency and ultimately reduce consumption.

Cleveland Clinic-Hillcrest Hospital rain barrel contest winner

Resources

Practice Greenhealth's Less Water Toolkit

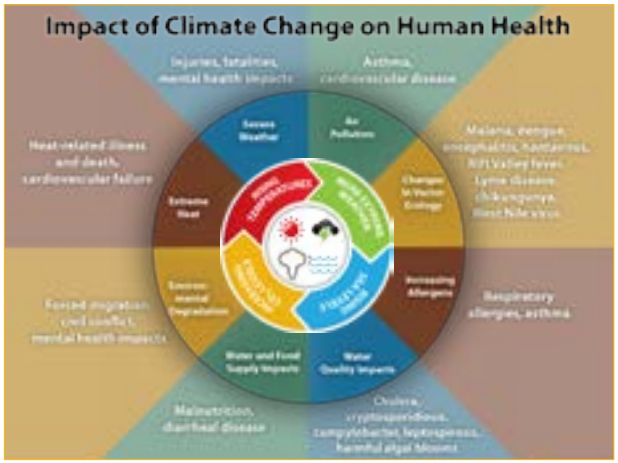
U.S. EPA WaterSense Program

Grumman Butkus Hospital Energy and Water Benchmarking Survey

Climate and Health

There is a clear scientific consensus backed by decades of research that climate change is real, and that it poses a danger not just to the natural world, but to human health and well-being (Figure 9.1).[1, 2] Health impacts of climate change include increases in vector borne-illnesses such as malaria, Lyme disease, West Nile and the Zika virus; cardiovascular ailments; respiratory ailments, including allergies and asthma; heat-related illnesses; and malnutrition, among others.[3, 4] In addition to responding to these emerging patient needs, hospitals need to prepare their physical buildings for climate resilience and to take steps to mitigate impacts by reducing their greenhouse gas emissions. Steps taken now to reduce carbon emissions can also help position hospitals to be prepared for a possible future in which their emissions are regulated, thereby reducing future compliance costs.

Figure 9.1: Impacts of Climate Change on Human Health



This year's Climate and Health highlights include:

43%
of award winners reported signing on to a public climate change challenge or commitment in 2015 (up from 36% in 2013).

Only 22%
of facilities have performed a greenhouse gas emissions audit.

More than 50%
of participating hospitals were able to report at least some Scope 1 or Scope 2 emissions but only 13% reported any Scope 3 emissions.

1 Source: Centers for Disease Control and Prevention, Climate Effects on Health, Webpage. Available at: http://www.cdc.gov/climateandhealth/effects/default.htm.
2 NASA. "Scientific consensus: Earth's climate is warming." 2016. http://climate.nasa.gov/scientific-consensus/. Accessed on August 29, 2016
3 Centers for Disease Control. Climate Change Increases the Risk of Vector Borne Disease. Available at: http://www.cdc.gov/climateandhealth/pubs/vector-borne-disease-final_508.pdf. Accessed on August 29, 2016.
4 Centers for Disease Control. "Climate Effects on Health." http://www.cdc.gov/climateandhealth/effects/default.htm. Accessed August 13, 2016.

Hospitals have intensive energy usage. The 2012 DOE Commercial Buildings Energy Consumption Survey (CBECS), the most comprehensive survey of building energy use, reported that health care buildings use a median of 231.1 kBtu per square foot per year—a higher rate than any other sector except food service and food sales, and nearly triple the median for all building sectors combined. In total, the inpatient health care buildings reporting in CBECS consumed 549 trillion Btus of energy in 2012, nearly eight percent of the total used by all buildings nationwide.[5] Given this energy use profile, it is clear that hospitals are major contributors to climate change. Backing this up, a 2009 study in the Journal of the American Medical Association estimated that hospitals contribute eight percent of the U.S. greenhouse gas emissions total through the purchase of health care goods and services.[6] Yet despite compelling early data, relatively few facilities have a clear understanding of their individual carbon impacts. While just over half of hospitals submitting the Practice Greenhealth award application could provide data on some of their greenhouse gas emissions, only 22 percent had performed a comprehensive emissions audit. Clearly, this is an area where there is both a need and an opportunity for hospitals to improve their performance.

There are a variety of operational practices and choices that contribute significantly to the organization's carbon footprint. This section of the report will outline those contributing factors—in some cases touching on data from other areas of the application as it pertains to climate[7]—and will also highlight data on hospitals' climate change commitments.

The data collected for the climate section of the application consists mostly of yes/no questions, with limited quantitative data. In general, large hospitals in the data set perform somewhat better in the climate arena than small hospitals, but not by a large margin. Because Practice Greenhealth has been collecting most of this data in the same way since 2013, some information on trends is available. The graphs in this chapter present a subset of the available data on climate; detailed data tables and results can be found in the appendix.

5 U.S. Energy Information Administration. "2012 Commercial Buildings Energy Consumption Survey: Energy Usage Summary." Table 2: Total energy consumption and gross energy intensity for sum of major fuels. March 18, 2016. http://www.eia.gov/consumption/commercial/reports/2012/energyusage. Accessed August 13, 2016.

6 Chung, JW and Meltzer, DO. Estimate of the Carbon Footprint of the U.S. Healthcare Sector. JAMA. 2009;302(18):1967-1972. doi:10.1001/jama.2009.1610. Available at: http://jama.jamanetwork.com/article.aspx?articleid=184856.

7 This section of the report will touch on energy use, waste management practices, and waste anesthetic gases as significant contributors to greenhouse gas emissions. These topics are also covered in depth in the energy, waste, and Greening the OR chapters of the report.

2016 Climate Circle of Excellence Winners

The Climate Circle of Excellence highlights visionary hospitals taking the lead on the tracking and measurement of CO_2 emissions, and overall climate program development. Hospitals in this Circle demonstrate an understanding of the health impacts of climate change and are taking action to mitigate those impacts and educate their staff and communities on playing a supporting role.

Cleveland Clinic
Cleveland, OH

Gundersen Health System
La Crosse, WI

Harborview Medical Center
Seattle, WA

James E. VanZandt VA Medical Center
Altoona, PA

Minneapolis VA Health Care System
Minneapolis, MN

Seattle Children's Hospital
Seattle, WA

UCSF Medical Center
San Francisco, CA

University of Washington Medical Center
Seattle, Washington

Virginia Mason Medical Center
Seattle, WA

Yale-New Haven Hospital
New Haven, CT

100%
of Circle of Excellence winners have signed on to a climate change challenge or commitment.

100%
purchase or generate renewable energy as some portion of the energy portfolio.

10 Circle Winners
together reported more than 63 percent of the emissions reductions (in $MTCO_2e$) for the entire data set.[8]

8 Circle winners reported reducing 90,968 $MTCO_2e$ while all winners in the data set combined reported reducing 144,035 $MTCO_2e$

Climate Change Commitments

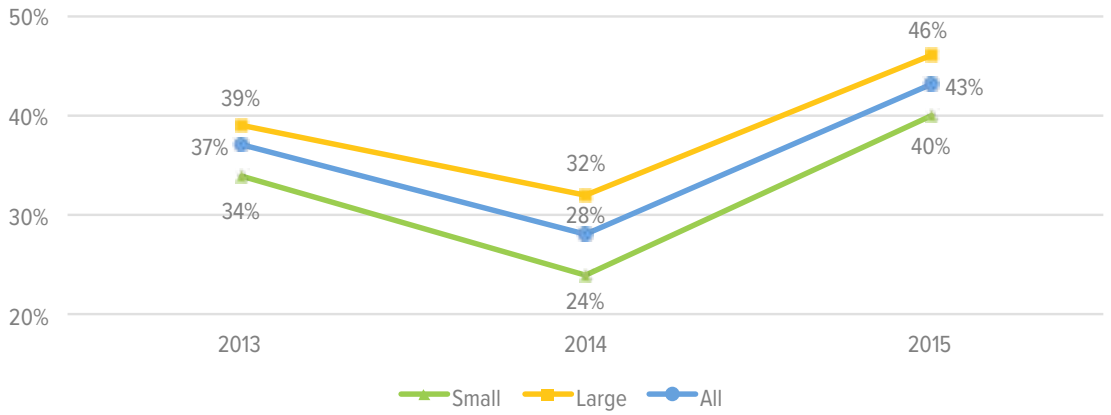
Health care organizations can demonstrate their dedication to addressing climate change by publicly signing on to a climate change challenge or commitment. Such commitments establish clear goals for the organization and invite accountability for both internal and external stakeholders, thereby encouraging improved performance over time.

As shown in Figure 9.2, there is a clear trend of an increasing number of hospitals signing on to climate change challenges or commitments, with 43 percent of facilities doing so in 2015. One factor that may be driving this number higher is the increasing number of Veterans Health Administration (VHA) facilities that are now actively participating in the Environmental Excellence Awards program. The VHA is bound by Executive Order 13693, which established a 40 percent reduction target by 2025 from a 2008 baseline for all federal agencies.

Practice Greenhealth also collected data on participation in specific commitments (see the appendix for details). Facilities had relatively low participation in the American College & University Presidents' Climate Commitment (ACUPCC) and Climate Registry (one percent and eight percent, respectively); they had greater participation in local/state/regional commitments (14 percent) or "other" (32 percent).[9] This indicates that there is no singular commitment platform being used across the sector.

Figure 9.2: Climate Change Commitments

Percent of health care facilities signing on to any climate change challenge or commitment.



9 "Other" commitments included Executive Order (n = 38); Health Care Without Harm's 2020 Health Care Climate Challenge (n = 17); Healthier Hospitals Initiative (n = 13); Interfaith Center for Corporate Responsibility (n = 7); and Health Care Without Harm Climate Council (n = 6).).

NYU Langone Medical Center in New York City, New York

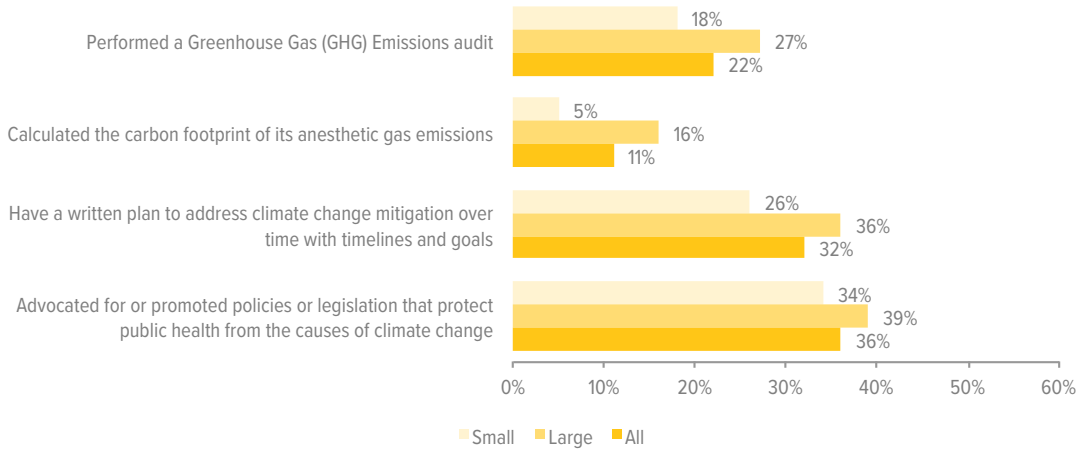
NYU Langone MEDICAL CENTER

The NYC Carbon Challenge is a voluntary program for prominent universities, hospitals, and commercial offices in New York City to reduce their building-based greenhouse gas (GHG) emissions by 30 percent or more in ten years. NYU Langone Medical Center accepted the original NYC Carbon Challenge to Hospitals in 2009 committing to reduce emissions from its New York City buildings by 30 percent from 2005 levels by 2019. In 2016, NYU Langone signed on to an increased target of 50 percent reduction by 2025 and has developed a comprehensive road map to meet this augmented Carbon Challenge goal. The hospital has identified projects and strategies across the areas of lighting and infrastructure upgrades, operations and maintenance, onsite generation, advanced building management systems, behavior change, commissioning and LEED green building design and construction. At the end of 2015, Langone had achieved a nearly 30 percent reduction in GHG emissions from baseline 2005.

Tracking Greenhouse Gas Emissions

While making a commitment to addressing climate health is a key first step, conducting a greenhouse gas emissions audit and developing a mitigation plan lay the foundation for organizations to address climate change. Without these preliminary steps, it is difficult for hospitals to understand the contributing elements of their carbon footprint and take effective action to reduce it. However, only a relatively small number of participating hospitals have taken these steps: 22 percent have undertaken an emissions audit, and 32 percent have developed a written mitigation plan with timelines and goals (Figure 9.3). Even for those facilities and health systems that have conducted an audit, many are not yet tracking emissions on a monthly or annual basis. It is worth noting that, as discussed in the energy chapter, a far larger proportion of participating hospitals (67 percent) reported benchmarking with ENERGY STAR Portfolio Manager®, which provides a greenhouse gas report for Scope 1 and 2 emissions. While a GHG audit encompasses Scope 3 emissions as well, the responses indicate that many participating hospitals are likely unaware of or do not yet utilize the greenhouse gas reporting function of Portfolio Manager.

Figure 9.3: Mitigation and Adaptation Strategies



Greenhouse gas emissions for an organization are typically divided into Scope 1, Scope 2, and Scope 3 emissions. Scope 1 emissions are direct emissions from sources that the organization owns or controls; Scope 2 emissions are indirect emissions from purchased energy; and Scope 3 emissions include all other indirect emissions in the value chain, such as the emissions associated with all of the products and services purchased by the organization, and employees, patients, and visitors traveling to and from the hospital and waste generated from operations. While Scope 3 emissions are the most difficult to track, in many cases they may represent the largest proportion of overall emissions.

Figure 9.4 shows the rate at which participating hospitals reported any Scope 1, 2, and 3 emissions. The results reflect the relative difficulty of tracking the different classes of emissions. While 54 percent reported both Scope 1 and Scope 2 emissions in 2015, only 13 percent reported Scope 3 emissions. Even so, the trends over time are encouraging; the proportion of hospitals in the data set reporting each level of emissions has grown in each of the past two years, with the number reporting any Scope 3 emissions nearly doubled from 7.2 percent in 2014 to 13 percent in 2015.

Figure 9.4: Hospitals Tracking GHG Emissions

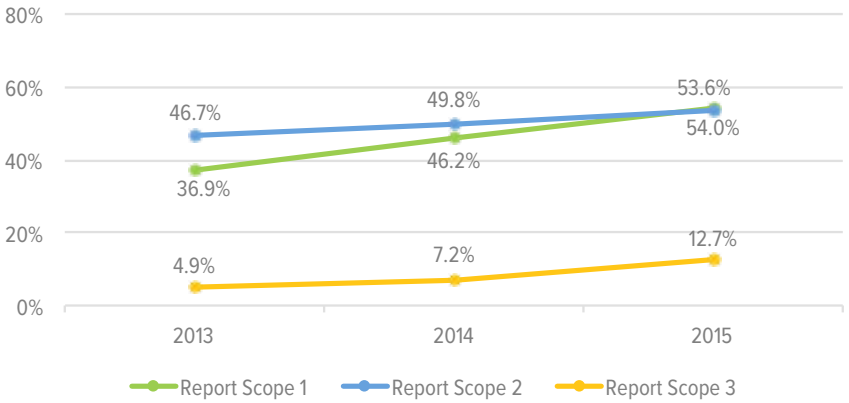


Figure 9.5 shows the total greenhouse gas emissions for those hospitals that reported data. However, it is important to understand that the figures shown here are incomplete; as noted above, only 13 percent of facilities reported Scope 3 emissions, and nearly half did not report Scope 1 or Scope 2. As a result, the actual emissions from this set of hospitals are significantly higher than shown here.

Figure 9.5: Scope 1, 2, and 3 GHG Emissions Reported (in $MTCO_2e$)

Emissions Totals	All	Small	Large
Scope 1 emissions	2,414,066	1,444,337	969,728
Scope 2 emissions	4,533,330	491,484	4,041,846
Scope 3 emissions	1,090,944	466,498	624,446
Total	**8,038,339**	**2,402,319**	**5,636,020**

Mitigation and Adaptation Strategies

As noted above, hospital energy use is a huge contributor to greenhouse gas emissions, and energy management and sourcing are often seen as the most obvious strategies to reduce climate impact. Building energy use makes up the majority of Scope 1 and Scope 2 emissions, but fuel consumption from fleet vehicle use and waste anesthetic gases are also significant Scope 1 contributors. Most health care organizations have not yet delved deeply into Scope 3 emissions reporting, which covers other indirect emissions, including those from supply chain, waste disposal, employee commute and business travel among others[10] It is clear from the relatively low percentage of applicants who reported on greenhouse gas emissions reduction projects in the application that many hospitals are still familiarizing themselves with the different components of their carbon footprints.

Figure 9.6: Hospital GHG Emissions

10 U.S. Environmental Protection Agency. "Sources of Greenhouse Gas Emissions." Last updated August 9, 2016. https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions. Accessed August 17, 2016.

Renewable Energy

One of the most direct ways that facilities can lessen their contribution to climate change is by using or generating renewable sources of energy. Overall, 28 percent have invested in clean energy technologies and 36 percent of hospitals in the data set meet a portion of their energy needs from either onsite or offsite renewable sources. The typical level of renewable energy purchased is quite modest; the median is only five percent. However, leading facilities are going far beyond this level. The three facilities with the highest proportions are getting more than 60 percent of their energy from renewable sources (Figure 9.7). Additional detail on offsite versus onsite sources of renewable energy can be found in the energy chapter of this report.

Figure 9.7: Hospitals with Highest Reported Levels of Renewable Energy

Facility	Location	Percentage of Renewable Energy
Cooley-Dickinson Hospital	Northampton, MA	84.1
University of Washington Medical Center	Seattle, WA	63.9
Virginia Mason Medical Center	Seattle, WA	60.7
Sonoma Valley Hospital	Sonoma, CA	44.9
Gundersen Health System	La Crosse, WI	38.7

11 Kaiser Permanente. Kaiser Permanente Makes Major Wind and Solar Energy Purchases. February 18, 2015. https://share.kaiserpermanente.org/article/kaiser-permanente-makes-major-wind-and-solar-energy-purchases/ Accessed on October 2, 2016.

Wind turbines at the Golden Hills wind farm on Altamont Pass, California.

KAISER PERMANENTE®

In 2015, Kaiser Permanente announced it will purchase enough renewable energy to provide half of the electricity it uses in California and reduce its greenhouse gas emissions nationwide by 30 percent.

In 2012, Kaiser Permanente adopted a national sustainable energy policy and launched an ambitious strategy to reduce its greenhouse gas emissions by 30 percent by 2020 (compared to 2008 levels), recognizing the connection between climate change and health.

Already a leading user of green power, Kaiser Permanente agreed to support the construction and operation of three new renewable energy projects that will generate 590 million kilowatt hours of power a year. That's equivalent to the amount of electricity used by more than 82,000 American homes a year.

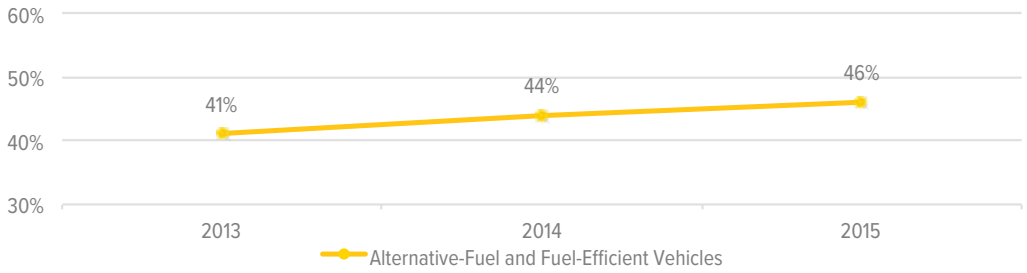
The renewable energy projects will make Kaiser Permanente one of the top users of green power in the country and will allow the health care system to achieve its greenhouse gas reduction goal three years earlier than promised.[11]

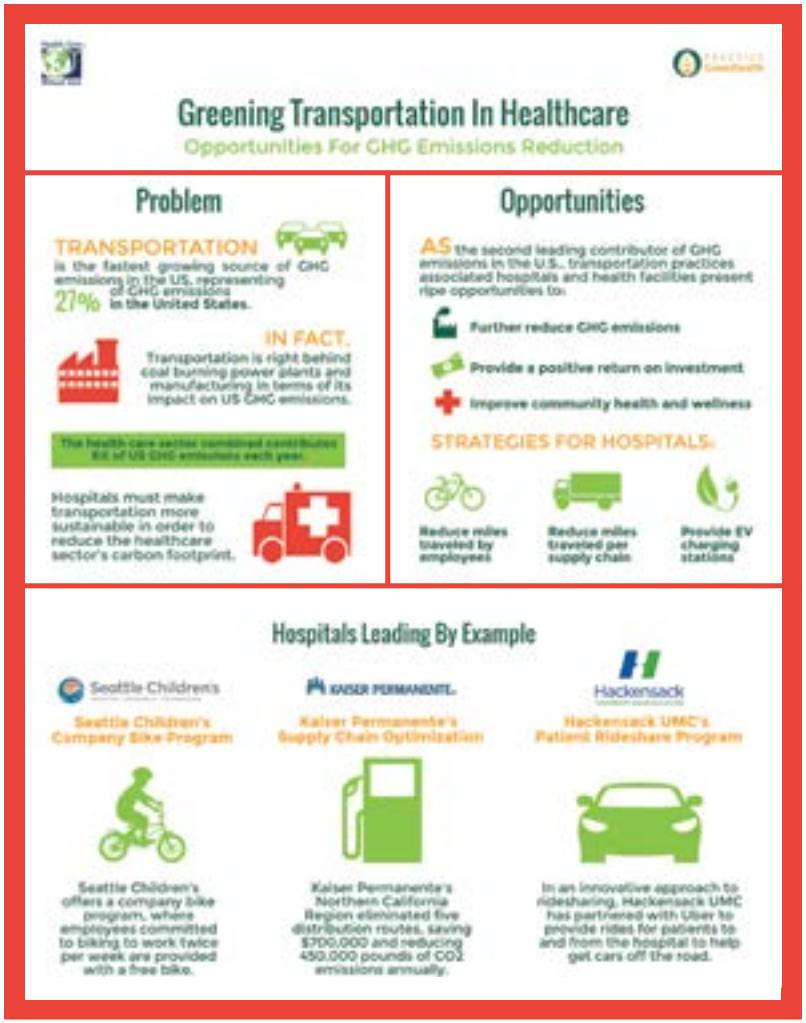
Alternative Transportation

In 2014, 26 percent of greenhouse gas emissions nationwide came from transportation.[12] Hospitals typically have fleet vehicles, including ambulances, supply trucks, home health care vehicles, and shuttle buses that each have an emissions footprint. Additionally, employee commuting has a substantial impact. Likewise, the emissions from transporting medical devices, supplies and equipment to the hospital is another large source—leaving the health care sector with significant emissions from transportation.

Ninety-seven percent of vehicles on the road today burn fossil fuel, and the number of vehicles worldwide is on pace to double by 2030, which would more than offset any gains of the 2016 Paris Climate Agreement.[13, 14] Purchasing alternative-fuel vehicles and low-emitting, fuel-efficient vehicles is one effective means to address this source of greenhouse gases. As shown in Figure 9.8, 46 percent of participating hospitals reported using this strategy in 2015. The data show a clear growth trend in the purchase and use of alternative-fuel and fuel-efficient vehicles. While falling gasoline prices may temporarily make the economics of efficient and alternative-fuel vehicles less attractive, hospitals that wish to make a strong commitment to sustainability and lower their contributions to climate change should not neglect opportunities to optimize fleet vehicle performance.

Figure 9.8: Alternative-Fuel and Fuel-Efficient Vehicles





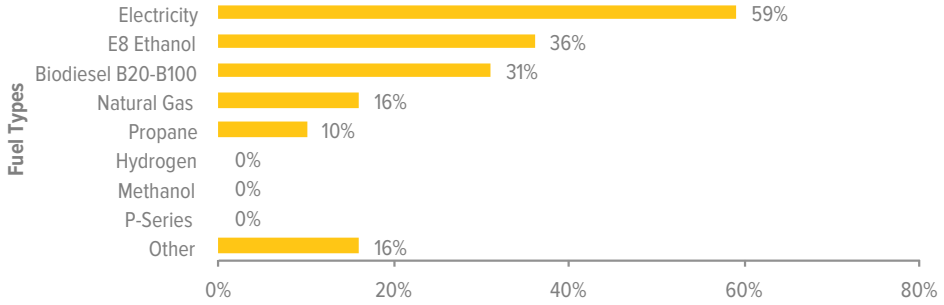
12 U.S. Environmental Protection Agency. "Sources of Greenhouse Gas Emissions." Last updated August 9, 2016. https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions. Accessed August 17, 2016.

13 Sperling, Daniel and Deborah Gordon. "Two Billion Cars: Transforming a Culture." http://onlinepubs.trb.org/onlinepubs/trnews/trnews259billioncars.pdf Accessed on August 18, 2016.

14 Jolly, David. "Despite Push for Cleaner Cars, Sheer Numbers Could Work Against Climate Benefits." New York Times, December 7, 2015. http://www.nytimes.com/2015/12/08/business/energy-environment/despite-push-for-cleaner-cars-sheer-numbers-could-work-against-climate-benefits.html. Accessed September 1, 2016.

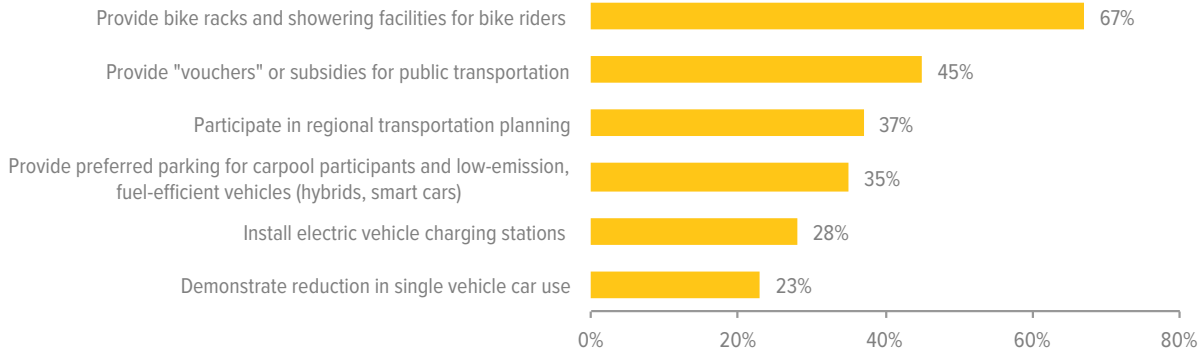
Among those facilities that are using alternative fuel vehicles, electricity is by far the most widely used option, followed by ethanol and then biodiesel (Figure 9.9). Other options are used only on a limited basis, if at all.

Figure 9.9: Alternative Fuel Use



Beyond direct use of alternative fuels for the facility's own use, hospitals are taking steps to promote other climate friendly transportation options for employees and others, including biking, carpooling, and mass transit (Figure 9.10).

Figure 9.10: Transportation Alternative Strategies

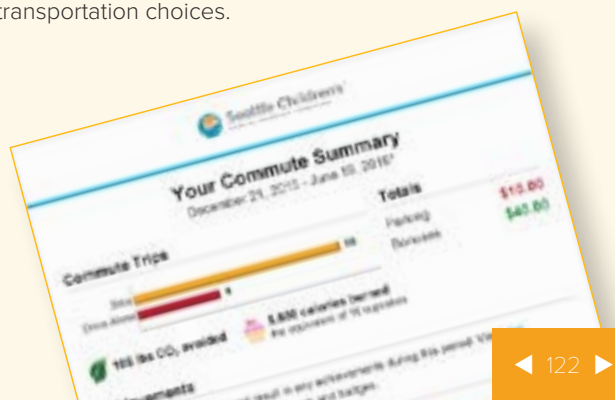


Moving forward, hospitals will need to incorporate additional strategies for reducing hospital-related transportation impacts, including encouraging employees to choose less fossil fuel dependent and more active modes of travel, working with supply chain partners to optimize the distribution of supplies and materials, and engaging with community partners to improve infrastructure and access to regional transit resources. Practice Greenhealth has spent much of 2016 exploring the transportation impacts of the sector and is going to be expanding its focus in this area in 2017.

Dr. Mark Del Beccaro during Bike to Work Month at Children's Hospital

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Seattle Children's Hospital's award-winning transportation program continues to drive down single occupancy vehicle commuting by their staff. They use a mix of incentives (alternative commute bonus, subsidized bus pass, bike program, pedestrian and bike-friendly campus) along with disincentives (parking rate increases). They also send their staff a personal commute profile, including calories burned and greenhouse gas emissions from their commute choices. This is generated from a third-party vendor platform, which calculates their greenhouse gases avoided for their entire staff that use alternative transportation choices.



Waste Management

Greenhouse gas emissions from disposal of waste generated in operations are Scope 3 emissions. Few participating hospitals are tracking avoided greenhouse gas emissions from recycling and composting rather than landfilling waste, but it can have a significant impact. Methane is generated when waste decomposes in landfills. Landfills are the third largest source of methane (CH_4) emissions in the US, generating about 20 percent of the methane each year, with methane making up 11 percent of the total U.S. carbon footprint.[15] Hospitals in the data set have together avoided more than 472,231 metric tons of CO_2e by recycling rather than landfilling their solid waste. This is a conservative estimate, as not all recycling streams could be easily converted into avoided CO_2e.[16] Figure 9.11 highlights avoided CO_2e for the different solid waste streams being recycled by participating hospitals in 2015.

Figure 9.11: Avoided Greenhouse Gas Emissions from Recyclables

Material	Aggregate Tons Recycled	Avoided $MTCO_2e$
Aluminum Cans	45	408
Steel Cans	673	1,234
Glass	822	244
Cardboard	14710	49,359
Mixed Paper	47403	173,687
Mixed Metals	4355	18,993
Mixed Plastics	731	762
Mixed Recyclables	77329	221,703
Food Waste	8121	5,841
Total	**154189**	**472,231**

15 U.S. EPA. Overview of Greenhouse Gas Emissions. Methane Tab. Available at: https://www.epa.gov/ghgemissions/overview-greenhouse-gases. Accessed on: August 31, 2016.
16 Practice Greenhhealth used the EPA's WARM calculator to convert recycling streams into avoided landfill emissions of CO2e. Learn more at: https://www.epa.gov/warm

Sumita Khatri, MD MS, Co-Director Asthma Center, Cleveland Clinic Foundation

Cleveland Clinic

Cleveland Clinic's Sumita Khatri, MD, of Pathobiology, Critical Care Medicine, and Pulmonary Medicine, and co-director of the Asthma Center, was honored at the White House on August 3, 2015, for her efforts to urge physicians to consider respiratory effects of pollution as part of the host of factors influencing patient well-being. President Barack Obama singled out Dr. Khatri when he announced an ambitious goal to cut pollution from coal-fired power plants through the Clean Power Plan. She has been a strong advocate for clean air as she sees the respiratory effects of pollution in her daily practice as co-director of Cleveland Clinic's Asthma Center. In 2015, Dr. Khatri traveled to the nation's capital to participate in a summit on climate change and the important role the public health community can play in communicating and preventing its impact. She described the respiratory effects she sees in her practice, but more importantly, what our role should be in addressing the problem.

> "We should all strive to make our practices and our policies result in the cleanest air possible so that collateral good from these efforts can have positive downstream health effects on our most valuable currency—our people."
>
> SUMITA KHATRI, MD MS, CO-DIRECTOR ASTHMA CENTER, CLEVELAND CLINIC FOUNDATION

Waste Anesthetic Gases

The provision of anesthesia and analgesia care to patients is one opportunity for clinicians to play a direct role in driving down their organization's greenhouse gas emissions. Because waste anesthetic gases pose a health risk to staff in high concentrations, these gases are scavenged from the operating rooms and post-anesthesia care units (PACUs) and vented off the hospital roof—a Scope 1 greenhouse gas emission for the facility. A recent estimate by the United Kingdom's National Health Service Sustainable Development Unit indicates that these vented waste anesthetic gases can represent as much as five percent of a facility's greenhouse gas footprint.

There are a range of strategies that allow anesthesia providers to safely decrease anesthesia emissions while upholding clinical care standards. These strategies are discussed in more detail in the Greening the OR chapter of the report.

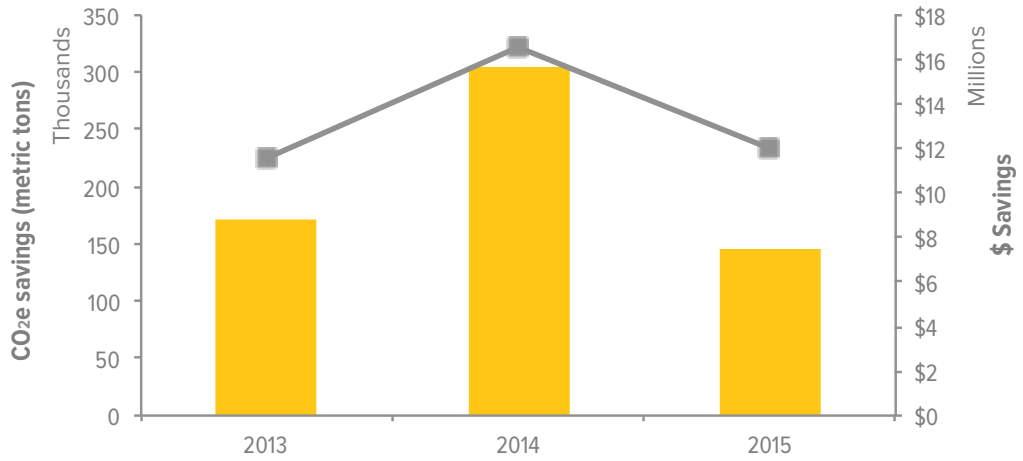
Thirty-four percent of Practice Greenhealth award winners provided clinician education on opportunities to reduce the impact of anesthesia care, while maintaining excellent patient care. Eleven percent of facilities reported on the Climate page that they had calculated the carbon emissions from anesthetic gas utilization in 2015, up from nine percent in 2014. On the Greening the OR page of the application, 49 percent of facilities reported at least some portion of their anesthesia data.

Despite growing awareness and education around the importance of re-evaluating anesthesia choices, significant opportunities for the health care sector remain. Due to inconsistencies in how the anesthesia data was reported—some facilities did not include nitrous oxide usage or could not accurately report anesthetic gas usage—it's difficult to report with confidence the aggregate climate impact of Practice Greenhealth award winners' anesthesia usage. Further education is needed for hospitals to establish an accurate GHG baseline footprint for anesthesia care. Hospitals can benefit from stepping through the protocol for accurate tracking of anesthesia emissions.

Mitigation Projects: Outcomes and Benefits

Participating hospitals were asked to provide examples of climate mitigation projects they have undertaken and the resulting greenhouse gas emissions reductions and financial savings. The data demonstrates that while many hospitals are tackling issues such as energy reduction, diversion of waste from landfill to recycling and purchasing of local foods, there is still a lack of awareness on the part of many facilities that these activities contribute to reducing the organization's carbon footprint—or there is a lack of understanding on how best to track these emission reductions. Summary results are shown in Figure 9.12. Note that these figures significantly underestimate actual savings; for the 2015 data, only 26 percent of facilities reported any climate mitigation projects at all. Furthermore, out of 190 reported projects, only 106 (56 percent) included quantified estimates of emissions reductions. Thus, if the projects without quantified estimates are similar to those with such estimates, the actual impact would be nearly double the figures shown here. Even with this limitation, the savings realized over time are substantial; the cumulative savings over 2013 to 2015 are equivalent to taking more than 130,000 cars off the road.[17]

Figure 9.12: Aggregate CO_2e Avoidance and Dollar Savings



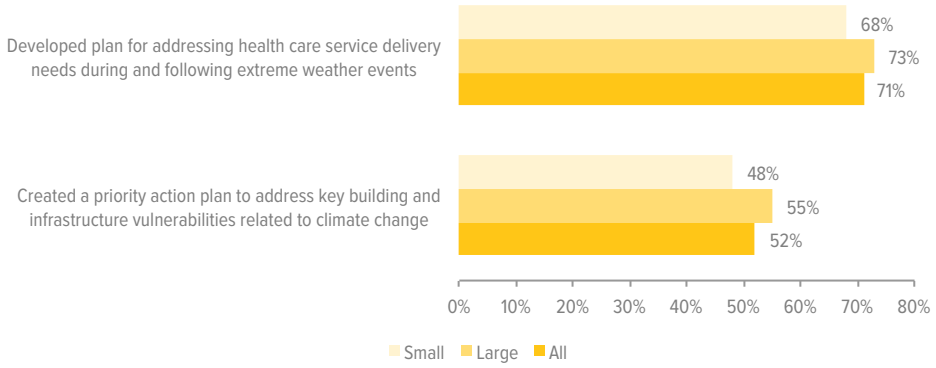
17 The average passenger vehicle emits 4.7 metric tons of CO2 per year. U.S. Environmental Protection Agency Office of Transportation and Air Quality. "Greenhouse Gas Emissions from a Typical Passenger Vehicle." May 2014. https://www.epa.gov/sites/production/files/2016-02/documents/420f14040a.pdf. Accessed August 15, 2016.

Climate Advocacy and Resilience

Some hospitals are looking beyond their own direct impacts in addressing climate change. Thirty-six percent have pushed for policy change, advocating for policies or legislation that protects public health from the root causes of climate change. A small number are now using the financial markets to promote a climate-friendly agenda—six percent of facilities or their parent companies have divested or sold off fossil fuel holdings.

In addition to taking steps on climate mitigation, it is also important for health care organizations to develop strategies to cope with the impacts of a changing climate, including both effects on buildings and infrastructure and on human health. The ability of a system to manage the stresses caused by climate change and maintain functionality is known as "climate resilience."[18] In fact, a higher proportion of facilities are taking action on climate resilience than on mitigation (Figure 9.13). A slight majority have created an action plan to address climate change-related building and infrastructure vulnerabilities (52 percent), while more than 70 percent have developed a plan for health care service delivery during and following extreme weather events, such as heat waves and hurricanes. For a useful overview of steps to climate resilience, see the The Sustainable and Climate-Resilient Health Care Facilities Toolkit, published by the U.S. Department of Health and Human Services in 2014.[19]

Figure 9.13: Climate Resilience



18 For a useful overview of steps to climate resilience, see the U.S. Climate Resilience Toolkit, available at http://toolkit.climate.gov/get-started/overview.

19 U.S. Department of Health and Human Services. Primary Protection: Enhancing Health Care Resilience for a Changing Climate. December 2014. https://toolkit.climate.gov/topics/human-health/building-climate-resilience-health-sector Accessed on September 9, 2016.

Sr. Mary Ellen Leciejewski
Director of Ecology, Dignity Health

Dignity Health

In December 2015, on the heels of the Paris climate negotiations, Dignity Health announced it is divesting from thermal coal companies, expanding sustainable investments, increasing its use of renewable energy, and reducing its greenhouse gas emissions. Coal combustion is the single largest contributor to climate change in the United States. It releases a toxic soup of chemicals—such as nitrogen oxides that contribute to smog, mercury, and particulate matter—that together damage the respiratory, cardiovascular, and nervous systems and contributes to heart disease, cancer, stroke, asthma, and chronic lower respiratory disease.

> "Our healing mission requires us to recognize the impact of climate change as a prominent public health issue. Because of this, we've taken a hard look at our environmental policies and taken steps to ensure that we limit our relationships with the worst environmental offenders."
>
> SHELLY SCHLENKER, VICE PRESIDENT OF PUBLIC POLICY, ADVOCACY AND GOVERNMENT AFFAIRS, DIGNITY HEALTH

Dignity Health is the first health system in the United States to develop a screen to divest its holdings in thermal coal companies. In the 1990's, Dignity Health (then called Catholic Healthcare West) took a similar moral leadership action when it stopped investing in tobacco.

Conclusion

The trends over the past few years regarding hospitals' actions on climate change mitigation and adaptation are largely positive. Participating hospitals are showing greater levels of engagement on climate issues across a range of strategies. Nonetheless, there is still clear room for improvement. Nearly half of facilities are not reporting any Scope 1, 2, or 3 greenhouse gas emissions, and less than half are pursuing each of the main climate mitigation strategies examined. Given that climate change is the preeminent global environmental challenge of our time, health care organizations can and should strive for continuing improvement in their efforts to address it.

Resources

CDC: Climate Effects on Health

Climate/Energy Webinar Series: Health Care Climate Council Presents: Climate Resilience and Using the Toolkit

Enhancing a Health Care Resilience for a Changing Climate

Health Care Climate Council

Practice Greenhealth Climate and Health

Green Buildings

There is growing awareness, both within the health care sector and more broadly, of the ways in which buildings affect the health and well-being of staff, patients and other building occupants. According to the Environmental Protection Agency, the average American spends 87 percent of their time indoors[1]—the quality of the indoor environment matters. The indoor environment includes materials and chemicals used in building construction and maintenance, and building heating, cooling, and ventilation systems. Green building is one of the most visible and tangible ways that organizations can signal their commitment to sustainability and a high-performance healing environment, to staff, visitors, and external stakeholders.

Evidence-based design is an important aspect of health care building projects, as are integrated project teams, where users have the ability to affect the design process in the earliest stages of the project. A growing number of hospitals are paying attention to acoustics, accessibility (onstage and offstage areas for clinicians can reduce stress for patients and staff), flexibility (building for future expansion potential or the ability to repurpose areas to meet future needs), improved indoor air quality, daylighting and views of nature that can reduce patient anxiety levels/stress and promote decreased length of stay.[2]

This year's Green Building highlights include:

69
facilities reported LEED-certified projects in the last five years covering 14 million square feet.

68%
of facilities (220 out of 322) have consciously selected building elements such as flooring, paints, and wall coverings that avoid chemicals of concern.

55%
of facilities reported a policy or commitment to design and construct all new buildings and/or major renovations to LEED (or another green building) design standard.


Advocate Lutheran General Hospital in Park Ridge, Illinois

1 Klepeis, Neil et al. "The National Human Activity Pattern Survey (NHAPS): A Resource for Assessing Exposure to Environmental Pollutants." Journal of Exposure Science and Environmental Epidemiology (2001), 11, pp. 231-252.

2 Ulrich, Roger. "A Review of the Research Literature on Evidence-Based Healthcare Design (Part I)." Health Environments Research & Design, 1(3), 2008. https://smartech.gatech.edu/bitstream/handle/1853/25676/zimring_HERD_2008_researchlitreview.pdf. Accessed September 2, 2016.

Hospitals are also community anchor institutions that need to be resilient in the face of natural disasters. In events such as Hurricanes Sandy and Katrina, hospital infrastructure needs to be able to withstand weather emergencies. Health care facilities need to take a long view when building and attempt to mitigate risk to their built environments to be able to serve their communities in times of need.

For all of these reasons, health care facilities are an important part of the green building movement. More than 200 hospitals in the U.S. have registered new construction projects using the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) for New Construction (BD+C) or Health Care (HC) green building certification since 2011, and dozens more have registered their building operations and maintenance (under the LEED O+M certification).[3] Many other hospitals are pursuing green building using other rating systems or criteria. Among hospitals participating in the Practice Greenhealth award application, 182 facilities (or 57 percent of applicants) have designed and built construction projects of 1,000 square feet or more in the past five years. Each of these projects provides opportunities for LEED certification or other sustainability-motivated choices. Since these building projects are long-lived, the impact of sustainable design and construction choices can be significant.

Regardless of whether a facility is using a green building rating system, there are a wide range of actions an organizations can undertake to ensure that major projects incorporate sustainable design elements. While the rest of the Practice Greenhealth awards program focuses primarily on sustainable operations, the Green Building category is focused on design, construction and major renovations. The data was reported in 2016 but reflects information from the 2015 fiscal or calendar year data. The graphs in this chapter present a subset of the available data on green building; detailed data tables and results can be found in the appendix.

3 Data from U.S. Green Building Council, LEED Project Database. http://www.usgbc.org/projects/list. Searched August 12, 2016. Includes all projects registered under LEED BD+C: Healthcare, plus all projects including the term 'hospital' registered under LEED BD+C: New Construction and LEED O+M: Existing Buildings.

Healing garden at University Hospitals Geauga Medical Center

2016 Green Building Circle of Excellence Winners

All of the Green Building Circle of Excellence winners have built a LEED Gold certified building in the past five years, and have a policy in place to build all new buildings to LEED or other green building standard. Furthermore, each of the green building strategies covered by the application were implemented by or near 100 percent of Circle of Excellence winners, including the avoidance of chemicals of concern in building materials, access to nature, energy- and water-saving elements, and the recycling of construction and demolition debris.

Advocate Christ Medical Center
Oak Lawn, IL

Advocate Lutheran General Hospital
Park Ridge, IL

Cleveland Clinic
Cleveland, OH

Memorial Sloan-Kettering Cancer Center
New York, NY

Seattle Children's Hospital & Regional Medical Center
Seattle, WA

UCSF Medical Center
San Francisco, CA

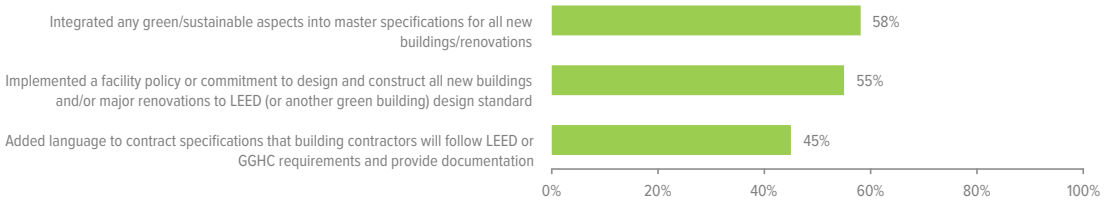
University of Vermont Medical Center
Burlington, VT

University of Vermont Medical Center

Green Design and Construction

As evidenced in Figure 10.1 below, many participating hospitals are making commitments that integrate sustainable practices into the design and construction of new buildings and renovation projects. By building these design principles into the master specifications or contract language that govern the project, organizations can ensure that green building features are built as envisioned in the design phase.

Figure 10.1: Green Design and Construction



More than half of the hospitals (58 percent) have integrated green aspects into master specifications, and a similar number (55 percent) have a policy or commitment to use LEED or another green building standard for all new construction and renovations. A slightly smaller number (45 percent) have integrated environmentally preferable elements into contract language.

One hundred eighty-two facilities indicated that they had designed and built a building project of greater than 1,000 square feet in the past five years. By comparison, participating hospitals reported 69 LEED-certified projects completed over that time period, with a smaller number of projects certified under other green building standards. Figure 10.2 shows the total number of projects and the square footage of space associated with each LEED certification level. A year-by-year analysis indicates that the number of certified projects completed has remained fairly consistent over the past five years.

Figure 10.2: LEED Projects by Category for Hospitals in the Data Set

LEED Category	Area, in square feet	# of facilities
LEED Platinum	0	0
LEED Gold	3,861,456	22
LEED Silver	9,203,906	40
LEED Certified	981,696	7
Total LEED	**14,047,058**	**69**

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

For Seattle Children's LEED Gold Certified "Building Hope," completed in 2013, the project team designed a building that went beyond energy and water efficiency and created a healing space for patients, families and staff. They connected the new building to the neighborhood and improved pedestrian and bike access to the campus. The construction included 94.8 percent Forest Stewardship Certified wood-based building materials, and low emitting adhesives, sealants, paint and carpets. Additionally, they used no added urea formaldehyde for all indoor composite wood and agrifiber materials. As they have continued to fill out and occupy the building, they continue to use this specification. Lastly, they diverted 97.6 percent of construction waste from the landfill through recycling.

Studies have found that green buildings can be designed and constructed with little or no price premium over conventional health care buildings.[4] Energy- and water-saving systems typically featured in green buildings can generate substantial financial savings over time, yielding an attractive return on investment. At the same time, researchers at Harvard University's Center for Health and the Global Environment, have done studies that demonstrate that green buildings versus conventional show a direct positive correlation to health, productivity and cognitive function for workers. The studies revealed on average that occupants experienced a major increase in health and cognitive scores by an average of 61 percent.[5] Indoor air quality, natural lighting, acoustics, biophilia and other design considerations to the natural world have also influenced absenteeism rates. In the US, this rate is three percent for every employee in the public sector and four percent in the private sector costing employers $2,074 to $2,502 a year.[6] Green buildings actively help to mitigate absenteeism and surveys emphasize employees are more engaged which equates to less turnover.

An integrated design process is fundamental to the creation of high-performance healing environments. An integrated design process and team enables stakeholders to influence the building design from the outset of the project, and develop elements and features that are beneficial to multiple players across the institution. The National Institute of Building Science's Whole Building Design Guide defines it as follows:

> **"An integrated design process includes the active and continuing participation of users and community members, code officials, building technologists, contractors, cost consultants, civil engineers, mechanical and electrical engineers, structural engineers, specifications specialists, and consultants from many specialized fields. The best buildings result from continual, organized collaboration among all players throughout the building's life cycle."**

Hospitals who have built LEED Gold buildings point to the integrated design process and team as integral to success. Likewise, it is important that the hospital has a commitment to the integration of sustainable features going into the design phase, and that it seeks out architecture, engineering, design and construction firms that have a proven track record and experience in designing and building sustainable hospitals. This shared vision for success is what enables projects to come in on time and on budget, while achieving sustainable features and creating a high-performance healing environment.

4 See, for example, Davis Langdon. "Cost of Green Revisited: Reexamining the Feasibility and Cost Impact of Sustainable Design in the Light of Increased Market Adoption." http://sustainability.ucr.edu/docs/leed-cost-of-green.pdf. Accessed August 16, 2016.

5 Allen, et al., 2015. Harvard Center for Health and the Global Environment. The impact of green buildings on cognitive function. Webpage. Available at: https://green.harvard.edu/tools-resources/research-highlight/impact-green-buildings-cognitive-function. Accessed on: September 29, 2016.

6 World Green Building Council. Health, Wellbeing and Productivity in Offices. 2015. Available at: http://www.worldgbc.org/files/6314/1152/0821/WorldGBC__Health_Wellbeing__productivity_Full_Report.pdf Accessed on: September 29, 2016.

Advocate Health Care

Advocate Health's Design & Construction department has identified Integrated Lean Project Delivery (ILPD) as the method by which it plans to deliver all of its construction projects by the year 2020. ILPD consists of four key principles: trust-based teams, early collaboration, transformational leadership and built-in sustainability. All of these principles lead to greater creativity and collaboration among the team members which in turn provides for higher-quality, lower-cost building projects.

One of the key objectives of Advocate's ILPD approach is to provide sustainably designed and more operationally efficient buildings that minimize the use of environmentally harmful building products and reduce energy consumption throughout the life of the building. ILPD also encourages prefabrication of major building components at offsite locations in safe controlled environments while significantly reducing material waste and building construction duration. Advocate Christ Medical Center's new East Patient Tower project used an ILPD approach. The new patient tower is a testament to the success of the approach, and uses 28 percent less water than a typical hospital in Illinois, achieves $259,000 in energy savings annually over code and baseline, and facilitates 54 percent daylight autonomy.

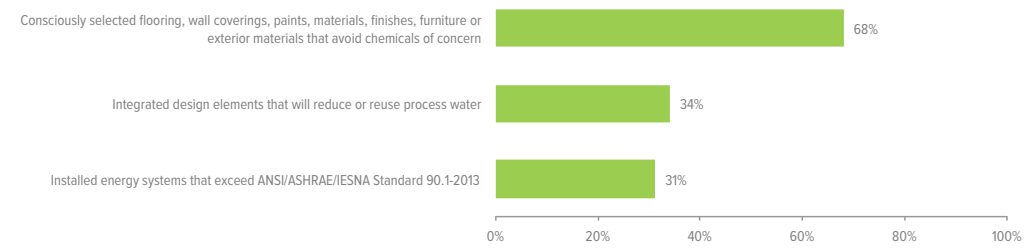
Innovative Green Building Strategies

The Practice Greenhealth award application gathered data regarding a range of specific green building strategies, including avoiding chemicals of concern, various means of providing access to nature, and installing energy and water-saving elements. Figure 10.3 summarizes hospitals' responses on these aspects of green building.

Given Practice Greenhealth hospitals' focus on health, it is perhaps unsurprising that the green building approach used most often is avoiding chemicals of concern, by deliberately selecting building materials that minimize chemicals that pose significant environmental and/or health risks. More than two-thirds of facilities reported taking this step. The most commonly reported measure was to avoid the use of volatile organic compounds in paints. Exposure to high levels of VOCs found in new paints and finishes can cause eye, nose and throat irritation; headaches; loss of coordination; liver damage; kidney damage; and damage to the central nervous system.[7] Using low-VOC paints and finishes can substantially reduce the occurrence of these symptoms. Other key strategies cited to avoid chemicals of concern include purchasing furniture made without chemicals of concern such as PVC, formaldehyde or brominated flame retardants, and purchasing low-emitting, natural rubber flooring that doesn't require harsh stripping and finishing chemicals.

On the energy front, just 31 percent had installed energy systems as of 2015 that exceed the ASHRAE 90.1-2013 standard.[8] At first glance, this may seem somewhat surprising, since energy savings translates directly into cost savings and is often one of the first sustainability measures undertaken in a green building effort. However, this specific ASHRAE standard is relatively new, and the LEED for Healthcare rating system references an older version of the ASHRAE standard. On the other hand, last year Practice Greenhealth asked hospitals about energy saving elements above ASHRAE 90.1-2007 and a similar proportion of applicants (32 percent) indicated they had installed such measures. This finding suggests that there is room for improvement on this metric. For those hospitals that did install energy saving elements, the most common level of performance improvement was 10 to 25 percent, but a substantial number of hospitals reported savings outside of that range (both higher and lower).

Figure 10:3: Innovative Building Strategies



ASHRAE and NREL have both developed guides for hospitals to achieve 50 percent savings below the ASHRAE 90.1 standard.[9, 10] While the most effective steps to reduce energy use varies between different climate zones, NREL reports that "the biggest energy saver (by far) is the change of HVAC system type—moving from the CAV AHUs [constant air volume air handling units] to a DOAS/WLHP [dedicated outdoor air system/water loop heat pump] system that decouples the space conditioning loads from the ventilation loads. This eliminates the largest energy use (reheat energy)."[11] Other strategies suggested by NREL include reduced lighting power densities, daylighting and occupancy sensors, high-efficiency chillers, boilers, and water heaters, and integration of subsystems to achieve whole-building performance improvements, among others.[12]

Regarding water conservation, 55 percent of facilities had installed water-saving measures that will substantially reduce potable water use or reuse non-potable water. Low-flow fixtures were the most common example of water-saving measures while reducing the need for irrigation through native plantings or rainwater capture was another area of focus. Just 34 percent of facilities had integrated design elements to reduce or reuse process water in 2015. There are a range of well-tested strategies for improvement on the process water front. Particularly in regions facing growing pressure on water resources, equipment and processes that reduce and reuse process water should be key elements of new building design. Examples used successfully by participating hospitals include reusing cooling tower water and boiler blowdown; recovering and reusing condensate; and increasing the efficiency of water-cooled equipment.

7 U.S. Environmental Protection Agency. "An Introduction to Indoor Air Quality (IAQ)." Last updated August 5, 2016. http://www.epa.gov/iaq/voc.html#Health_Effects. Accessed August 16, 2016.

8 Other area of the Practice Greenhealth award application, including the Energy, Climate, and EPP areas, inquire about other energy savings opportunities and projects. In this chapter, the content is only focused on the energy-savings opportunities related to new construction or major renovation projects. that appear in the Green Building section.

9 ASHRAE. "Advanced Energy Design Guide for Large Hospitals: Achieving 50 percent Energy Savings Toward a Net Zero Energy Building." May 1, 2012. https://www.ashrae.org/standards-research--technology/advanced-energy-design-guides/50-percent-aedg-free-download. Accessed September 2, 2016.

10 Bonnema, Eric et al. "Large Hospital 50 percent Energy Savings: Technical Support Document." National Renewable Energy Laboratory. Technical Report NREL/TP-550-47867, September 2010. http://www.nrel.gov/docs/fy10osti/47867.pdf. Accessed September 2, 2016.

11 Ibid, p. 63.

12 Ibid., p. v.

UCSF Medical Center

Across cultures and history, nature has been regarded as a compelling healing force, connecting individuals to the cycles of life and inspiring renewal and hope. More recently, research into the restorative power of gardens has demonstrated that access to healing gardens during an illness can lead to a reduced need for pain medication and shorter hospital stays. One of the greenest urban hospitals in the nation, the UCSF Medical Center at Mission Bay received LEED Gold certification prior to occupancy. The complex features 16 individual gardens totaling 4.3 acres of green space, which includes over an acre of rooftop gardens to help reduce storm water runoff.

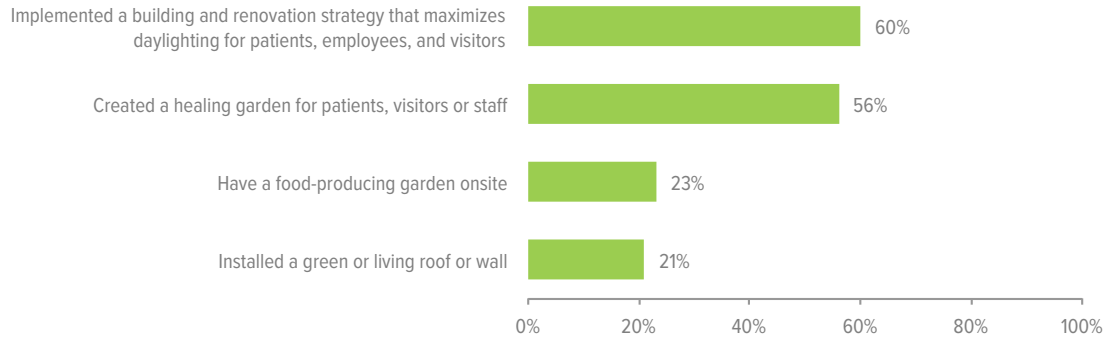
> "The hospital buildings are designed to flow seamlessly from patient units to the outdoors, offering positive diversions from the stress of illness and hospitalization."
>
> ELENA GATES, MD
> CHIEF OF THE UCSF DIVISION OF GENERAL GYNECOLOGY
> UCSF MEDICAL CENTER [13]

13 UCSF Medical Center. A Healing Respite: The Gardens of UCSF Medical Center at Mission Bay. July 17, 2010. Accessed on September 26, 2016. Available at: https://www.ucsfhealth.org/news/2012/07/a_healing_respite_the_gardens_of_ucsf_medical_center_at_mission_bay.html

Access to Nature

Access to and views of nature go beyond an environmental aesthetic and translate back into high-quality patient care. A number of studies have found that views of nature can reduce patient stress, reduce length of stay and reduce medication errors—among other benefits. The emphasis is on creating not only high-performance buildings but also places of healing. Leading hospitals are continuing to find ways to integrate nature into the building design. Strategies include a focus on increased access to daylight, healing gardens, views of nature from different areas of the hospital including green roofs and living walls, and even food-producing gardens onsite. Green roofs can not only transform views but can also aid significantly in storm water management and reduce cooling loads and heat island effect. Figure 10.4 highlights how hospitals in the data set are employing these elements to create better hospital campuses.

Figure 10.4. Access to Nature



Green roof on Spaulding Rehabilitation Hospital, Charlestown, Massachusetts

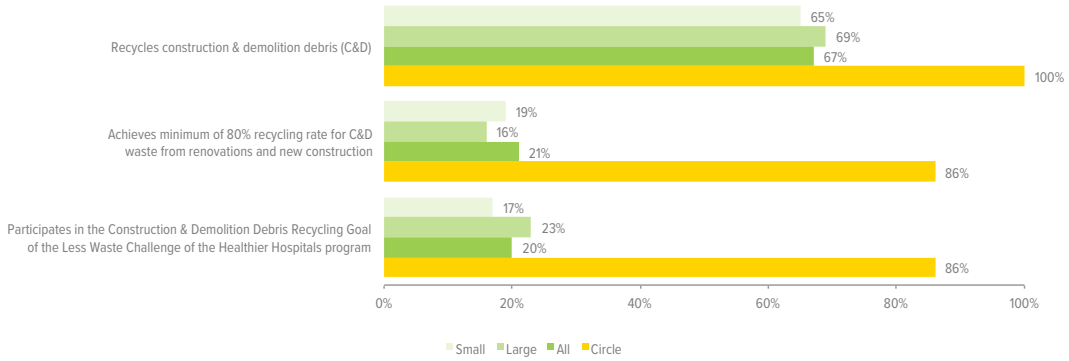
Construction and Demolition Waste

Construction and demolition (C&D) waste is a major component of the commercial waste stream. In 2013, 530 million tons of C&D waste were generated in the United States—more than double the level of municipal solid waste. Cement concrete and asphalt concrete account for 85 percent of this total. The vast majority of this waste is produced during demolition, rather than construction.

Ten to 15 percent of building material is wasted during construction. Over two-thirds of the hospitals reported that they recycle C&D waste, indicating that this is a fairly mainstream practice. However, only 43 percent of those (or 29 percent of all applicants) were able to provide numerical data on construction waste. About 20 percent of those claiming to recycle shared data indicating a recycling rate greater than 80 percent, although another 14 percent claimed they had achieved an 80 percent C&D recycling rate but didn't provide numbers to back up that claim. Among the top performers, 15 hospitals reported recycling rates of 95 percent or higher. Note that the LEED 2009 for Healthcare New Construction and Major Renovation rating system awards one point for achieving a 50 percent recycling or salvage rate and two points for achieving a rate of 75 percent or higher.

Some demolition materials have market value that can generate rebates and other revenues. Hospitals should make sure that construction contracts account for this by ensuring that any revenue from recycling C&D waste comes back to the organization or is used to offset hauling fees. Other materials can be reused in the new building. Salvaged, refurbished or reused materials count toward the Sustainably Sourced Materials and Products Credit (MRc3) which is worth between one and four points in the LEED rating system. There are a variety of regional contractors who have well-established programs for C&D material recovery and recycling.

Figure 10.5: Construction and Demolition Waste Reduction



Memorial Sloan Kettering Cancer Center.

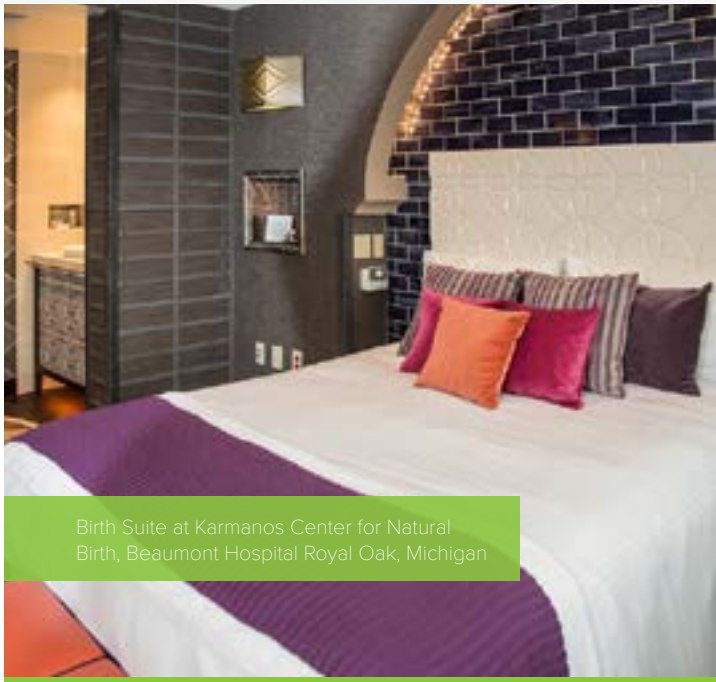
For the Memorial Sloan Kettering (MSK) David H. Koch Center for Cancer Care Project, the MSK sustainability team is working closely with the project team to avoid chemicals of concern such as PFOAs (Teflon coatings, Nanotex, Gore-Tex), dioxin, chlorides, etc.—thereby reducing chemicals that are carcinogenic to its occupants. MSK examines all materials from building products to flooring, paints, and furniture, as it continually looks for more sustainably efficient solutions throughout the design and construction phases. On the construction waste front, MSK sustainability staff worked with the hospital's design and construction team to create a form that tracks solid waste and recycled waste per construction job. The form was shared with the hospital's contracted construction management firms and their waste haulers in order to collect data for the numerous construction and renovation projects that occurred throughout 2015. In 2015, MSKCC achieved an overall 80 percent recycling rate for C&D waste. MSK requires all new construction buildings to achieve a minimum LEED Silver standard, which requires a construction waste management plan that ensures at least a 75 percent recycling rate of C&D waste generated on site. Recycling rates for MSKCC's major new construction projects generally are well over 80 percent. In 2016, MSK sustainability staff continued to engage with the design and construction team in order to streamline the process of collecting C&D waste data for all projects, including those outside of its main campus.

Conclusion

Participating hospitals are taking numerous steps to promote green building design and construction and create the hospitals of the future by building LEED-certified buildings, minimizing chemicals of concern, and recycling construction and demolition debris. There is still room for opportunity, however, in creating awareness at the executive level about the ROI for integrating green elements into building projects. Only a minority of hospitals are aggressively implementing energy- and water-saving elements into new buildings. Many of these elements can be implemented at little or no up-front cost and generate substantial, ongoing financial savings but require committed leadership to bring their vision for sustainability to the architecture, engineering and design firms early on in the design process.

As more is learned about the myriad benefits that greener buildings can offer in terms of operational efficiency, worker productivity, stress reduction, indoor air quality—as well as reputation and recruitment potential, health care executives have begun to pay attention and are slowly recognizing the added value that greener buildings can offer. An integrated design process combined with a committed executive suite and innovative AED firms can result in beautiful, state-of-the-art, high-performance healing environments. And research has shown that many green buildings are constructed with little or no cost premium relative to conventional buildings. Today, inspired leaders are finding that creating flexible, functional and sustainable designs that support and promote health and well-being are not just an asset but instead are vital to the hospital mission to protect community health and attract and retain top-notch employees. Decision makers should consider both the environmental and the financial impetus to adopt green building practices.

Hospitals planning a major renovation or new construction project should look to examples from other facilities that have undertaken green building projects to better understand how these efforts can advance sustainability while meeting the organization's operational and financial objectives.



Birth Suite at Karmanos Center for Natural Birth, Beaumont Hospital Royal Oak, Michigan

Resources

ASHRAE Guide to Building Hospitals With 50% Less Energy for Large Hospitals

Demystifying the Costs and Benefits of Green Healthcare Facilities

Living Building Challenge 3.1

The Business Case for Green Building USBGC

Long-Term Care Facilities

In 2016, 26 facilities applied for the Partner for Change award under the category of long-term care (LTC). This category comprises facilities with overnight beds but no operating rooms, and includes skilled nursing facilities, assisted living and memory care facilities, behavioral health facilities, long-term acute-care hospitals, and rehabilitation hospitals. These types of facilities are markedly different than typical hospitals and this chapter provides the opportunity for these facilities to benchmark against a similar peer cohort. This chapter focuses on an analysis of a subset of quantitative performance metrics collected for five primary topic areas including waste, chemicals, food, energy and climate, and water.

The environmental performance of LTC facilities is a relatively new topic. Despite the small dataset (26 facilities), the data in this chapter can help shape the collective understanding of the unique challenges faced by these kinds of hospitals as they embrace sustainability. Practice Greenhealth is interested in providing better support to LTC facilities, and hopes to offer additional tailored resources and tools for its long term care member facilities in the future. The benchmark data for LTC facilities will provide a useful starting point from which to drive organizational goal setting in the coming year.

Waste and Recycling

LTC facilities produce far less total waste than acute-care hospitals. This may be due to the infrequency of new patients and the use of fewer medically acute products to care for them. The median total waste per patient day for LTC facilities is nine pounds per patient day compared to a median of 40 pounds per patient day for acute care hospitals—a substantial difference.

LTC facilities have found success reducing their overall waste footprint through a variety of techniques. Figure 11.1 presents the proportion of facilities that are engaging in mainstream waste reduction/minimization techniques. LTC facilities in the data set recycle similar proportions of their total waste as compared to acute-care hospital applicants, with median recycling rates of 30 and 28 percent, respectively.

Figure 11:1: Waste Reduction Strategies

Percent of facilities engaging in common waste reduction strategies.

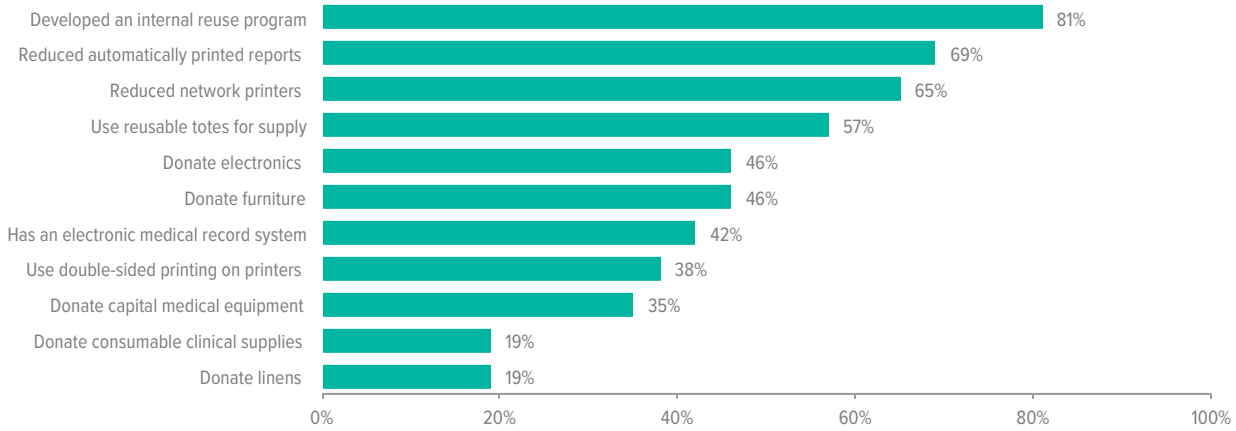
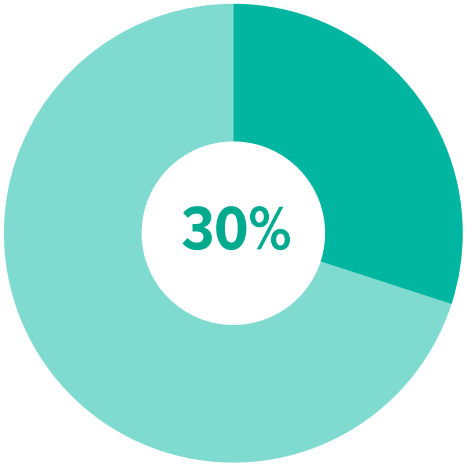


Figure 11.2: Recycling as a Percent of Total Waste

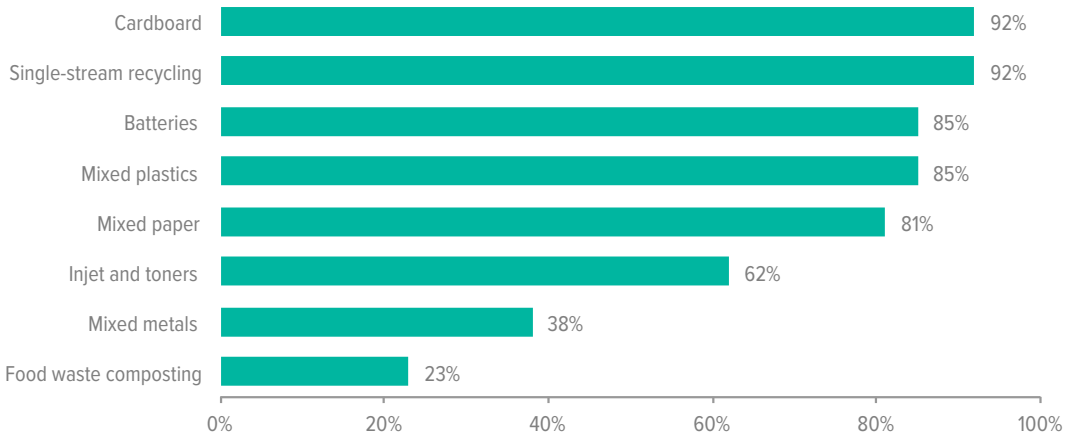
Median percent recycling as a percent of total waste.



Facilities with this profile are finding ways to implement successful recycling (or composting) programs for a number of different waste streams including cardboard, mixed paper, mixed plastics, mixed metals, food waste, batteries, fluorescent lamps and ink jets and toner cartridges—to name a few. Figure 11.3 indicates the percent of LTC facilities that recycle (or compost) these types of wastes.

Figure 11.3: Recycling or Composting Common Wastes

Percent of LTC Facilities that recycle (or compost) common wastes.



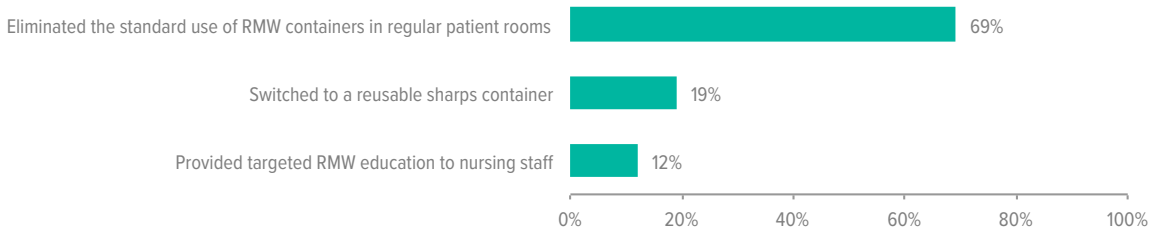
Northern Arizona VA Healthcare System

Housekeeping supervisors at Northern Arizona VA Healthcare System in Phoenix, AZ have focused on continually teaching staff about which wastes should go into the red bag containers. Supervisors have posted signs in the soiled utility closets and conducted one-on-one training in areas where they see a lot of unnecessary commingling of wastes. The hospital has seen dramatic reductions in their red bag waste over the last three years with a current RMW rate of 1.99 percent of total waste.

LTC facilities produce significantly lower rates of regulated medical waste (RMW) as compared to acute-care hospitals. The median percentage of RMW (as a percent of total waste) is 0.6 percent for LTC facilities compared to 6.8 percent of total waste for acute care hospitals (regardless of onsite or offsite treatment of the waste). This result is not surprising given that operating rooms produce a large portion of the medical waste in acute-care hospitals—lower rates of RMW are a reflection of the non-acute nature of most LTC facilities.

LTC facilities have found success reducing their RMW through targeted RMW education to nursing staff, use of reusable sharps containers, and elimination of the standard use of RMW containers in regular patient rooms. Figure 11.4 indicates the prevalence of these practices at LTC facilities.

Figure 11.4: RMW Reduction Strategies



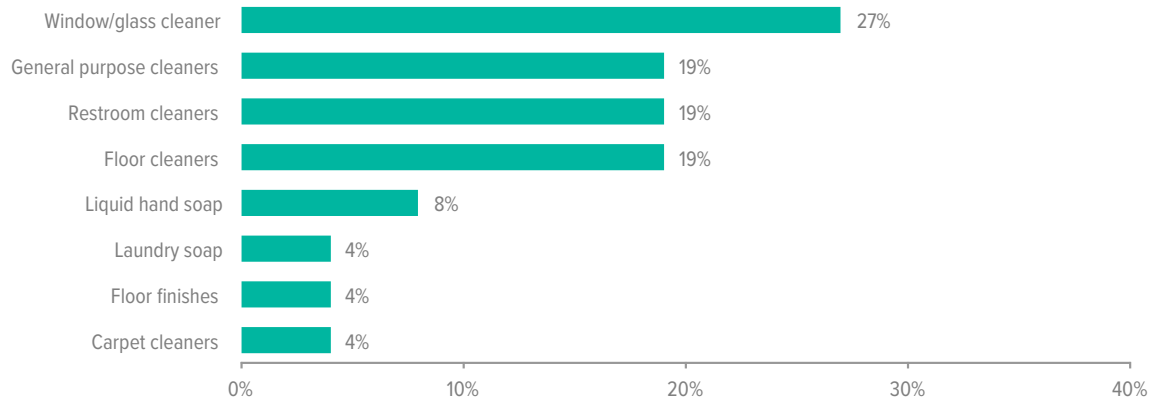
The data gathered suggests that LTC facilities are generating pharmaceutical waste in lower volumes than acute-care hospitals—with a median of 0.66 tons of pharmaceutical waste annually as compared to the acute-care median of 3.57 tons. Facility size, specialty and risk management approach all can cause significant variation in volumes of pharmaceutical waste. This is an area for deeper review with the LTC community, as only six facilities were able to provide data on how their non-RCRA pharmaceuticals were being disposed of and only 42 percent of the participants in the data set provided any data on RCRA-hazardous pharmaceuticals. Deeper analysis is needed to understand whether there remains confusion about best management practices for pharma waste in the LTC setting or whether it is a reflection of lack of access to waste disposal data for some sites.

Chemicals

LTC facilities are making good headway on reducing chemicals of concern—though it appears prioritization of this work is less focused than in acute-care hospitals. 80 percent of LTC facilities had conducted an inventory of cleaning products across their institutions. Of the 31 percent of LTC facilities who indicated they are using certified green cleaning products, LTC facilities are spending a median 53 percent of their reported cleaning chemical budget on products that are Green Seal or UL ECOLOGO-certified. The percent of facilities that purchase at least some green-certified chemicals in each of the eight key cleaning chemical categories are noted in Figure 11.5.

Figure 11.5: Green Chemicals

Percent of LTC facilities purchasing green-certified cleaning chemicals by type

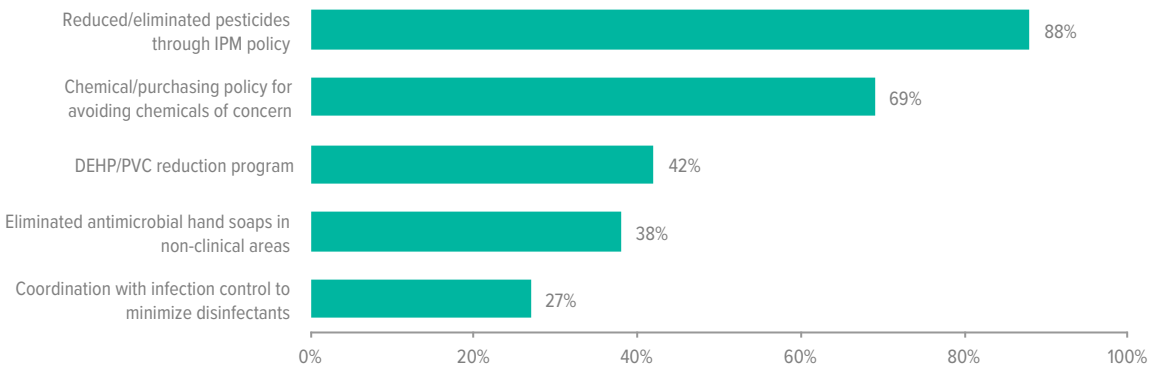


Mary Immaculate Health Care/Services achieved an impressive 73.9 percent of their total cleaning chemical spend on certified GreenSeal or UL EcoLogo cleaning chemicals, with nearly 88 percent green spend on general-purpose cleaners, 100 percent green spend on window/glass and 78.3 percent green spend on bathroom/restroom cleaners. The facility has also conducted an inventory of its cleaning chemical products and has developed a policy/plan to codify its green cleaning efforts.

LTC facilities have found additional ways to minimize chemicals of concern such as eliminating antimicrobial hand soaps in non-clinical areas, with 38 percent of LTC facilities tackling this goal, or developing DEHP/PVC reduction programs, with 42 percent of hospitals reporting progress. Most LTC facilities have also implemented an IPM policy. And just a few hospitals indicated working with infection control to minimize the use of disinfectants for surface cleaning where clinically indicated.

Figure 11.6: Chemical Minimization

Percent of facilities engaged in common chemical minimization techniques.



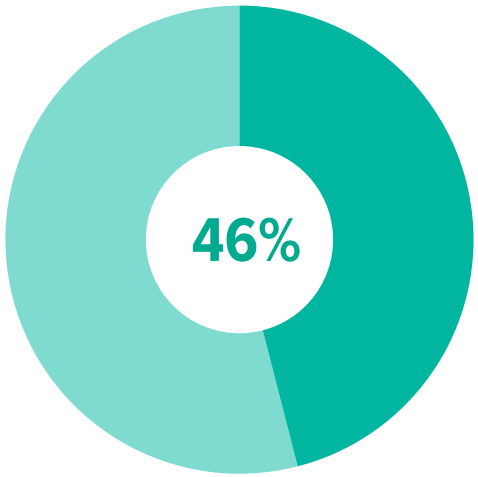
Work on the elimination of chemicals of concern in furniture and furnishings is just getting off the ground amongst LTC facilities. Only three facilities in the data set reported that they are purchasing furniture/furnishings that meet an environmental standard or certification.

Food

A challenge for LTC facilities is bringing local and organic foods into the organization, especially as a part of their routine, everyday purchases. Only four facilities reported spending a portion of their budget on local or sustainable foods, although additional evidence indicates that other facilities may acquire local foods through their common food distributor. Cost, contracts, and an inability to obtain the data were common barriers cited to broader adoption of local and sustainable food spending.

However, LTC facilities are having some success with promoting a move away from sugar-sweetened beverages to healthier beverages, and are actively working to reduce the availability of unhealthy options. The median spending on healthier beverages (as a percent of total beverage spending) in LTC facilities is now 46 percent.

Figure 11.7: Median Percent of Spending on Healthy Beverages



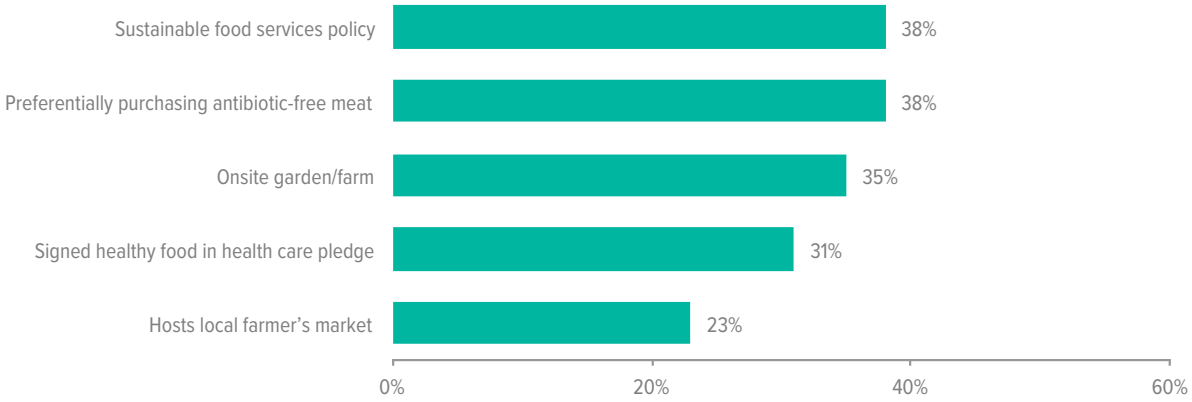
Work on meat reduction and purchase of meat/poultry raised without routine use of non-therapeutic antibiotics is still gaining traction. Only 35 percent of LTC facilities reported they are tackling meat reduction and 39 percent reported they are purchasing meat and poultry raised without the routine use of non-therapeutic antibiotics. Due to the small sample size of only two facilities, the median percent meat reduction is not statistically significant. Antibiotic-resistant infections can be incredibly dangerous in a long-term care setting. Only three of the 26 LTC facilities in the data set reported spend on meat/poultry raised without routine antibiotics, also making the median not statistically significant. LTC facilities that were part of an integrated delivery network with a corporate commitment to the antibiotics work were more likely to report action on this front.

SPAULDING REHABILITATION NETWORK

All of the poultry at Spaulding Rehabilitation Hospital, part of Partners HealthCare in Boston—100 percent—is raised without the routine use of non-therapeutic antibiotics. The beef is currently at 50 percent antibiotic-free, and the hospital is working on pork, and on addressing all of its animal proteins.

LTC facilities are also finding success with garden initiatives. With more than a third of facilities reporting an onsite farm or garden, this is a popular way to engage long-term residents in outdoor activities. One of the LTC facilities also hosted an onsite community supported agriculture (CSA) food program for patients, employees, and/or community residents.

Figure 11.8: Percent of Facilities Supporting Common Healthy Food Initiatives



Energy and Climate

An energy use intensity (EUI) score (kBtus/square foot) is a valuable way for facilities to benchmark against other similarly-typed peers, as it normalizes the usage across total indoor square footage. The median EUI score is much lower for LTC facilities when compared to acute-care hospitals, 142 kBtus/sq ft versus a median of 233 kBtus/sq ft respectively. This data is an important indicator that LTC facilities should be using a peer set to benchmark against for energy users, rather than continue a comparison with acute-care hospitals. LTC facilities that have applied for an award in the past three years demonstrate a median 5.4 percent reduction in EUI since their initial year of reporting, indicating that LTC facilities are becoming more efficient overtime.

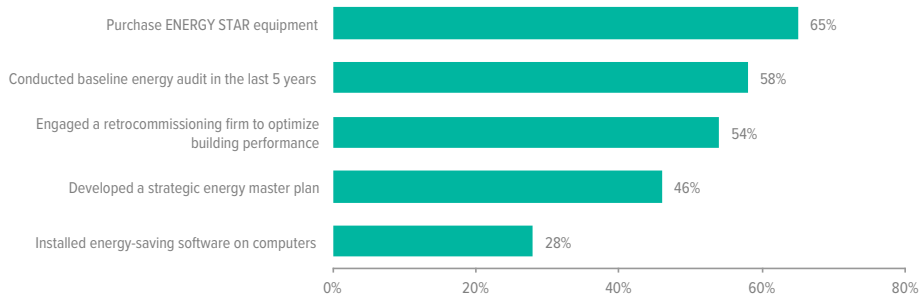
ENERGY STAR Portfolio Manager is a tool for facilities to use for analyzing and comparing their energy data. Data indicate that 35 percent of LTC facilities utilize this free tool for energy tracking and benchmarking. LTC facilities that do not currently use this tool may consider making use of ENERGY STAR's program for senior care communities, a potentially better match than the general hospital category. The ENERGY STAR program defines such senior care space as "including independent living, assisted living, dementia care, skilled nursing, and common areas such as dining and recreational rooms."[1]

LTC facilities use a variety of techniques for reducing their energy footprint. LTC facilities are engaging in a variety of common energy-saving initiatives. For example, nearly 30 percent of LTC facilities are taking advantage of energy-saving software to shut down non-essential computers during off-times, and 65 percent are routinely purchasing ENERGY STAR-labeled equipment.

1 https://www.energystar.gov/buildings/tools-and-resources/energy-star-score-senior-care-communities

Figure 11.9: Energy-saving Initiatives

Percent of facilities engaging in common energy-saving initiatives.



Nineteen percent of LTC facilities utilize renewable energy sources—either produced onsite or purchased offsite—for some portion of their energy portfolio. Of those facilities that use renewable energy sources, approximately eight percent of total energy use is powered through renewables. This is a similar value to acute-care hospitals; nearly 22 percent of acute-care hospitals utilize onsite or offsite renewable energy sources for some portion of their energy portfolio.

LTC facilities are working in other ways to reduce their climate impact: 42 percent indicated they have performed a Greenhouse Gas (GHG) Emissions Audit, and 35 percent are using alternative-fuel or low-emitting vehicles for fleet and other transportation needs. In comparison, only 22 percent of acute care hospitals have performed a GHG Audit. However 38 percent of acute care hospitals utilize alternative-fuel or low-emitting vehicles, a slightly higher rate of use compared to LTC facilities.

specialtyhospital
MEMORIAL HEALTH

Specialty Hospital Jacksonville, a long -term acute-care Hospital with 54 staffed beds, put four air handling units on a schedule in the building automation system where the units are shut down for 11 hours of the day, since the area is unoccupied at night. In addition to the calculated savings of more than $13,000 annually, additional savings that cannot be calculated include the reduced amount of chilled water being required. This means a smaller load on the chiller, cooling tower and pumps in the power plant.

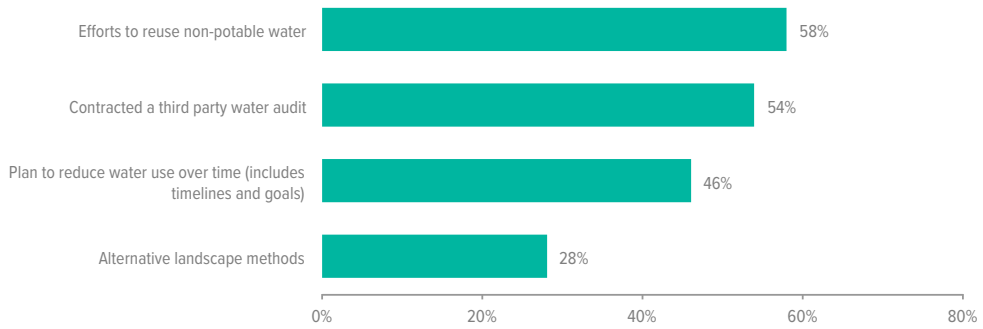
Water

Overall, LTC facilities are using a median 45 gallons of water per square foot of gross floor area. This is very similar to acute-care hospitals, which used a median 47 gallons per square foot of gross floor area. As noted in the water chapter of this report, gallons of water used per square feet of gross floor is currently an imperfect metric because total water use for the facility is being used to calculate this metric in 2015 instead of only indoor water use (which segregates irrigation water).

LTC facilities have achieved an admirable median of six percent reduction in water use per square foot since their reported baseline year. Some common ways that LTC facilities are reducing water usage include alternative landscaping and re-using non-potable water. Practice Greenhealth is encouraging health care facilities to consider creating a site-specific, targeted water goal to reduce water use and has created the Less Water Toolkit to assist facilities in that endeavor.

Figure 11.10: Water Reduction Strategies

Percent of LTC facilities implementing common water reduction strategies.



Conclusion

LTC facilities face different environmental challenges than acute-care hospitals, given the nature of their patient population and care. This chapter highlights a subset of data that may be of particular interest to LTC facilities and will help to inform strategies and benchmarking activities in the future. It also highlights some areas warranting further investigation, such as gaining a better understanding of LTC water needs and usage patterns, and why they have a relatively high water use intensity despite not having the sterilization equipment and temperature requirements of many acute-care hospitals.

Energy use and benchmarking is another area that can be further explored, so that LTC facilities will better understand their energy footprint in relation to other health care facilities with similar scope and size. This data showed a wide gap between the 90th percentile, at an EUI score of 55, versus the median EUI at 142. The reasons for this gap are not yet fully understood. Finally, waste disposal is a topic that can be looked at more closely, in order to discover the opportunities and challenges that LTC facilities have to reduce, reuse, and recycle, and to properly manage pharmaceutical, hazardous and biohazardous waste.

Practice Greenhealth is proud of its LTC members for leading the way by tackling the comprehensive data inputs in the Environmental Excellence Awards applications. By taking the time to input data, these facilities have demonstrated their leadership in the larger LTC community, and are helping showcase the environmental successes and unique challenges faced by these kinds of facilities. Deeper data analysis and project-based work will lead to a better understanding of how Practice Greenhealth can support the long-term care community in becoming more environmentally conscious while achieving operational efficiencies.

Figure 11.11: Median Sustainability Performance Metrics for Long Term Care

CATEGORY	METRIC	Median Value
	Recycling as a percent of total waste	28%
	RMW as a percent of total waste	0.6%
	Lbs. of total waste per staffed bed per day	9.2lbs.
	% of cleaning chemical spend on green “certified” cleaning chemicals	51%
	% of furnishings spend on items that eliminate the use of target chemicals	58%
	% change in meat use (by weight)	15.4%
	% of spend on healthier beverages	57%
	% of spend on local and/or sustainable	15%
	% meat raised without antibiotics	33%
	Pounds of meat per meal	0.10 lbs.
	Pounds of compost per meal	0.1 lbs.
	Energy use intensity (EUI)	139
	% change in EUI from baseline	11%
	ENERGY STAR score	47
	% Offsite renewable energy	5.6%
	% Onsite renewable energy	0.9%
	Gallons per sq. ft.	47 gals/ft^2
	Gallons per cleanable sq. ft.	56 gals/ft^2
	% Change in water use per sq. ft.	16%
	Gallons per staffed bed	45179 gals/bed
	Gallons per FTE	23869 Gals/FTE
	% Total renewable energy use	4.9%
	% of construction & demolition debris recycled	78%

Academic Medical Centers

In the 2015 data set, 141 hospitals identifying themselves as academic medical centers (AMC), or teaching hospitals, applied for the Partner for Change or Partner Recognition award. An AMC is typically a university medical school with a hospital attached and/or a teaching hospital affiliated with a medical school which trains students and doctors. As such, these hospitals are training grounds for residents, medical and nursing students, PhDs, and post-doctoral researchers. Eighty-seven of these hospitals also include onsite research facilities, which host laboratories and other research amenities that can add to their environmental footprint. This subset of hospitals will be referred to as academic research hospitals.

This chapter provides academic medical centers and academic research hospitals the opportunity to benchmark against similar peers, and presents a subset of the data collected for five primary topic areas with quantitative data, including waste, chemicals, food, energy and climate, and water. As this is the first year that Practice GreenHealth is presenting analysis on academic hospitals as a specific subset, trend data is not presented in the chapter. Compared to non-academic hospitals:

- Academic medical centers tend to have more patient volume. The median number of staffed beds, patient days and adjusted patient days for academic hospitals were more than twice that of non-academic facilities.
- Academic medical centers are larger, and have nearly 2.5 time the median square footage of non-academic hospitals, with research hospitals at 3.5 times the size.
- Academic medical centers have more staff than facilities of a similar size. The median number of employees (full-time and contracted, including researchers, residents, and students) per OR and per staffed bed for academic facilities was twice that of non-academic, although they had similar numbers of employees per square foot. Academic research hospitals had more than three times the number of FTEs and five times the median number of contracted staff as the median for non-academic hospitals.
- Academic medical centers have more operating rooms (ORs), a median of 14 ORs versus eight ORs for non-academic hospitals. Academic research hospitals have nearly three times the number of ORs as non-academic hospitals (median of 21 versus 8).
- Academic medical centers generate more total waste than non-academic hospitals and recycle a smaller portion of their waste streams.
- Academic medical centers generate more regulated medical waste (RMW) and have RMW as a higher proportion of their total waste.
- Academic medical centers use more energy per square foot when research facilities are present.
- Academic medical centers use three times more water per square foot and use 1.5 times more water per OR.

Figure 12.1: Median Demographics for Academic Medical Centers

Normalizer	All	Non-Academic	Academic	Academic with research	Academic without research
Adjusted Patient Days	87,679	67,074	136,286	191,090	100,191
Patient Days	47,417	29,758	72,282	102,385	49,330
Staffed Beds	202	150	306	402	185
Operating Rooms	11	8	14	21	11
OR Procedures	6,430	4,669	11,858	13,656	10,393
FTEs	1,446	947	2,870	3,926	1,810
FTEs + Contractors	1,646	997	3,164	4,630	1,944
Square Feet of Gross Floor Area	600,153	427,403	1,079,781	1,484,143	666,103

University of Vermont Medical Center

Waste

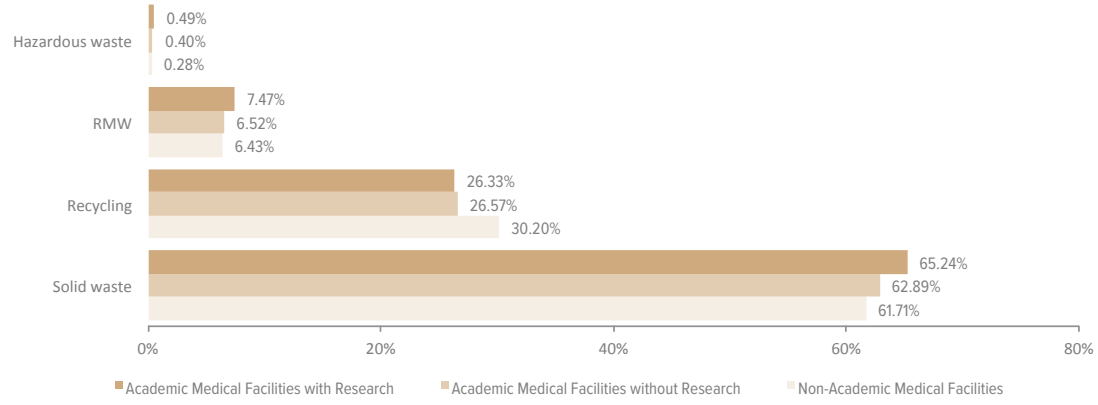
Academic hospitals produce more total waste compared to all hospitals; this is especially true for academic hospitals that conduct research. This is likely due to the higher staff and student density within academic hospitals. Academic hospitals have three to 25 percent more FTEs and contractors, while academic research hospitals in the data set have between 25 percent to 100 percent more FTEs and contractors onsite than non-academic hospitals. Research activities often produce significant quantities of waste—including regulated medical waste and hazardous waste. Students, residents and contracted employees may have less training in waste minimization techniques and proper waste segregation than other clinical employees which may also influence total waste numbers. The median total waste per OR annually for academic hospitals is 125 tons for those with research facilities and 87 tons per OR annually for academic hospitals without research, compared to a median of 72 tons per OR annually for non-academic hospitals. Other normalizers (total waste per patient day, adjusted patient day and staffed bed) mimicked this trend. Figure 12.2 indicates the median percent of recycling, RMW, solid waste, and hazardous waste being generated at academic hospitals with and without research compared to non-academic hospitals.

Academic hospitals recycle a smaller proportion of their total waste compared to non-academic hospitals—again, possibly due to less training of medical students, residents and contracted staff. The median proportion of total waste being recycled for academic hospitals is 26.6 percent, and for non-academic hospitals is 30.2 percent. Like their non-academic counterparts, academic hospitals are finding ways to implement successful recycling programs for a number of different waste streams including cardboard, mixed paper, mixed plastics, mixed metals, food waste, fluorescent lamps, batteries, and inkjet and toner cartridges.

Academic hospitals produce a slightly higher proportion of hazardous waste than non-academic hospitals. The median percent of hazardous waste generated out of total waste is 0.46 percent for academic hospitals—over sixty percent higher than the 0.28 percent for non-academic hospitals. Academic research hospitals came in at 0.49 percent hazardous waste—likely a reflection of the hazardous nature of certain lab chemicals, solvents and fixatives used in research facilities. Regulated medical waste (RMW) was about the same for non-academic and academic hospitals without research facilities (median 6.4 and 6.5 percent respectively), but is 7.2 percent of total waste for academic hospitals doing research. This may be due in part to less training of research staff on RMW segregation and minimization techniques, but is also likely due to lab animal waste which would typically be disposed of as RMW.

Figure 12.2: Waste Types

Percent of waste types at academic hospitals with research and without research compared to non-academic hospitals.

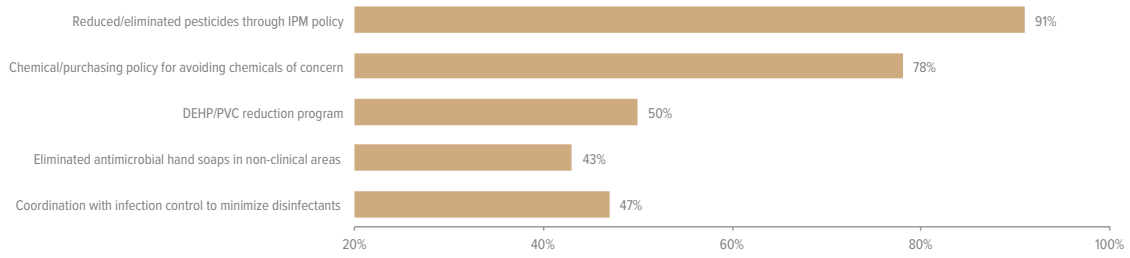


Chemicals

Academic hospitals in 2015 spent a median 39 percent of their total cleaning chemical budget on green cleaning products, which is quite low compared with the 60 percent being achieved by non-academic hospitals. Interestingly, academic hospitals with no onsite research had the lowest reported rates of green cleaning spend, at just 25 percent. In future years, trend data will hopefully help establish if this is a meaningful difference or an aberration. Of the academic hospitals who reported spend on furniture and furnishings, academic hospitals spent 59 percent on furnishings and furniture that eliminate target chemicals of concern—slightly higher than their non-academic counterparts at 52 percent. Academic hospitals are also purchasing flame retardant-free furniture (where codes permit), requiring furniture to meet an environmental standard/certification or obtain LEED HC credit, or refurbishing or re-upholstering furniture for reuse at slightly higher rates than non-academic hospitals. Ninety-four percent of academic hospitals are also purchasing paints, adhesives and sealants that have low- or no- volatile organic compounds (VOCs). A research and student focus can often mean hospitals keep up better on the latest peer-reviewed literature and may have more up-to-date familiarity with recent science on chemicals of concern in health care products, supporting this slight advantage. Academic hospitals have also found additional ways to minimize harmful chemicals such as eliminating antimicrobial hand soaps in non-clinical areas, or developing a DEHP/PVC reduction program (Figure 12.3).

Figure 12.3: Chemical Minimization

Percent of academic hospitals engaged in common chemical minimization techniques.

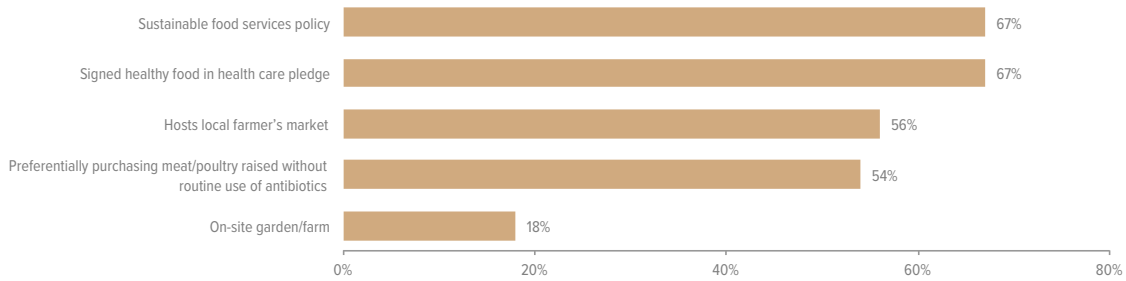


Food

With so many additional students and other staff working in academic hospitals, food can have a big impact on the overall environmental footprint of an academic facility. That said, academic and non-academic hospitals have made similar progress on most of the sustainable food metrics. Driven by both university policy and student interest, academic hospitals are purchasing sustainable food with a median 15 percent of food spending on local and/or sustainable options. Cost, contracts, and an inability to obtain the data were common barriers to broader adoption of local and sustainable food spending. Healthier beverage options are also a priority, with a median 58 percent spend on healthier beverage options such as tap water, flavored waters, and beverages with less sugar.[1] Both academic and non-academic hospitals are working to transform their beverage environments using strategies like creating healthy vending criteria, reducing advertising of unhealthy beverages, increasing access and signage for public drinking water on hospital grounds, and shifting pricing structures to encourage healthy beverage choices. Non-academic hospitals had a slight edge at pursuing meat reduction at a median 20 percent reduction versus a median eight percent reduction for academic hospitals. This may well be an indicator of academic hospitals getting out in front on offering more vegetable and non-meat proteins, as academic hospitals had similar rates of meat consumption (0.1 median pounds per meal). Academic hospitals were on par with non-academic hospitals on other food programs including purchase of meat /poultry raised without the routine use of antibiotics (32 percent) and pounds of compost per meal served (0.1 median pounds per meal) (Figure 12.4). There was virtually no difference between academic research hospitals and academic hospitals with no onsite research for this sustainability program area.

Figure 12.4: Healthy Food Initiatives

Percent of academic hospitals supporting common healthy food initiatives.



1 Healthy Beverages include: Water (filtered tap, unsweetened, 100 percent fruit-infused, seltzer or flavored); 100 percent fruit juice (optimal 4 oz. serving); 100% vegetable juice (optimal sodium less than 140 mg.); milk (unflavored AND certified organic or rBGH-free); non-dairy milk alternatives (unsweetened); teas and coffee (unsweetened with only naturally occurring caffeine).

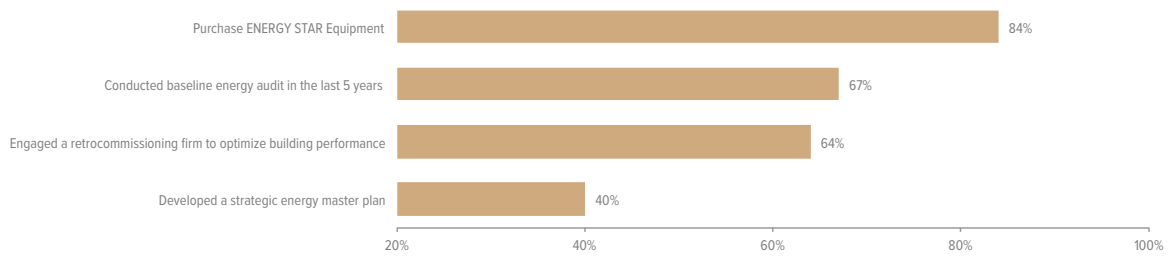
Energy and Climate

Measuring energy use intensity (EUI) (kBtus per square foot) is a valuable way for hospitals to benchmark against other similarly-typed peers, since it normalizes the usage across total square footage. The median EUI score is higher for academic hospitals compared to non-academic hospitals, 242 versus 223 kBtus per square foot respectively. The difference is even more significant for academic research hospitals, which had a median EUI of 258 kBtus per square foot as compared to academic medical centers with no research facilities (231) or non-academic hospitals (223). This increased energy utilization is likely due to both the presence of higher numbers of operating rooms, as well as the presence of research labs which have high ventilation requirements and use energy-intensive equipment such as fume hoods and testing equipment. Practice Greenhealth is in the midst of exploring the development of new resources to support sustainability in the health care lab setting.

Academic hospitals are on par with non-academic hospitals when it comes to energy reduction, with a median 11 percent reduction in EUI since their baseline year. The median ENERGY STAR score for academic hospitals (51 out of 100) is higher than for non-academic hospitals (42 out of 100).[2] This energy performance advantage is likely related to facility size. Academic medical centers are often larger organizations that have an energy manager role in place which can be a key factor in driving down energy use and achieving higher ENERGY STAR scores. Eighty-two percent of academic hospitals have an energy manager, as compared to 60 percent for non-academic hospitals. Like their non-academic counterparts, academic hospitals are engaging in a set of common energy-saving initiatives. For example, 40 percent are routinely purchasing ENERGY STAR-labeled equipment (Figure 12.5).

Figure 12.5: Energy Saving Initiatives

Percent of academic hospitals engaging in common energy-saving initiatives.



2 For more information on ENERGY STAR score methodology see the website: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/understand-metrics/how-1-100

Forty-seven percent of academic hospitals utilize renewable energy sources. This is much higher than non-academic hospitals, where just 29 percent utilize renewable energy sources. Of those facilities that report using renewable energy sources, non-academic facilities had a slight advantage at a median 5.3 percent renewable energy (offsite and onsite combined), as compared to 4.5 percent for academic hospitals. Because academic hospitals tend to be much larger, however, the total renewable energy usage overall is higher for academic medical centers. Renewable energy purchasing is one of the most effective ways of reducing the climate impact of a hospital.

Academic hospitals are working more aggressively on climate impact than their non-academic counterparts. Sixty-two percent of academic medical centers had signed a climate commitment of some sort as compared to 28 percent of non-academic medical centers. And 28 percent indicated they have performed a greenhouse gas (GHG) emissions audit. In comparison, 18 percent of non-academic hospitals have performed a GHG audit. Climate change is still a revolutionary concept at some smaller medical centers. For academically affiliated hospitals, action on climate change is a more accepted norm and is pushed heavily by the student body and recent graduates.

Water

Academic medical centers are using slightly more water than non-academic hospitals with a median 48 gallons of water per square foot of gross floor area versus a median of 46 gallons per gross square foot at non-academic institutions. Academic research hospitals used the highest volumes of water at a median 50 gallons per square foot. Water use per cleanable square foot was similar, at 53 versus 50 gallons per cleanable square foot for academic versus non-academic. And academic hospitals have a higher median water use per OR than non-academic hospitals, with a median of 3.2 million gallons of water per OR annually versus 2.1 million gallons, respectively. This difference was even more evident for academic hospitals with research facilities, which used 3.8 million gallons per OR compared to 2.7 million for academic hospitals without onsite research. Laboratory processes can often be water-intensive. Submetering laboratory water use in academic research hospitals can be one strategy to identify how much of a facility's water use burden is generated by labs. Three major water use improvement targets in laboratories include cooling of equipment, rinsing, and flow control, according to the Institute for Sustainable Labs (I2SL).

Academic hospitals demonstrate an impressive median of 16 percent reduction in water use (per square foot) since their reported baseline year, approximately the same as non-academic hospitals. Academic hospitals are crafting water reduction plans at higher rates than non-academic facilities 38 percent versus 20 percent), and have conducted water audits at a higher rate than non-academic hospitals as well (30 percent versus 18 percent). Again, the presence of an energy manager may contribute to greater success in the development of strategies for water reduction. The transparency with which many academic hospitals operate is also a factor in driving public goals around major environmental issues areas such as waste, energy and water.

Conclusion

Academic hospitals face different environmental challenges as compared to their non-academic counterparts. These institutions have a unique profile in regards to onsite staffing, facility size and intensity of use. The larger numbers of operating rooms (already established as a dominant source of environmental impact) as well as large areas of research combine to present these hospitals with bigger challenges in some areas than non-academic hospitals.

On the other hand, some areas such as the movement toward purchasing products with safer chemicals, the development of more sustainable food systems and climate mitigation strategies may gain traction more easily in academic environments. Academic hospitals can benefit from using these benchmarks to compare performance of environmental indicators to their peers. This chapter highlights data that may be of particular interest to academic hospitals and will help to inform their strategies and benchmarking activities in the future.

Special thanks to Crystal Saric Fashant of Widespread Green, LLC for her contribution and data analysis for the Long Term Care chapter of the 2016 Sustainability Benchmark Report.

Figure 12.6: Median Sustainability Performance Metrics for Academic Medical Centers

CATEGORY	METRIC	Median Value
	% recycling	26.57
	% RMW	7.19
	RMW lbs per staffed bed/day	2.40
	Total lbs waste/patient day	41.45
	Total tons waste/OR	114
	% spend certified green cleaners	39
	% spend healthy interiors	59
	% of OR kits reviewed	100
	Reprocessing compliance level	60
	% of kits in reusable sterilization containers	60
	% of ORs with HVAC setback	100
	% change in meat use (by weight)	8
	% of spend on healthier beverages	58
	% of spend on local and/or sustainable	15
	% raised without antibiotics	32
	Pounds meat per meal	0.10
	Pounds compost per meal	0.10
	Energy use intensity (EUI)	242
	% change in EUI from baseline year	11
	ENERGY STAR score	51
	% offsite renewable energy	5.30
	% onsite renewable energy	0.20
	Gallons per sq ft	48
	Gallons per cleanable sq ft	53
	% change in water use	16
	Million gallons of water per OR	3.20
	% renewable energy as a percent of total energy portfolio	4.5
	% of construction and demolition debris recycled	79

Conclusions

The health care sector continued to mature in its implementation of environmental sustainability initiatives. Increasingly, the sector is embracing a holistic view of health and sustainability that connects environmental issues to hospitals' priority outcomes, including community health, staff engagement, safety and patient experience. The sector continues to demonstrate that environmental practices are part and parcel to the hospitals' mission to "first, do no harm," as science increasingly links built environment, air quality, and climate conditions to human health and well-being. Leading hospitals are taking a preventative approach to waste and chemicals by reducing, re-using and recycling materials and by using environmentally preferable purchasing techniques, which can have a profound impact up and down the supply chain.

Maturation can be seen in many of the sustainability accomplishments of the hospital sector, yet key challenges remain in transforming the sector so it is no longer a source of public health impact through its operations.

Health care leaders are gaining a better understanding of how sustainability aligns with mission and margin. A growing number of hospitals are making sustainability a business discipline—complete with a strategic plan, accountable leader, staff expectations, performance measurement, and reporting. Yet the majority of health care leaders across the sector have yet to recognize and embrace both the strategic and financial value environmental stewardship can usher in.

Smarter waste management continues to make good business sense, and hospitals in the data set are continuing to innovate and find new ways to reduce waste and divert waste to more environmentally preferable disposal options. Participating hospitals saved more than $2.9 million in 2015 on solid waste recycling alone—diverting more than 77,000 tons of material from the landfill.

What we buy matters. With the substantial spend of health care sector, leadership on smarter purchasing will help drive transformation across the sector. Environmentally preferable purchasing (EPP) is where the emphasis is going to be in health care sustainability over the next few years. EPP can help hospitals prevent waste, avoid chemicals of concern in medical products, furniture/furnishings and building materials, and drive down supply costs through better understanding of the lifecycle cost of product decisions to the organization. While 80 percent of participating hospitals have engaged their supply chain leadership—there is still significant opportunity for growth in uptake.

A focus on the operating room can bring worthwhile savings to hospitals while reducing its environmental footprint. Based on median cost savings from the data set, a hospital with 15 operating rooms that focuses on five core sustainability programs can save more than $370,000 annually—savings too large to overlook with the financial pressures in health care.

By embracing healthier and more sustainable food systems, hospitals can send a message to their employees, patients and community that eating healthier and more sustainable choices can help prevent and manage the risk of chronic disease. Hospitals have an opportunity to leverage the voice of the clinician in driving the market for meat and poultry raised without the routine use of antibiotics. And strengthening ties with local farmers and producers can continue to build economic growth locally while offering healthier options for the more than a million meals most hospitals serve each year.

Hospitals are continuing to make progress on driving down energy use and are moving slowly toward purchasing cleaner, renewable energy sources and greater capacity for onsite energy generation. These choices will not only help support better energy security and emergency preparedness for hospitals, but will also help lower the negative health impacts of energy generation on public health. With a conservative estimate of nearly $23.7 million in cost savings—a median of $75,100 for hospitals reporting efficiency projects—an energy focus is imperative for health care leadership.

Water is going to continue to be an area of growing concern—with slowly rising prices, severe droughts and the impending threat of climate change. Hospitals are beginning to make progress on water reduction with 28 percent reporting water use reduction plans. But hospitals will need to prioritize water reduction work in the short term to realize the long term benefits.

Although hospitals are taking actions to reduce fossil fuel use and invest in renewables, a comprehensive approach to climate change is just beginning to emerge in health care, as evidenced by the fact that only 22 percent have conducted a greenhouse gas emissions audit. At the same time, the news is largely positive, with a strong uptick in hospitals making climate commitments and growing interest in learning about different mitigation strategies. The World Health Organization has labeled climate change as the largest global health threat of the 21st century—and the work continues to help health care organizations begin to operationalize the programs to address climate change.

On the design and construction side, large numbers of hospitals are moving toward using green building standards to construct new and replacement hospitals. Practice Greenhealth award applicants reported 69 building projects certified by the US Green Building Council's LEED standard—covering 14 million square feet. And studies continue to point to demonstrable improvement in indoor air quality, worker health, productivity and reduced absenteeism. Creating a high performance healing environment means going beyond a narrow focus on clinical care to a holistic, healthy building with built in efficiencies that help support employee health, patient health and community health. Dedication to sustainability will help hospitals adapt to changing market and regulatory conditions. Hospitals' sustainability outcomes are helping individual facilities meet key objectives for creating healing environments in a cost-effective way. Sustainability also helps hospitals offer high quality, safer care now and in the future. Practice Greenhealth wishes to thank all of the hospitals and individuals who dedicated their time and energy to the implementation, management and growth of these sustainability programs and looks forward to seeing the progress made in next year's Sustainability Benchmark Report.

Practice Greenhealth wishes to thank IEC for their contributions in the production of Practice Greenhealth 2016 Sustainability Benchmark Report.

Appendix

The appendix offers hospitals a chance to dig into the numerical data that supports the analysis seen across the report. The appendix provides data tables for each of the ten category chapters and provides at-a-glance reference data for both qualitative and quantitative questions from the 2016 Environmental Excellence Awards program.

For quantitative metrics, Practice Greenhealth reports median performance and 90th percentile points across hospitals. Practice Greenhealth also reports performance by hospital size and highlights the performance of the Top 25 and the Circle of Excellence winners for each category.

Medians for these values typically provide a stronger basis for comparisons and benchmarking than averages and standard deviations. Averages and standard deviations can be influenced by outliers or incorrect data and can result in misleading conclusions. Median values provide hospitals the chance to compare their sustainability performance, while the 90th percentile informs hospitals on the long term target to reach for—a data-driven determination of how well hospitals can actually perform on a given metric.

The tables also list the performance of large hospitals and small hospitals across the data set. Hospitals with fewer than 200 beds are grouped in the “small hospitals” data set, and hospitals with more than 200 beds are grouped in the “large hospitals” data set. The report consistently lists the performance of “all hospitals;” which represents a compilation of all hospitals with a valid data point for that particular program or metric, and includes both small and large hospitals. Throughout the report, the “N” (or sample size) for each group varies. This is because the “N” can differ based on the number of hospitals reporting on that metric—not all hospitals respond to every question or provide data for every metric.

Normalizing data is an important step to allow comparisons of performance between hospitals and groups of hospitals, regardless of size or number of patients. Practice Greenhealth normalizes the data to help identify comparable metrics for each category. To normalize data is to determine how different characteristics are affected by other variables. In other words, instead of looking at waste generation by ton, you would look at what variables might impact the amount of waste generated by a facility, and then try to normalize, or standardize, your data by those variables. Practice Greenhealth uses statistical analysis to determine which variables have the greatest impact on characteristics of interest, through the use of multiple regression techniques that reveal which variables correlate the best with each characteristic. The variables that emerge as important influences on each characteristic are called normalizing factors. Practice Greenhealth analyzes each of the following normalization factors for all of the major areas of environmental impact. A list of normalizing factors is available in the Introduction and Methods chapter of this report.

This data is then paired the qualitative data—an analysis of the programmatic actions utilized by best performing hospitals to support improvement in these key metrics. In the tables within the appendix, qualitative data tables represent the percentage of hospitals that responded "Yes" to questions about the implementation of a particular program or action.

The appendix is designed to make available in-depth data tables for those sustainability leaders interested in the more detailed aspects of sustainability performance measurement. Please address any data questions to Lara Sutherland, Director of Performance Analytics for Practice Greenhealth at **lsutherland@practicegreenhealth.org**. General questions on the Sustainability Benchmark Report can be directed to Cecilia DeLoach Lynn, Director of Sector Performance and Recognition at **cdeloach@practicegreenhealth.org**.

Engaged Leadership Data Tables

Sustainability Commitments and Plans	All	Small	Large	Top 25	Circle
The facility established an organizational environmental commitment statement/principles/charter for integrating environmental sustainability that is approved by top leadership	**79%**	75%	83%	96%	90%
The facility conducted a sustainability baseline assessment	**87%**	87%	88%	96%	100%
The facility created a strategic sustainability plan that aligns with other organizational priorities or embeds sustainability objectives or goals within the overall strategic plan	**65%**	65%	66%	92%	100%
The facility participated in the Engaged Leadership Challenge of the Healthier Hospitals program	**37%**	32%	41%	81%	100%

Management and Human Resources for Environmental Stewardship	All	Small	Large	Top 25	Circle
The facility appointed an executive champion to provide administrative support for environmental stewardship	84%	81%	86%	100%	100%
The facility established a green team/sustainability committee (or did it utilize an existing committee) for ownership/oversight of designing, implementing and reporting on environmental sustainability initiatives	94%	91%	96%	100%	100%
The facility identified a clinical champion(s) to lead efforts on clinical engagement and education	58%	56%	62%	100%	100%
The facility added sustainability measures into performance objectives/evaluations for leadership staff	48%	45%	52%	73%	100%
The facility added language to job descriptions on the organization's commitment to the environment and the role that each employee plays	27%	27%	27%	58%	80%
The facility included an overview of organizational sustainability goals in new employee orientation	61%	63%	58%	85%	80%
The facility included questions about sustainability/environmental stewardship program in its employee engagement/satisfaction survey	21%	17%	25%	35%	50%
The facility appointed or hired someone to lead sustainability efforts at the facility level	76%	73%	79%	96%	100%
For the facilities that had appointed someone leading sustainability efforts, that position is:					
Full-time - facility specific	29%	22%	35%	54%	50%
Part time - facility specific	4%	5%	2%	4%	10%
Other duties within existing job assignment	48%	52%	44%	42%	40%
The facility is part of a health system that hired or appointed a sustainability leader to provide support to its affiliates	82%	87%	78%	73%	90%
For facilities part of a health system that hired or appointed a sustainability leader to provide support to its affiliates, that position is:					
Full time - system level	77%	84%	70%	65%	90%
Part time - system level	3%	3%	4%	0%	0%
Other	2%	1%	4%	8%	0%

Budgets and Making the Business Case	All	Small	Large	Top 25	Circle
The facility calculated and delineated a payback period / return on investment (ROI) / internal rate of return (IRR) for sustainability activities that have up-front costs as part of the program development process	**59%**	53%	65%	96%	100%
The facility formulated a sustainability program budget	**61%**	58%	63%	88%	100%
The facility developed a green revolving fund	**31%**	29%	33%	46%	50%

Communications, Reporting and Engagement	All	Small	Large	Top 25	Circle
The facility implemented a sustainability reporting structure (e.g., making certain positions accountable for reporting sustainability progress up the organizational hierarchy)	**81%**	77%	85%	100%	100%
The facility implemented annual sustainability reporting to the board of directors/trustees	**71%**	68%	74%	92%	100%
The facility reported sustainability initiatives within its community benefit report to the IRS (for non-profit organizations) through IRS Schedule H, Form 990	**39%**	35%	43%	69%	80%
The facility wrote a publicly available annual report that details environmental stewardship accomplishments	**58%**	56%	61%	88%	100%
The facility developed a 'Leadership Walks, Talks and Envisions' statement for a C-level executive within its organization	**30%**	25%	35%	38%	60%
The facility communicated sustainability goals and progress from the leadership team to the staff at least annually	**71%**	63%	80%	100%	100%
The facility developed education and communication strategies to convey the organization's sustainability initiatives	**80%**	78%	80%	100%	100%
The facility displayed visuals to patients (such as segregation signage, posters, lanyards, etc.) describing organization's environmental commitment	**71%**	70%	72%	100%	100%
The facility educated the community on environmental topics (e.g., provide information on proper medication disposal when issuing prescriptions or link human health to global warming)	**66%**	65%	67%	100%	100%
The facility included sustainability components in local or national marketing or educational campaigns	**49%**	48%	50%	73%	80%
The facility shared its environmental sustainability successes in a media story	**64%**	64%	64%	96%	100%
The facility featured a sustainability topic connecting health and the environment in at least one grand rounds event this year	**24%**	20%	27%	50%	70%
The facility presented publicly on the organization's sustainability efforts in 2015	**62%**	58%	64%	96%	100%
The facility provided mentoring to other hospitals either within the health system or externally	**68%**	65%	71%	100%	100%
The facility worked with city government or local organizations to promote sustainability locally or plan local events (like Clean Air days, drug or electronics take-back event, etc.)	**68%**	67%	69%	100%	100%

For the 256 facilities that developed education and communication strategies, the following strategies were identified:	All	Small	Large	Top 25	Circle
Internal web page for staff	**78%**	77%	80%	96%	100%
Public web page	**48%**	44%	52%	77%	80%
E-learning modules	**37%**	34%	38%	81%	90%
Newsletter	**55%**	50%	58%	88%	100%
Poster campaign	**56%**	56%	56%	77%	80%
Other	**41%**	40%	42%	77%	70%

For the 161 facilities that wrote a publicly available annual report detailing environmental stewardship accomplishments, the following types of reports were produced:	All	Small	Large	Top 25	Circle
Annual sustainability report	**34%**	30%	37%	52%	60%
Annual sustainability report using GRI framework	**12%**	13%	12%	9%	10%
Annual report that specifically highlights environmental stewardship	**41%**	44%	38%	52%	30%
Community benefit report that specifically highlights environmental stewardship	**45%**	44%	45%	61%	70%
Other report highlighting environmental stewardship	**31%**	36%	26%	39%	30%

Less Waste Data Tables

Waste Types - Tons

Median Tons of Waste by Type as a Percent of Total Waste - All Facilities Reporting	All	Small	Large	Top 25	Circle	90th Percentile
Solid waste	**63%**	64%	62%	59%	53%	74%
Recycling	**28%**	27%	30%	32%	41%	46%
Regulated medical waste	**7%**	7%	7%	6%	5%	13%
Hazardous waste	**0%**	0%	0%	1%	1%	1%

Median Tons of Waste by Type as a Percent of Total Waste - Facilities treating RMW OFFSITE (N=191)	All	Small	Large	Top.25	Circle	90th percentile
Solid waste	**63%**	64%	62%	55%	52%	74%
Recycling	**29%**	27%	30%	38%	41%	46%
Regulated medical waste	**7%**	7%	7%	6%	5%	13%
Hazardous waste	**0%**	0%	0%	1%	1%	1%

Median Tons of Waste by Type as a Percent of Total Waste - Facilities Treating RMW ONSITE (N=36)	All	Small	Large	Top 25	Circle	90th percentile
Solid waste	**63%**	63%	63%	60%	53%	78%
Recycling	**27%**	26%	28%	31%	40%	46%
Regulated medical waste	**7%**	7%	8%	6%	5%	13%
Hazardous waste	**0%**	0%	0%	1%	2%	2%

Waste Types - Costs

Median Cost of Waste Generation by Type as a Percent of Total Waste - All Facilities Reporting	All	Small	Large	Top 25	Circle	90th Percentile
Solid waste	**28%**	27%	28%	25%	26%	48%
Recycling	**13%**	13%	13%	15%	17%	30%
Regulated medical waste	**42%**	41%	44%	22%	19%	67%
Hazardous waste	**12%**	14%	10%	18%	16%	34%

Median Cost of Waste Generation by Type as a Percent of Total Waste - Facilities treating RMW Offsite	All	Small	Large	Top 25	Circle	90th Percentile
Solid waste	**27%**	24%	28%	20%	21%	47%
Recycling	**13%**	13%	13%	16%	17%	29%
Regulated medical waste	**44%**	43%	45%	21%	19%	69%
Hazardous waste	**12%**	13%	10%	23%	16%	34%

Median Cost of Waste Generation by Type as a Percent of Total Waste- Facilities treating RMW Onsite	All	Small	Large	Top 25	Circle	90th Percentile
Solid waste	**34%**	35%	34%	30%	34%	60%
Recycling	**15%**	15%	16%	7%	24%	35%
Regulated medical waste	**29%**	20%	42%	31%	19%	64%
Hazardous waste	**10%**	17%	6%	17%	23%	41%

Total Waste	All	Small	Large	Top 25	Circle	90th Percentile
Median total waste - Cost per ton	**$180.52**	$165.11	$205.69	$195.54	$277.61	$326.41

Solid Waste

Solid Waste Tons and Cost	All	Small	Large	Top 25	Circle	90th Percentile
Percent solid waste of total waste (tons)	**63%**	64%	62%	59%	53%	74%
Percent solid waste cost to total waste (cost)	**28%**	27%	28%	25%	26%	48%
Median cost per ton	**$102.52**	$95.00	$104.05	$95.92	$106.20	$237.55

Solid Waste Reduction and Prevention	All	Small	Large	Top 25	Circle
The facility developed an internal reuse program or strategy for office supplies, clinical products and equipment, and furniture before making these materials available for external donation	**88%**	87%	90%	96%	100%
The facility implemented a paper reduction program	**82%**	81%	83%	100%	100%
The facility developed an equipment and supplies donation program (domestic or abroad) for materials, equipment and furniture that can no longer be used internally	**87%**	85%	88%	85%	100%
The facility required the use of reusable totes for other product areas beyond med/surg, such as food, office supplies, etc.	**28%**	26%	30%	58%	90%
The facility participated in or require through contracting a product take-back program for any products after use	**56%**	50%	62%	85%	100%
Of the 239 facilities that developed a donation program, facilities that ensured all donated medical supplies, equipment and electronics are actually needed, such as working with an organization that ensures the needs of developing countries are met with the donated items	**79%**	78%	82%	86%	100%

Facility Disposal of Regular Solid Waste (non-pharmaceutical)	All	Small	Large	Top 25	Circle
Landfill	**73%**	78%	69%	81%	70%
Municipal waste incinerator	**2%**	3%	2%	0%	0%
Waste-to-energy incinerator	**9%**	4%	14%	19%	30%

Recycling

Recycling Tons and Cost	All	Small	Large	Top 25	Circle	90th Percentile
Percent recycling tons to total waste (tons)	**28%**	27%	30%	32%	41%	46%
Percent recycling cost to total waste cost (cost only, no revenue)	**13%**	13%	13%	15%	17%	30%
Median recycling cost per ton (cost only)	**$87.49**	$69.21	$103.28	$95.96	$146.90	$226.01
Median recycling cost per ton (revenue only)	**$(36.48)**	$(38.58)	$(27.59)	$(33.59)	$(317.87)	$(4.79)
Median recycling cost per ton (cost and revenue)	**$67.21**	$60.40	$84.10	$60.99	$136.17	$205.34

Recycling Actions	All	Small	Large	Top 25	Circle
The facility recycled clinical/medical plastics in the operating room	**73%**	72%	74%	96%	100%
The facility established a contract with a certified electronics waste/recycling vendor that is certified to e-Stewards (or subcontractors that use e-Stewards certified vendors) for legal and environmentally responsible electronics (or e-waste) management and recycling.	**61%**	59%	64%	85%	100%
The facility recycled batteries	**93%**	91%	94%	100%	100%

Trends in Recycling of Medical Plastics	All	Small	Large	Top 25	Circle
The facility recycled clinical/medical plastics in the operating room	**73%**	73%	74%	96%	100%
The facility recycled clinical/medical plastics	**82%**	77%	89%	96%	100%
The facility recycled clinical plastics in the OR	**73%**	70%	83%	96%	100%
The facility recycled clinical/medical plastics	**81%**	82%	82%	100%	100%

Regulated Medical Waste (RMW)

Regulated Medical Waste Tons and Costs	All	Small	Large	Top 25	Circle	90th Percentile
RMW as a percent of total waste (tons)	**7%**	7%	7%	6%	5%	13%
RMW as a percent of total waste (cost)	**42%**	41%	44%	22%	19%	67%
RMW as a percent of total waste (cost - onsite treatment)	**29%**	20%	42%	31%	19%	64%
RMW as a percent of total waste (cost - offsite treatment)	**44%**	43%	45%	21%	19%	69%
Median cost per ton	**$1,142**	$1,084	$1,225	$1,323	$1,602	$2,682
Median cost per ton (onsite treatment)	**$956**	$776	$1,114	$1,607	$1,225	$1,867
Median cost per ton (offsite treatment)	**$1,198**	$1,091	$1,380	$1,249	$2,164	$3,216

RMW Reduction Strategies	All	Small	Large	Top 25	Circle
The facility disinfected/treated RMW using onsite technology	**13%**	9%	17%	27%	30%
The facility eliminated the standard use of red bag waste (RMW) containers in regular patient rooms	**66%**	67%	64%	96%	90%
The facility implemented a reusable sharps container program	**72%**	65%	78%	88%	90%
The facility implemented a single-use device (SUD) reprocessing program with an FDA-approved third party reprocessor	**65%**	61%	67%	85%	100%
The facility incinerated a portion of its regulated medical waste (RMW)	**57%**	52%	61%	73%	90%
Of the 183 facilities that incinerated a portion of RMW, the following medical waste streams are incinerated:					
General RMW	**25%**	24%	25%	21%	11%
Path/chemo	**84%**	82%	86%	100%	100%
Sharps	**22%**	28%	17%	26%	11%
Non-RCRA pharmaceuticals	**41%**	41%	40%	42%	44%
Other	**5%**	6%	3%	0%	0%

Hazardous Waste

Hazardous Waste	All	Small	Large	Top 25	Circle	90th percentile
Median percent hazardous waste to total waste (tons)	**0.4%**	0.4%	0.4%	0.7%	0.8%	1.4%
Median percent hazardous waste to total waste (cost)	**12%**	14%	10%	18%	16%	34%
Median hazardous waste disposal - cost per ton	**$4,245**	$4,028	$4,534	$3,849	$3,661	$14,146

Hazardous Waste Reduction	All	Small	Large	Top.25	Circle
The facility had an onsite laboratory	**83%**	82%	83%	96%	90%
Of the 266 facilities that had an onsite laboratory, percent of facilities that did work to green its laboratory	**53%**	43%	61%	92%	100%

Solvent Distillation	All	Small	Large	Top 25	Circle
Total gallons distilled annually - sum of all reporting	**128,095**	41,773	86,322	103,439	26,635
Annual savings from avoided virgin solvent purchase - sum of all reporting	**$539,363**	$360,015	$179,348	$163,995	$70,739
Annual savings from reduced disposal costs - sum of all reporting	**$203,321**	$134,859	$68,462	$35,510	$60,080
Total savings from solvent reprocessing - sum of all reporting	**$742,684**	$494,874	$247,810	$199,505	$130,819

Pharmaceutical Waste

Pharmaceutical Waste and Costs	All	Small	Large	Top 25	Circle	90th percentile
Total pounds of pharmaceutical waste - per patient day	**21%**	21%	20%	29%	41%	92%
Total pounds of pharmaceutical waste - per adjusted patient day	**10%**	10%	9%	15%	20%	52%
Total pounds of pharmaceutical waste - per staffed bed/day	**12%**	13%	11%	20%	29%	60%
Pharmaceutical waste cost per ton - for total RCRA and non-RCRA waste (including MSW and RMW)	**$4,087**	$4,146	$4,000	$3,879	$3,529	$20,833

Normalized Metrics

Normalized Total Waste - Tons	All	Small	Large	Top 25	Circle
Total waste tons per square foot	**0.0016**	0.0016	0.0014	0.0016	0.0016
Total waste tons per full-time equivalent (FTE)	**0.69**	0.71	0.67	0.66	0.56
Total waste tons per FTE and contractors	**0.62**	0.62	0.62	0.55	0.38
Total waste tons per adjusted patient day (APD)	**0.01**	0.01	0.01	0.01	0.01
Total waste tons per patient day (PD)	**0.02**	0.02	0.02	0.02	0.02
Total waste tons per staffed bed	**5.17**	5.21	5.16	5.93	6.01
Total waste tons per licensed bed	**4.53**	4.56	4.47	4.96	5.01
Total waste tons per operating room (OR)	**90.35**	93.33	89.60	99.06	104.74
Total waste tons per OR procedure	**0.13**	0.14	0.13	0.15	0.15
Total waste tons per Case Mix Index	**801.99**	790.92	805.03	1271.46	1195.81

Normalized Recycling Metrics - Tons	All	Small	Large	Top 25	Circle
Total recycling tons per square foot	**0.6951**	0.0004	0.0004	0.0004	0.0005
Total recycling tons per full-time equivalent (FTE)	**0.71**	0.18	0.17	0.18	0.18
Total recycling tons per FTE and contractors	**0.73**	0.16	0.16	0.17	0.16
Total recycling tons per adjusted patient day (APD)	**0.54**	0.00	0.00	0.00	0.00
Total recycling tons per patient day (PD)	**0.50**	0.01	0.01	0.01	0.01
Total recycling tons per staffed bed	**0.54**	1.45	1.42	1.46	1.88
Total recycling tons per licensed bed	**0.57**	1.21	1.24	1.13	1.78
Total recycling tons per operating room (OR)	**0.60**	23.67	22.57	23.74	31.91
Total recycling tons per OR procedure	**0.48**	0.04	0.04	0.04	0.05
Total recycling tons per Case Mix Index	**0.08**	209.98	214.85	205.11	414.80

Normalized Regulated Medical Waste - Tons	All	Small	Large	Top 25	Circle
Total RMW tons per square foot	**0.0001**	0.0001	0.0001	0.0001	0.0001
Total RMW tons per full-time equivalent (FTE)	**0.04**	0.05	0.04	0.04	0.03
Total RMW tons per FTE and contractors	**0.04**	0.04	0.04	0.03	0.02
Total RMW tons per adjusted patient day (APD)	**0.00**	0.00	0.00	0.00	0.00
Total RMW tons per patient day (PD)	**0.00**	0.00	0.00	0.00	0.00
Total RMW tons per staffed bed	**0.36**	0.36	0.36	0.37	0.28
Total RMW tons per licensed bed	**0.30**	0.30	0.30	0.32	0.24
Total RMW tons per operating room (OR)	**5.80**	5.76	5.80	6.08	4.63
Total RMW tons per OR procedure	**0.01**	0.01	0.01	0.01	0.01
Total RMW tons per Case Mix Index	**51.67**	53.72	48.32	65.86	48.46
Total RMW pounds per staffed bed/day	**1.96**	1.98	1.96	2.05	1.53

Normalized Tons of Hazardous Waste - Tons	All	Small	Large	Top 25	Circle
Total haz waste tons per square foot	**0.00001**	0.00001	0.00000	0.00001	0.00001
Total haz waste tons per full-time equivalent (FTE)	**0.00227**	0.00222	0.00266	0.00447	0.00514
Total haz waste tons per FTE and contractors	**0.00214**	0.00210	0.00216	0.00394	0.00386
Total haz waste tons per adjusted patient day (APD)	**0.00004**	0.00004	0.00004	0.00011	0.00012
Total haz waste tons per patient day (PD)	**0.00009**	0.00008	0.00009	0.00018	0.00015
Total haz waste tons per staffed bed	**0.01984**	0.01745	0.02118	0.05422	0.05663
Total haz waste tons per licensed bed	**0.01625**	0.01593	0.01696	0.04583	0.05366
Total haz waste tons per operating room (OR)	**0.33000**	0.33000	0.33374	0.97056	0.84876
Total haz waste tons per OR procedure	**0.00054**	0.00053	0.00057	0.00166	0.00126
Total haz waste tons per Case Mix Index	**2.53684**	2.52416	2.53684	11.27469	10.08148

Normalized Pharmaceutical Waste - Tons	All	Small	Large	Top 25	Circle
Total pharm waste tons per square foot	**0.00001**	0.00001	0.00001	0.00001	0.00002
Total pharm waste tons per full-time equivalent (FTE)	**0.00322**	0.00354	0.00240	0.00435	0.00553
Total pharm waste tons per FTE and contractors	**0.00304**	0.00322	0.00235	0.00421	0.00479
Total pharm waste tons per adjusted patient day (APD)	**0.00005**	0.00005	0.00005	0.00008	0.00010
Total pharm waste tons per patient day (PD)	**0.00010**	0.00011	0.00010	0.00014	0.00020
Total pharm waste tons per staffed bed	**0.02220**	0.02288	0.01946	0.03704	0.05344
Total pharm waste tons per licensed bed	**0.01758**	0.01898	0.01434	0.03564	0.04818
Total pharm waste tons per operating room (OR)	**0.35929**	0.35929	0.35910	0.68233	0.82609
Total pharm waste tons per OR procedure	**0.00056**	0.00056	0.00055	0.00123	0.00131
Total pharm waste tons per Case Mix Index	**2.75532**	2.56774	2.77110	7.56218	6.84589

Safer Chemicals Data Tables

Chemical Policies	All	Small	Large	Top 25	Circle
The facility contracted for, or performed internally, a hazardous chemical/material audit by hospital department and update at least annually	**85%**	85%	85%	100%	100%
The facility have chemical or purchasing policies that identify and avoid specific chemicals of concern contained in products that may be hazardous to human health and the environment	**78%**	78%	77%	96%	90%
The facility developed a fragrance-free policy for staff	**53%**	55%	50%	65%	70%

Green Cleaning	All	Small	Large	Top 25	Circle
The facility conducted an inventory of all products used at the facility for cleaning and disinfection of surfaces	**79%**	78%	80%	100%	100%
The facility, in collaboration with the Infection Prevention & Control Committee, instituted a policy and/or implementation plan that addresses environmentally preferable cleaning and addresses cleaning/ disinfection of major surfaces (as outlined in the Green Seal Certification Checklist, Standard GS-42)	**47%**	45%	49%	69%	90%
The facility inventoried its use of antimicrobial hand soaps	**66%**	61%	70%	92%	90%
The facility utilized automatic scrubbing machines that use only water for floor cleaning	**74%**	71%	77%	92%	90%
The facility utilized microfiber mops and cleaning cloths as a mechanism to reduce water and chemical use, reduce cross contamination and ergonomic stress	**88%**	87%	90%	100%	100%
The facility eliminated the purchase and use of antimicrobial hand soaps that contain triclosan or triclocarban	**43%**	42%	44%	50%	40%
The facility eliminated the purchase and use of antimicrobial hand soaps in non-clinical areas	**39%**	37%	42%	46%	50%
The facility utilized ultraviolet germicidal irradiation (UVGI) technology for surface disinfection in any area of the organization	**34%**	26%	42%	54%	60%
The facility utilized Green Seal and/or UL ECOLOGO-certified cleaning products	**79%**	77%	83%	100%	100%
Product types specified by the 219 facilities that utilized the following kinds of certified cleaning products					
General purpose (hard surface) cleaners	**90%**	90%	90%	96%	100%
Window/glass cleaners	**81%**	79%	83%	88%	90%
Carpet and upholstery cleaners	**61%**	60%	62%	77%	60%
Bathroom/restroom cleaner	**76%**	75%	77%	85%	100%
Floor cleaners	**82%**	81%	82%	88%	100%
Floor strippers	**47%**	44%	49%	50%	40%
Floor finishes	**53%**	51%	54%	54%	50%
Laundry soaps/cleaners	**31%**	30%	31%	31%	20%
Liquid and foam hand soap	**53%**	50%	55%	62%	50%
Other	**16%**	14%	17%	12%	10%

Integrated Pest Management (IPM)	All	Small	Large	Top 25	Circle
The facility reduced or eliminated the use of chemical pesticides by implementing an IPM program	**77%**	75%	80%	100%	100%
The facility developed a written IPM plan/policy for the facility that includes attention to both indoor and outdoor (buildings and grounds) pest habitats and issues	**62%**	58%	68%	73%	80%
The facility designated an IPM coordinator to oversee pest management	**68%**	66%	71%	92%	100%

Sterilization and Disinfection	All	Small	Large	Top 25	Circle
The facility eliminated the use of the high-level disinfectant glutaraldehyde and moved to safer alternatives (as defined by the ICRA process involving Infection Prevention & Control and Employee Health)	**75%**	77%	75%	100%	100%
The facility eliminated the use of the sterilant ethylene oxide (EtO) onsite while maintaining compliance with regulatory requirements	**70%**	75%	65%	85%	100%
The facility purchased automatic machine washers/disinfectors to replace manual high-level disinfection to minimize staff exposure to liquid high-level disinfectants	**73%**	73%	73%	88%	70%
The facility utilized medical instrument cleaners that are certified by EPA's Safer Choice Program (formerly Design for the Environment- DfE)	**39%**	38%	42%	50%	40%

DEHP/PVC Reduction	All	Small	Large	Top 25	Circle
The facility established a DEHP/PVC reduction program	**50%**	42%	60%	77%	90%
The facility set a goal or commitment to a DEHP-free NICU (whether or not they claimed earlier to have a NICU)	**31%**	16%	47%	73%	70%
The facility set a goal or commitment to a DEHP-free NICU (out of 105 facilities that claim to have a NICU)	**64%**	50%	69%	100%	100%

Chemicals of concern identified by the 214 facilities with chemical or purchasing policies that identify and avoid specific chemicals of concern.	All	Small	Large	Top 25	Circle
Mercury	**93%**	94%	92%	92%	100%
Lead	**43%**	41%	46%	68%	56%
Persistent, bioaccumulative, and toxic substances (PBTs)	**53%**	49%	58%	52%	67%
Phthalates (DEHP, BBP, DnHP, DIDP, DBP, DINP, and DiBP)	**58%**	57%	60%	60%	78%
Polyvinyl chloride, or PVC	**49%**	45%	53%	68%	78%
Flame retardants, including chlorinated, brominated, and phosphate-based flame retardants	**59%**	54%	64%	56%	78%
Latex	**65%**	65%	65%	88%	89%
CA Proposition 65 listed chemicals (e.g. carcinogens, mutagens, reproductive toxicants)	**29%**	26%	31%	36%	11%
Bisphenol A and its structural analogues	**38%**	32%	45%	56%	67%
Volatile organic compounds (VOCs)	**54%**	50%	58%	64%	78%
Polystyrene	**11%**	8%	13%	28%	0%
Triclocarban	**23%**	19%	27%	24%	11%
Triclosan	**15%**	11%	19%	36%	22%
Perfluorinated compounds	**51%**	50%	52%	72%	100%
Formaldehyde	**47%**	44%	51%	60%	78%
Other prioritized chemical constituents	**12%**	10%	13%	24%	0%
The facility utilized Green Seal and/or UL ECOLOGO-certified cleaning products	**79%**	77%	83%	100%	100%

Alternatives used by the 243 facilities who have eliminated the high-level disinfectant glutaraldehyde.	All	Small	Large	Top 25	Circle
OPA (ASP Cidex OPA, Metrex Metricide OPA)	**79%**	75%	83%	92%	90%
Hydrogen peroxide	**65%**	65%	64%	77%	60%
Other	**13%**	12%	15%	19%	20%

Alternatives used by the 224 facilities who have eliminated ethylene oxide.	All	Small	Large	Top 25	Circle
Steam sterilization	**81%**	80%	83%	95%	90%
Ozone plasma (3M Optreoz with TSO3 Sterizone technology)	**10%**	8%	13%	14%	10%
Low temperature hydrogen peroxide gas plasma (Sterrad)	**71%**	67%	75%	82%	70%
Peracetic acid (Steris 1 or 1E)	**38%**	35%	41%	64%	40%
Other	**4%**	3%	4%	5%	0%

Mercury Elimination	All	Small	Large	Top 25	Circle
Percent of facilities that won the Making Medicine Mercury Free Award (MMMF)	**44%**	39%	48%	73%	80%
Actions taken by the 140 facilities that did not win the Making Medicine Mercury Free Award:					
The facility established a mercury-free purchasing policy (a stand-alone policy or included in a broader policy with other constituents of concern)	**81%**	76%	86%	100%	100%
The facility replaced all clinical thermometers with mercury-free patient thermometers	**94%**	93%	94%	100%	100%
The facility utilized 90% or more mercury-free blood pressure devices (sphygmomanometers) with a goal of total elimination	**93%**	95%	91%	100%	100%
The facility utilized 90% or more mercury-free clinical devices (e.g., bougies, miller-abbott tubes, cantor tubes, dilators) with a goal of total elimination	**85%**	87%	83%	100%	100%
The facility purchased mercury amalgam separators for installation at all dental chairs	**74%**	81%	68%	100%	100%

Healthy Interiors	All	Small	Large	Top 25	Circle
The facility purchased paints, adhesives and sealants that are low or no VOC	**84%**	84%	83%	100%	100%
The facility required furniture to meet an environmental standard/certification or obtain LEED HC credit	**33%**	29%	36%	65%	80%
The facility refurbished or reupholstered furniture for reuse	**59%**	50%	67%	88%	80%
The facility purchased flame retardant-free furniture where code permits	**70%**	70%	69%	88%	100%
The facility worked to achieve the Healthy Interiors Challenge of the Healthier Hospitals program	**30%**	29%	31%	58%	80%

Greening the Operating Room Data Tables

Waste Segregation, Management and Recycling in the OR	All	Small	Large	Top 25	Circle
The facility had a process to divert pre-incision (prior to the case) non-pharmaceutical waste from the regulated medical waste stream into the solid waste stream for non-infectious waste disposal	**77%**	78%	77%	100%	100%
The facility had a process to segregate non-infectious solid waste from the regulated medical waste stream during and after the procedure	**80%**	79%	80%	96%	100%
The facility utilized a fluid management system that empties directly into the sanitary sewer as a means to reduce exposure to blood borne pathogens and reduce waste	**70%**	68%	70%	88%	100%
The facility utilized microfiber mops in the OR as a means to reduce water usage, ergonomic stress, and waste	**74%**	73%	75%	96%	70%
The facility utilized reusable hard cases for sterilization of surgical instrumentation and reduction of disposable sterile wrap	**67%**	66%	69%	92%	100%
The facility recycled clinical/medical plastics in the OR	**68%**	63%	72%	100%	100%
For those 218 facilities that recycled clinical plastics, the percent of facilities that tracked the weight of clinical/medical plastics recycled in the OR	**23%**	21%	23%	27%	40%

Types of Recycled Plastics	All
Irrigation bottles	**83%**
Skin prep solution bottles	**63%**
Trays	**61%**
Overwraps	**56%**
Rigid inserts	**58%**
Blue wrap	**69%**
Tyvek	**32%**
Basins	**61%**
Urinals/bedpans	**24%**
Other	**15%**

Single Use Recycling (SUDs)	All	Small	Large	Top 25	Circle
The facility had implemented a single-use device (SUD) reprocessing program by an FDA-approved third party reprocessor	**65%**	63%	67%	85%	100%

Of the 208 facilities who had a reprocessing program, the department which collected and purchased them	% Collect Reprocessed Devices	% Purchase Reprocessed Devices
OR	**97%**	85%
EP/Cath	**57%**	50%
Patient care	**82%**	69%
Other	**20%**	17%

Kit Reformulation	All	Small	Large	Top 25	Circle
The facility reformulated OR kits	**68%**	65%	72%	100%	100%

Of the 208 facilities who had a reprocessing program, the device category included	% Collect Reprocessed Devices	% Purchase Reprocessed Devices
Non-invasive	**89%**	81%
Invasive	**82%**	71%

Energy Management in the OR	All	Small	Large	Top 25	Circle
Utilize LED surgical lighting	**63%**	59%	68%	96%	100%
Utilize occupancy sensors for lighting to reduce energy consumption when the OR is unoccupied	**19%**	18%	20%	46%	40%
The facility programmed the HVAC system to reduce air changes per hour (HVAC setback) when the ORs are unoccupied to reduce energy consumption	**32%**	29%	35%	58%	80%

For the 102 facilities that programmed HVAC setbacks, the mechanisms used were:	All
Occupancy sensors	**33%**
Mushroom button	**3%**
Scheduling system	**25%**
Building automation system	**55%**
Other	**3%**

Anesthesia Use	All	Small	Large	Top 25	Circle
The facility purchased or did in-house pharmacy prepare pre-filled syringes (not including boxed bristojets) to minimize waste of unneeded pharmaceuticals	**68%**	66%	71%	92%	90%
The facility purchased the smallest pharmaceutical vials possible to minimize pharmaceutical wastage	**79%**	77%	83%	96%	90%
The facility utilized a supplemental waste anesthetic gas capture system to prevent waste anesthetic gases from venting to the outside air	**19%**	17%	21%	19%	20%
The facility removed desflurane from its formulary	**22%**	23%	22%	35%	40%
The facility calculated the carbon footprint of its anesthetic gas emissions	**11%**	4%	18%	50%	60%
The facility provided or held anesthesia staff education on environmental impacts of inhaled anesthetics and reduction strategies for clinicians	**34%**	30%	38%	73%	100%

Volatile Anesthetic Agent used by Reporting Hospitals	Mls (all)	N. All (reporting any volume)
Sevoflurane	**55,986,699**	**147**
Isoflurane	**5,697,852**	**105**
Desflurane	**13,307,090**	**112**

Healthy Food Data Tables

Sustainable Food Policy	All	Small	Large	Top 25	Circle
The facility signed the Healthy Food in Health Care Pledge	**60%**	57%	62%	88%	100%
The facility signed on to the Healthier Hospitals Healthier Beverages Challenge	**47%**	45%	50%	85%	100%
The facility signed on to the Healthier Hospitals Local/Sustainable Food Challenge	**43%**	40%	47%	88%	100%
The facility developed and adopted a sustainable food service policy	**62%**	58%	66%	96%	100%
The facility developed and implemented a comprehensive nutrition policy	**71%**	72%	71%	77%	100%
The facility used community benefit investments to support healthy food access/healthy food systems in your community	**29%**	26%	31%	54%	73%

Local and Sustainable Food Purchasing	All	Small	Large	Top 25	Circle
The facility increased healthy beverage options in at least 3 of the following: cafeteria/retail, patient, vending and catering	**77%**	72%	81%	96%	100%
The facility encouraged their food suppliers (including distributors and GPOs) to improve tracking and traceability of local and sustainable foods in their ordering, invoicing, and reporting systems	**70%**	66%	73%	100%	100%
The facility reduced the amount of meat and poultry purchased for cafeteria/retail and patient service	**55%**	51%	59%	88%	100%
The facility purchased meat and poultry produced without the use of non-therapeutic antibiotics	**54%**	50%	58%	73%	100%
The facility purchased locally and/or sustainably grown and produced foods	**70%**	65%	75%	96%	100%
For the 226 facilities purchasing locally/sustainably grown and produced food, the percentage spend on local/sustainable food	**15%**	15%	15%	18%	22%

Outsourced Food Services	All	Small	Large	Top 25	Circle
The facility outsourced Food Services Department or management	**48%**	48%	49%	42%	18%
The facility developed and implemented a policy, contract and/or RFP language that includes local/sustainable food purchasing and other environmental stewardship goals with food vendors	**62%**	58%	66%	81%	82%

Meat Reduction Outcomes Achieved	All	Small	Large	Top 25	Circle	90th Percentile
Median percent of meat reduction (by weight)	**16%**	20%	15%	18%	19%	38%
Median estimated annual cost savings from reduced meat procurement in 2015	**$21,146**	$14,126	$25,250	$32,561	$33,070	$80,625
Median dollars saved per meal served	**$0.03**	$0.05	$0.02	$0.04	$0.02	$0.16
Median pounds of meat served per meal	**0.1**	0.12	0.1	0.1	0.1	0.07

Healthy Beverages	All	Small	Large	Top 25	Circle
The facility increased healthy beverage options in at least 3 of the following: cafeteria/retail, patient, vending and catering	**77%**	72%	81%	96%	100%
Activities the facility implemented to increase access and promote the use of tap water included:					
Provided and promoted reusable beverage containers	**48%**	46%	49%	85%	82%
Eliminated bottled water from patient menus and cafeteria	**13%**	12%	14%	27%	55%
Installed filtered water stations, 'spa water' and/or installed water bottle filling stations throughout the facility or in cafeterias	**50%**	47%	53%	100%	91%
Provided free 'spa water' or pitchers at functions and meetings instead of bottled water	**46%**	45%	46%	92%	82%
Changed the relative price of healthy vs. unhealthy beverages to make healthy choices more affordable and desirable	**22%**	18%	25%	42%	73%
Other	**10%**	9%	11%	15%	27%
None of these have been implemented	**8%**	11%	5%	0%	0%

Supporting Local Farms and Increasing Healthy Food Access	All	Small	Large	Top 25	Circle
The facility purchased food from local farmers (local defined as less than 250 miles)	**52%**	47%	57%	85%	100%
Of the 167 applicants that purchased food from local farmers, they do so by:					
Food hubs	**24%**	20%	27%	18%	18%
Farm-direct purchasing	**26%**	31%	23%	50%	55%
Farmers cooperatives	**24%**	21%	26%	32%	18%
Other	**56%**	52%	59%	59%	73%

The facility increased access to healthy food by:	All	Small	Large	Top 25	Circle
Hosted local farmers market	**45%**	39%	52%	85%	73%
Hosted onsite community supported agriculture (CSA) food box program for patients, employees and/or community residents	**29%**	30%	28%	58%	91%
Supported onsite hospital farm and/or garden	**22%**	25%	20%	46%	55%
Supported offsite community garden or farm	**12%**	11%	13%	23%	36%
Developed and offed a fruit & vegetable prescription program	**4%**	5%	4%	12%	0%
Used community benefit investments to support healthy food access/healthy food systems in their community.	**29%**	26%	31%	54%	73%
Other	**16%**	15%	18%	23%	55%

Food and Beverage Environments: Education & Promotion	All	Small	Large	Top 25	Circle
The facility included sustainability information (reference eco-labels and foods grown locally/regionally) on menu labeling for meals served in retail or patient service	**49%**	42%	55%	88%	100%
The facility conducted a facility-wide education campaign that improved the visibility of healthy beverages and/or tap water choices	**63%**	53%	73%	100%	100%
The facility used strategies for promotion and placement of healthy and sustainable food options to increase their sales	**70%**	67%	73%	92%	100%
Of the 226 applicants that used strategies for promoting and placing healthy and sustainable food, did so with the following activities:					
Pricing incentives on healthy and sustainable food options	**40%**	34%	44%	63%	91%
Placement of healthier food options	**91%**	87%	95%	96%	100%
Food sampling	**45%**	37%	53%	71%	100%
Other promotions	**28%**	25%	31%	46%	55%

Food Waste Reduction and Recycling	All	Small	Large	Top 25	Circle
The facility had a food waste reduction plan/policy that is being implemented and tracked	**53%**	45%	60%	88%	73%
The facility had a food waste donation policy/plan that is being implemented and tracked	**12%**	10%	15%	35%	45%
The facility purchased reusable food serviceware for cafeteria/retail and patient meals wherever possible	**77%**	80%	73%	96%	100%
The facility recycled cooking oil in a non-single-stream recycling program	**42%**	37%	48%	73%	55%
The facility eliminated polystyrene (Styrofoam) purchase and usage in food service	**36%**	37%	35%	73%	91%
The facility purchased and used recyclable to-go containers	**47%**	43%	50%	88%	100%
Of these 130 facilities that purchased/used recyclable to-go containers:					
The facility offered the option to recycle to-go containers onsite (as part of commingled or other recycling program)	**75%**	75%	75%	91%	100%
The facility purchased certified commercially compostable food serviceware (such as certified by Biodegradable Products Institute (BPI) where single use/disposable items are necessary	**44%**	42%	45%	77%	91%
Of the 142 facilities that purchased compostable food serviceware:					
The facility composted these compostable single-use items	**34%**	33%	33%	60%	90%

Composting	All	Small	Large	Top 25	Circle
The facility had a food waste composting program	**33%**	28%	37%	69%	100%
Of the 106 facilities with a food waste composting program, food waste was taken from:					
Food preparation areas	**99%**	100%	98%	100%	100%
Patient meals	**68%**	66%	68%	78%	64%
Cafeteria/retail	**64%**	59%	67%	94%	82%
Catering	**65%**	66%	63%	78%	73%
Of the 106 facilities with a food waste composting program:					
The facility tracked the weight or volume of compost	**89%**	89%	90%	94%	100%

Pounds of Composted Food Waste, per Meal Served	All	Small	Large	Top 25	Circle	90th Percentile
Median pounds of food waste composted per meal served in 2015	**0.1022**	0.1	0.1043	0.165	0.1943	0.3975

Environmentally Preferable Purchasing Data Tables

Policies and Leadership Engagement	All	Small	Large	Top 25	Circle
The facility engaged supply chain leadership in sustainability activities at the hospital level	**80%**	78%	81%	100%	100%
The facility had senior leadership or C-Suite representative signed Practice Greenhealth's Environmentally Preferable Purchasing (EPP) Pledge	**38%**	33%	43%	69%	100%
The facility had an EPP policy that identifies specific environmental attributes of concern that are being considered when making purchasing decisions	**68%**	68%	69%	96%	100%
The facility purchasing certified commercially compostable food serviceware (such as certified by Biodegradable Products Institute (BPI)) where single-use/disposable items are necessary	**44%**	42%	45%	77%	74%

EPP Attributes Covered by the 219 Facilities with an EPP Policy	All	Small	Large	Top 25	Circle
Avoiding chemicals of concern	**89%**	88%	91%	96%	100%
Energy efficiency	**86%**	85%	86%	92%	100%
Water efficiency	**79%**	79%	78%	76%	89%
Excessive packaging	**61%**	57%	64%	92%	100%
Recycled content of product	**79%**	76%	83%	84%	95%
Recyclability	**69%**	65%	73%	88%	95%
Avoiding chemicals of concern	**89%**	88%	91%	96%	100%
Reusable (vs. single-use) products	**56%**	54%	58%	80%	89%
Waste minimization	**85%**	82%	87%	88%	100%
The product becomes or generates hazardous waste	**55%**	51%	59%	72%	89%
End of life product management (for example, take back)	**68%**	64%	71%	76%	89%
Green building products	**73%**	70%	75%	68%	84%
Other	**23%**	22%	23%	40%	16%

Integrating EPP into Procurement Processes	All	Small	Large	Top 25	Circle
The facility communicated with their GPO regarding support for environmentally preferable products	**77%**	75%	79%	100%	100%
The facility reviewed upcoming contracts (that will expire or be renewed in the next 6 -12 months) to identify EPP opportunities or savings	**67%**	66%	69%	85%	89%
The facility set priorities for purchasing environmentally preferable products	**80%**	77%	84%	100%	100%
The facility had a process to include environmental considerations in the sourcing process (RFI/RFP, value analysis, or through data provided by the GPO)	**76%**	70%	83%	100%	100%
The facility specified in contract templates and other supplier outreach materials the organization's commitment to EPP	**66%**	65%	69%	81%	95%
The facility tracked and reported metrics regarding green spend (what is spent for environmentally preferable products)	**59%**	54%	65%	92%	89%
The facility introduced supply chain staff to the Standardized Environmental Questions for Medical Products	**48%**	44%	50%	88%	95%
The facility purchased white copy paper that contains a minimum of 30% postconsumer recycled content	**57%**	54%	59%	85%	89%

Electronics Purchasing	All	Small	Large	Top 25	Circle
The facility participated in the Greener Electronics Goal of the Healthier Hospitals program	**28%**	29%	28%	58%	89%
The facility purchased EPEAT-registered products	**75%**	74%	78%	96%	100%
For the 208 applicants that purchased EPEAT products, the types of EPEAT products purchased:					
EPEAT-registered computers monitors and laptops	**98%**	98%	98%	100%	100%
EPEAT-registered imaging equipment (copiers, printers, fax, MFD, scanners, digital duplicators, mailing machines)	**87%**	88%	86%	88%	89%
EPEAT-registered televisions	**58%**	52%	63%	68%	74%

EPP Actions	All	Small	Large	Top 25	Circle
The facility implemented a Reusable Sharps Container program	**72%**	65%	78%	88%	95%
The facility increased healthy beverage options in at least 3 of the following: cafeteria/retail, patient, vending and catering.	**77%**	72%	81%	96%	100%
The facility purchased locally and/or sustainably grown and produced foods? Local is defined as grown/raised and processed less than 250 miles from the facility. Sustainable is defined as a product that has an allowed sustainability certification or label claim, and/or meets the definition of local.	**70%**	65%	75%	96%	100%
The facility purchasing certified commercially compostable food serviceware (such as certified by Biodegradable Products Institute (BPI)) where single-use/disposable items are necessary	**44%**	42%	45%	77%	74%
The facility purchased and used recyclable to-go containers	**47%**	43%	50%	88%	79%
The facility generated or purchased renewable energy	**38%**	36%	40%	62%	32%
The facility purchased energy-efficient equipment that is ENERGY STAR labeled	**77%**	74%	82%	100%	100%
The facility purchased US EPA WaterSense-labeled devices and equipment	**30%**	29%	30%	73%	89%
The facility purchased alternative-fueled vehicles for transportation purposes	**38%**	38%	39%	58%	32%
The facility purchased low-emitting and fuel-efficient vehicles for fleet transportation	**33%**	31%	35%	58%	26%
The facility integrated some green/sustainable aspects into master specifications for all new buildings/renovations	**58%**	57%	60%	92%	95%
The facility established a contract with a certified electronics waste/recycling vendor that is certified to e-Stewards (or subcontractors that use e-Stewards certified vendors) for legal and environmentally responsible electronics (or e-waste) management and recycling	**61%**	59%	64%	85%	95%
The facility required its designers, builders and contractors to have experience with LEED or other green building rating systems	**46%**	47%	46%	81%	89%
The facility added language to contract specifications that building contractors will follow LEED or GGHC requirements and provide documentation	**45%**	42%	47%	81%	84%
The facility consciously selected flooring, wall coverings, paints, materials, finishes, furniture or exterior materials that avoid chemicals of concern	**68%**	66%	71%	96%	100%
The facility had chemical or purchasing policies that identify and avoid specific chemicals of concern contained in products that may be hazardous to human health and the environment	**78%**	78%	77%	96%	84%
The facility utilized Green Seal or UL ECOLOGO-certified cleaning products	**79%**	77%	83%	100%	100%
The facility eliminated DEHP and PVC from at least two product lines	**50%**	47%	55%	69%	32%
The facility required furniture to meet an environmental standard/certification or obtain LEED HC credit	**33%**	29%	36%	65%	79%
The facility implemented a single-use device (SUD) reprocessing program by an FDA-approved third party reprocessor	**65%**	63%	67%	85%	100%
The facility purchased reusable surgical items where environmentally and clinically preferable	**66%**	64%	69%	92%	95%
The facility preferentially purchase meat and poultry produced without the use of routine, non-therapeutic antibiotics	**54%**	50%	58%	73%	89%

Leaner Energy Data Tables

Energy Usage	All	Small	Large	Top 25	Circle
The facility generates or purchases renewable energy	**38%**	36%	40%	62%	80%
The facility put a combined heat and power/cogeneration project into place in the last five years	**6%**	7%	6%	4%	20%
The facility has an onsite laundry	**20%**	24%	17%	27%	50%

Energy Program and Performance Metrics	All	Small	Large	Top 25	Circle
The facility used ENERGY STAR Portfolio Manager	**78%**	73%	83%	92%	90%
Of the 250 facilities that used ENERGY STAR Portfolio Manager, percent of facilities that benchmarked your hospital using ENERGY STAR's Portfolio Manager	**86%**	87%	84%	100%	100%

Energy Efficiency Planning and Strategy	All	Small	Large	Top 25	Circle
The facility had a written plan to reduce energy use over time with timelines and goals	**56%**	54%	58%	92%	100%
The facility had a Strategic ENERGY STAR Plan (SEMP)	**36%**	33%	39%	62%	80%
The facility conducted a baseline energy audit for the institution in the past five years	**57%**	55%	58%	85%	90%
The facility engaged a retrocommissioning firm to optimize building performance	**51%**	49%	54%	73%	90%
The facility utilized submeters to better monitor energy efficiency opportunities	**29%**	25%	34%	46%	60%
The facility collaborated with the information technology (IT) department to integrate energy efficiency measures	**52%**	47%	57%	88%	90%
The facility had an onsite data center that requires a constant power load of 75 kW or more	**27%**	20%	35%	42%	30%
The facility purchased energy-efficient equipment that is ENERGY STAR or EPEAT certified (where applicable)	**77%**	74%	82%	100%	100%

Normalized Energy Use	All	Small	Large	Top 25	Circle	90th percentile
Total kBtus used current per square foot (EUI)	**233**	236	227	229	159	147
Total kBtus used current per FTE	**97,734**	102,304	92,786	89,324	94,969	51,118
Total kBtus used current per FTE+contracted employees	**91,660**	97,864	83,933	70,997	94,554	46,018
Total kBtus used current per OR	**11,846,367**	11,156,100	13,375,907	14,163,731	10,833,882	6,371,799
Total kBtus used current per adjusted patient day	**1,483**	1,555	1,432	1,380	1,553	828

For hospitals reporting any efficiency projects:	All	Small	Large	Top 25	Circle	90th percentile
Median percent kBtus saved by hospitals engaging in energy efficiency	**1.1%**	0.8%	1.3%	2.4%	1.8%	7.2%
Median percent change EUI from baseline	**10.8%**	11.2%	9.9%	15.4%	23.8%	27.6%
Median percent change EUI from previous	**5.2%**	5.4%	5.0%	5.0%	4.9%	17.0%
Current year EUI	**233**	240	228	229	159	157

Renewable Energy	All	Small	Large	Top 25	Circle	90th percentile
Median percent of facilites' energy portfolio (energy use) from renewable sources	**4.7%**	4.5%	5.0%	10.4%	12.7%	22.6%
Median percent of onsite renewable energy	**0.8%**	0.4%	3.7%	15.4%	17.6%	30.5%
Median percent of offsite renewable energy	**5.7%**	5.7%	5.7%	9.2%	19.6%	17.4%
Percent of facilities reporting onsite generation	**6.5%**	8.9%	4.3%	11.5%	20.0%	
Percent of facilities reporting offsite generation	**15.2%**	13.9%	16.7%	53.8%	60.0%	

Type of Renewable	# Facilities with Onsite or Offsite Renewables	# Facilities with Onsite	# Facilities with Offsite or RECs
Solar or photovoltaic	39	34	5
Geothermal heating and electric	4	4	1
Low-impact hydro electric	10	3	7
Biomass	6	2	4
Wind	29	1	29
Bio-gas	2	0	2

Less Water Data Tables

Median Water Use	All	Small	Large	Top 25	Circle
Water use intensity (gallons per square foot)	**47**	44	48	44	33
Median cost per gallon	**$0.0059**	$0.0054	$0.0068	$0.0068	$0.0055

Median Annual Water Consumption - Normalized	All	Small	Large	Top 25	Circle	90th percentile
Gallons per cleanable square foot	**51.79**	45.69	57.84	50.36	33.18	23.82
Gallons per gross square foot	**47.18**	43.61	47.68	43.84	33.18	22.23
Gallons per FTE	**19,945.00**	19,439.00	20,432.00	15,677.00	11,962.00	8,229.00
Gallons per (FTE + contracted employees)	**18,607.49**	18,393.40	18,947.16	13,481.42	8,107.44	7,317.46
Gallons per adjusted patient day	**306**	290	310	294	469	127
Million gallons per OR	**2.56**	2.12	2.93	2.41	2.22	1.02

Median Water Use	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7
Water use intensity (gallons per square foot)	43.51	51.71	58.12	50.59	41.34	40.97	52.97
Median cost per gallon	5	21	46	73	89	34	2

Water Planning and Reduction Strategies	All	Small	Large	Top 25	Circle
The facility submetered water	**29%**	27%	31%	65%	80%
The facility had a written plan to reduce water use over time with timelines and goals	**28%**	28%	28%	42%	100%
The facility contracted with a third party to conduct water audits	**24%**	18%	30%	54%	80%
The facility made any efforts to reuse non-potable water	**22%**	19%	25%	50%	60%
The facility utilized US EPA WaterSense criteria during the procurement of water using devices/equipment	**30%**	29%	30%	73%	80%
The facility benchmarked water usage	**43%**	41%	46%	77%	100%

Irrigation Methods	All	Small	Large	Top 25	Circle
The facility used alternative landscaping methods that reduce the need for irrigation	**44%**	43%	45%	73%	90%

Water Reduction	All	Small	Large	Top 25	Circle	90th percentile
Median gallons saved through water reduction projects per square foot	**0.74**	0.94	0.59	0.45	0.99	10.46
Median $ savings from water reduction projects per square foot	**$0.0056**	$0.0086	$0.0029	$0.0026	$0.0128	$0.1411
Median water use reduction (percent reduction compared to baseline using gallons / square foot)	**15%**	19%	14%	22%	38%	40%
Number of facilities (N) for median water use reduction	**113**	57	56	15	9	

Climate and Health Data Tables

Climate Change Commitments	All	Small	Large	Top 25	Circle
The facility has a written plan to address climate change mitigation over time with timelines and goals	**32%**	26%	36%	42%	70%
The facility signed on to a climate challenge or commitment	**43%**	39%	46%	73%	100%
Of the 138 facilities that signed onto a climate challenge or commitment, the following agreements were signed:					
American College & University Presidents' Climate Commitment (ACUPCC)	**3%**	2%	4%	16%	30%
Climate registry	**17%**	15%	20%	5%	10%
Local/state/regional commitment	**33%**	29%	35%	53%	60%
Other	**66%**	71%	62%	68%	60%

Tracking GHG Emissions	All	Small	Large	Top 25	Circle
The organization performed a greenhouse gas (GHG) emissions audit	**22%**	18%	27%	46%	80%
The organization calculated the carbon footprint of its anesthetic gas emissions	**11%**	5%	16%	38%	60%
Percent of hospitals that reported any Scope 1 Emissions	**54%**	53%	55%	88%	90%
Percent of hospitals that reported any Scope 2 Emissions	**54%**	55%	53%	85%	80%
Percent of hospitals that reported any Scope 3 Emissions	**13%**	14%	12%	42%	60%

Mitigation and Adaptation Strategies	All	Small	Large	Top 25	Circle
The facility developed a plan for addressing key health care service delivery needs during and following extreme weather events, such as cold or heat waves, hurricanes, droughts, etc.	**71%**	68%	73%	81%	100%
The facility created a priority action plan to address key building and infrastructure vulnerabilities related to climate change	**52%**	48%	55%	62%	70%

Divestment from Fossil Fuels and Investment in Clean Technology	All	Small	Large	Top 25	Circle
The facility or its parent company divested or sold off fossil fuel holdings	**20%**	19%	22%	15%	40%
The facility or its parent company committed to freezing future investments in fossil fuel companies	**20%**	18%	21%	23%	50%
The facility invested in clean (renewable) energy technology	**28%**	23%	33%	35%	60%

Transportation and Alternative Fuels	All	Small	Large	Top 25	Circle
The facility encouraged or required its suppliers to become an EPA SmartWay Shipper Partner as a means to drive down Scope III GHG emissions from freight transportation	**18%**	15%	23%	50%	60%
The facility purchased low-emitting and fuel-efficient vehicles for fleet transportation	**33%**	31%	35%	58%	80%
The facility purchase alternative-fueled vehicles for transportation purposes	**38%**	38%	39%	58%	90%
Of the 105 facilities that identified alternative fuels, the following fuels were selected:					
Biodiesel B20-B100	**31%**	27%	36%	47%	44%
Electricity	**59%**	56%	62%	73%	67%
E8 ethanol	**36%**	37%	36%	33%	44%
Hydrogen	**0%**	0%	0%	0%	0%
Methanol	**0%**	0%	0%	0%	0%
Natural gas	**16%**	8%	25%	33%	56%
Propane	**10%**	6%	13%	13%	22%
P-Series	**0%**	0%	0%	0%	0%
Other	**16%**	19%	13%	13%	11%

The facility participated in or has the facility implemented:	All	Small	Large	Top 25	Circle
Participated in regional transportation planning	**37%**	32%	41%	77%	100%
Demonstrated reduction in single vehicle car use	**23%**	16%	29%	58%	90%
Provided "vouchers" or subsidies for public transportation	**45%**	36%	53%	69%	90%
Provided preferred parking for carpool participants and low-emission, fuel-efficient vehicles (hybrids, smart cars)	**35%**	28%	42%	65%	90%
Provided bike racks and showering facilities for bike riders	**67%**	66%	68%	96%	100%
Installed electric vehicle charging stations	**28%**	17%	37%	58%	80%
Advocated for or promoted policies or legislation that protect public health from the causes of climate change	**36%**	34%	39%	65%	100%

Renewable Energy	All	Small	Large	Top 25	Circle
The facility generated or purchased renewable energy	**36%**	35%	37%	62%	100%
Of the 116 applicants that purchased renewable energy, median percentage of facilities' energy portfolio from renewable sources	**4.8%**	4.7%	5.0%	10.4%	13.7%

Green Buildings Data Tables

Green Design and Construction	All	Small	Large	Top 25	Circle
The facility designed and built projects over 1000 square foot in the last five years	**57%**	52%	61%	96%	100%
The organization integrated green/sustainable aspects into master specifications for all new buildings/renovations	**58%**	57%	60%	92%	100%
The organization implemented a facility policy or commitment to design and construct all new buildings and/or major renovations to LEED (or another green building) design standard	**55%**	54%	56%	85%	100%
The organization was required to build to a certain minimum LEED standard (certifiable) due to municipal, state, region or federal legislative requirements	**20%**	23%	17%	27%	14%
The organization added language to contract specifications that building contractors will follow LEED or GGHC requirements and provide documentation	**45%**	42%	47%	81%	100%

Innovative Green Building Elements	All	Small	Large	Top 25	Circle
The facility consciously selected flooring, wall coverings, paints, materials, finishes, furniture or exterior materials that avoid chemicals of concern	**68%**	66%	71%	96%	100%
The facility installed a green or living roof or wall	**21%**	15%	28%	58%	86%
The facility created a healing garden for patients, visitors or staff	**56%**	48%	64%	96%	100%
The organization has a food-producing garden onsite	**23%**	23%	23%	46%	29%

Energy and Water-Saving Elements	All	Small	Large	Top 25	Circle
The facility implemented a building and renovation strategy that maximizes daylighting for patients, employees, visitors	**60%**	53%	68%	100%	100%
The facility installed water saving measures that will substantially reduce potable water use or reuse non-potable water	**55%**	56%	55%	92%	100%
The facility integrated design elements that will reduce or reuse process water	**34%**	29%	39%	69%	86%
The facility installed energy systems that exceed ANSI/ASHRAE/IESNA Standard 90.1-2013	**31%**	30%	32%	65%	86%
Percent Improvement Range Of the 85 applicants that indicated that had installed energy systems that exceed ANSI/ASHRAE/IESNA Standard 90.1-2013, the percentage improvement range in the proposed building performance rating when compared with the baseline building performance rating (per Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2013 or LEED for Healthcare EA Credit 12: Optimize Energy Performance)					
<10%	**24%**	22%	25%	12%	0%
10-25%	**35%**	32%	39%	65%	83%
>25%	**26%**	27%	25%	24%	17%

Construction & Demolition Debris	All	Small	Large	Top 25	Circle
The facility recycled construction & demolition debris (C&D)	**67%**	65%	69%	92%	100%
Of the 215 applicants that recycled C&D debris, the percentage of facilities achieving a minimum of 80% recycling rate for C&D waste from renovations and new construction was:	**33%**	32%	34%	67%	86%

2016 Environmental Excellence Awards Top 25 Winners

The Top 25 Environmental Excellence Award is Practice Greenhealth's highest honor for hospitals. Selected from the Greenhealth Partner for Change Awards applications, these 25 hospitals are leading the industry with innovation in sustainability, demonstrating superior programs and illustrating how sustainability is entrenched in their culture. Competition was fierce, with many advanced and innovative programs at member hospitals vying for these 25 spots.

Advocate Christ Medical Center

Advocate Good Samaritan Hospital

Advocate Illinois Masonic Medical Center

Beaumont Hospital, Royal Oak

Bon Secours Richmond Health System - St. Mary's Hospital

Bon Secours St. Francis Eastside

Cleveland Clinic

Cleveland Clinic Marymount Hospital

Dartmouth-Hitchcock Medical Center

Erie Veterans Affairs Medical Center

Gundersen Health System

HackensackUMC

Harborview Medical Center

James E Van Zandt VA Medical Center

Littleton Adventist Hospital

Memorial Sloan Kettering Cancer Center

Metro Health Hospital

Minneapolis VA Health Care System

NorthShore University HealthSystem Evanston Hospital

Seattle Children's Hospital

St. Cloud VA Health Care System

The University of Vermont Medical Center

UCSF Medical Center /
UCSF Benioff Children's Hospital

University of Washington Medical Center

Virginia Mason Seattle Hospital & Medical Center

Yale-New Haven Hospital

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