

GBA 2023 HOSPITAL ENERGY AND WATER BENCHMARKING SURVEY: COMBINED CALENDAR YEAR 2021 AND 2022 DATA

Thank you for participating in Grumman|Butkus Associates' 2023 Hospital Energy and Water Benchmarking Survey (combining 2021 and 2022 data). We are pleased to provide you with the latest information on healthcare facilities' use of these vital resources. The energy-and water-use and cost charts can be viewed online:

- 2023 report charts: https://www.trendsumo-gba.com/survey/report_charts/2023
- Historical charts: https://www.trendsumo-gba.com/survey/historical_charts

WHY DOES THIS MATTER?

The U.S. healthcare sector's energy use is adversely affecting the environment as well as the health of those we intend to serve:

- "Health care facilities consume close to 10% of the total energy used in U.S. commercial buildings and spend more than \$8 billion on energy every year. The health care sector is responsible for 8.5% of U.S. greenhouse gas emissions." (Source: Practice Greenhealth)
- The U.S. healthcare system is responsible for about a quarter of all global healthcare greenhouse gas emissions. Healthcare-related particulate matter (PM_{2.5}) and ozone pollution are estimated to have caused the loss of 133,000 to 188,000 disability-adjusted life years in 2018 (Source: *Health Affairs*, December 2020).
- "The EPA estimates that the U.S. healthcare sector's current annual electricity use of 73 trillion kilowatt-hours (kWh) contributes \$600 million per year to healthcare costs via increased asthma and other respiratory illness" (Source: Chicago Green Health Care Initiative).
- Healthcare buildings constitute only 2% of commercial buildings and 4% of commercial floor space but consume 9% of the major fuels in the U.S. (Source: EIA and CBECS, 2018).

The healthcare industry is under tremendous pressure to reduce operating expenses, including energy costs. A survey by the American Society for Healthcare Engineering showed that energy accounts for more than half the annual budget of a typical hospital facilities director — more than staff, supplies, and outsourced services combined (chart, right).

To help hospital facilities managers in this undertaking, Grumman | Butkus Associates (GBA) initiated its annual survey in 1995, collecting data on energy usage and costs for Midwestern hospitals. Today, healthcare facilities nationwide are invited to participate in the survey by submitting responses to a short list of questions regarding their usage of electricity, natural gas, oil, purchased steam, purchased chilled water, and domestic water/sewer. GBA compiles and analyzes the data **free of charge**, as a service to the industry.

Since its inception, this annual survey has helped hundreds of hospitals benchmark their energy performance against others, in an anonymous format. Participants are provided with graphic comparisons to all hospitals in the survey, as well as numeric comparisons to their own facilities.

With the information provided by a total of 181 hospitals across two years — located in Illinois (80), Wisconsin (33), New Jersey (25), Nevada (16), Michigan (13), and several other states — we have updated our databases for energy and water.

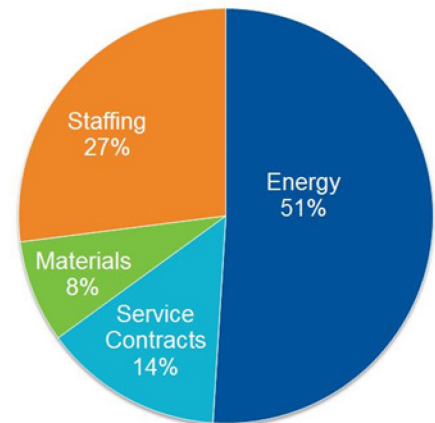
The bar charts provided with this report present the following detailed data for 2021 and 2022:

- Fossil Fuel Energy Consumption in Btu/sf/yr
- Fossil Fuel Energy Cost in \$/sf/yr
- Average Fossil Fuel Energy Cost in \$/therm
- Electric Energy Consumption in Btu/sf/yr
- Electric Energy Cost in \$/sf/yr
- Average Electric Energy Cost in \$/kWh
- Total Energy Consumption in Btu/sf/yr
- Total Energy Cost in \$/sf/yr
- Water and Sewer Usage in Gallons/sf/yr
- Water and Sewer Cost in \$/sf/yr
- Average Water and Sewer Cost in \$/1,000 gallons
- Carbon Footprint in lb/sf/yr

The dedicated website linked at the top of this report, a new feature for the GBA benchmarking survey, allows customized viewing of the data. For instance, pulldown menus let users select facilities with particular characteristics (such as electric heat or in-house laundry) and also lets users choose some aspects of data presentation (for instance, \$/therm vs \$/MMBtu in the fossil fuel energy cost chart).

HOSPITAL FACILITIES BUDGET BREAKDOWN

ASHE Survey, 2014



DATA UNIQUENESS AND VALIDITY

Since GBA began conducting its survey 29 years ago, a few other benchmarking tools have become available for hospitals. Most are familiar with the EPA’s ENERGY STAR benchmarking tool, for instance. GBA’s survey tracks energy costs, water usage and costs, and carbon emissions—data not available from the other benchmarking tools. The comparison table below reveals that our energy survey data tracks well with ENERGY STAR, further validating the accuracy and validity of our findings.

GBA SURVEY VS. ENERGY STAR

PARAMETER	GBA SURVEY (CY2021)	GBA SURVEY (CY2022)	GBA SURVEY (CY2021 & CY2022 COMBINED)	ENERGY STAR REFERENCE DATA (2021)
# of Hospitals	96	84	181	135
Locations	Regional (83% in IL, IN, MI, and WI)	National (36% outside of Lake Michigan)	Regional (75% in IL, IN, MI, and WI)	National
Average Size (sf)	746,490 (mean) 585,151 (median)	632,009 (mean) 462,608 (median)	696,869 (mean) 556,379 (median)	No data
Average Source EUI (kBTU/sf)	396	404	400	434
Average Site EUI (kBTU/sf)	224	226	225	No data
Average Energy Cost (\$/sf)	\$3.16	\$3.76	\$3.46	No data
Average Water Usage (gal/sf)	42	51	45	No data
Average Scope 1 and Scope 2 Emissions (lbs CDE/sf/yr)	40	37	38	No data

SUMMARY AND PARTICIPANT CHARACTERISTICS

The following tables summarize data collected for our report from participants for calendar years 2021 and 2022. Though annual consumption periods may vary for some hospitals, the period surveyed is generally January through December of 2021 and 2022. Summary data was not broken out by state in these tables for states with fewer than five participating organizations.

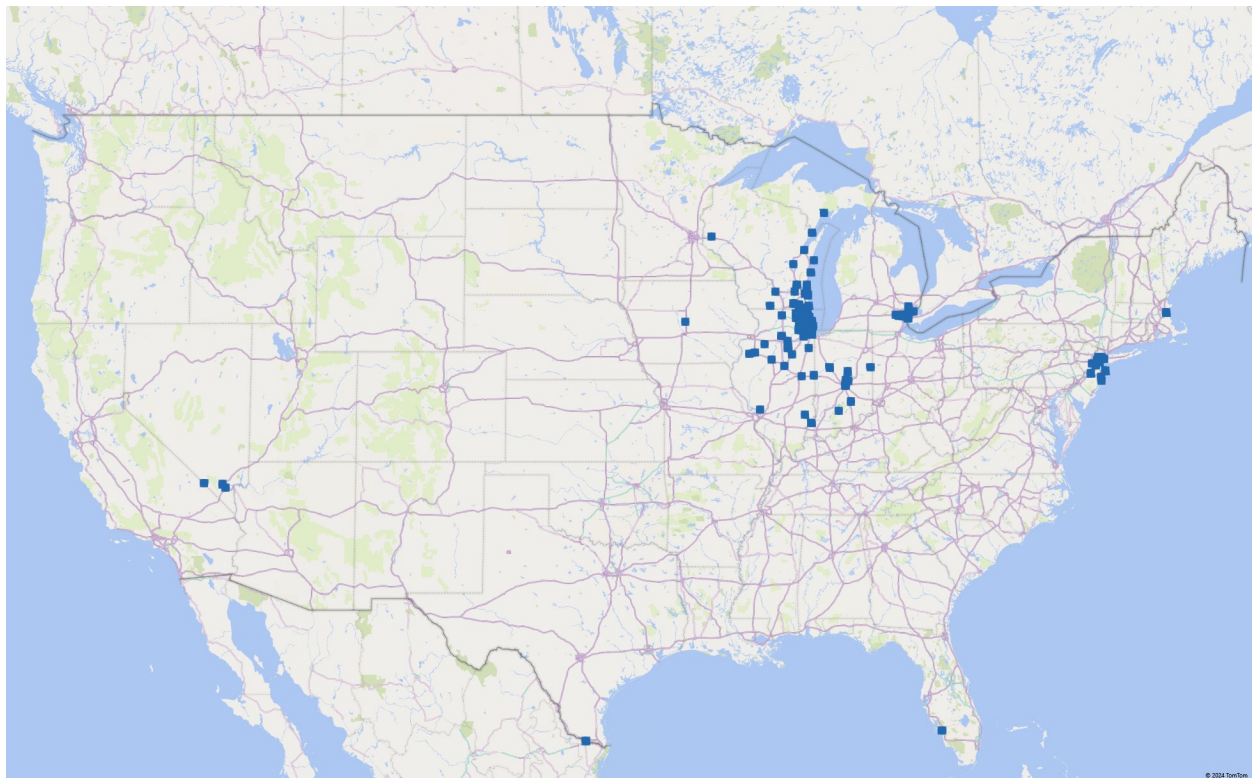
SUMMARY DATA CY2021

STATISTICS	GAS/STEAM		ELECTRIC/CHW		TOTAL	
	BTU/SF	\$/SF	BTU/SF	\$/SF	BTU/SF	\$/SF
Overall (96)	132,065	\$0.75	91,713	\$2.40	223,778	\$3.16
Illinois (51)	145,518	\$0.81	90,495	\$2.22	236,013	\$3.03
Wisconsin (18)	117,814	\$0.56	78,226	\$2.02	196,040	\$2.58
New Jersey (13)	111,106	\$0.64	97,724	\$3.35	208,830	\$3.99
Indiana (8)	115,542	\$0.72	118,989	\$2.91	234,531	\$3.63

SUMMARY DATA CY2022

STATISTICS	GAS/STEAM		ELECTRIC/CHW		TOTAL	
	BTU/SF	\$/SF	BTU/SF	\$/SF	BTU/SF	\$/SF
Overall (84)	129,870	\$0.98	96,211	\$2.78	226,081	\$3.76
Illinois (29)	145,907	\$1.03	88,287	\$2.31	234,194	\$3.33
Nevada (16)	108,980	\$1.21	114,248	\$3.62	223,227	\$4.83
Wisconsin (14)	126,360	\$0.91	81,680	\$2.21	208,040	\$3.12
New Jersey (12)	119,158	\$0.77	99,744	\$3.79	218,903	\$4.56
Michigan (10)	137,785	\$0.94	106,017	\$2.49	243,082	\$3.43

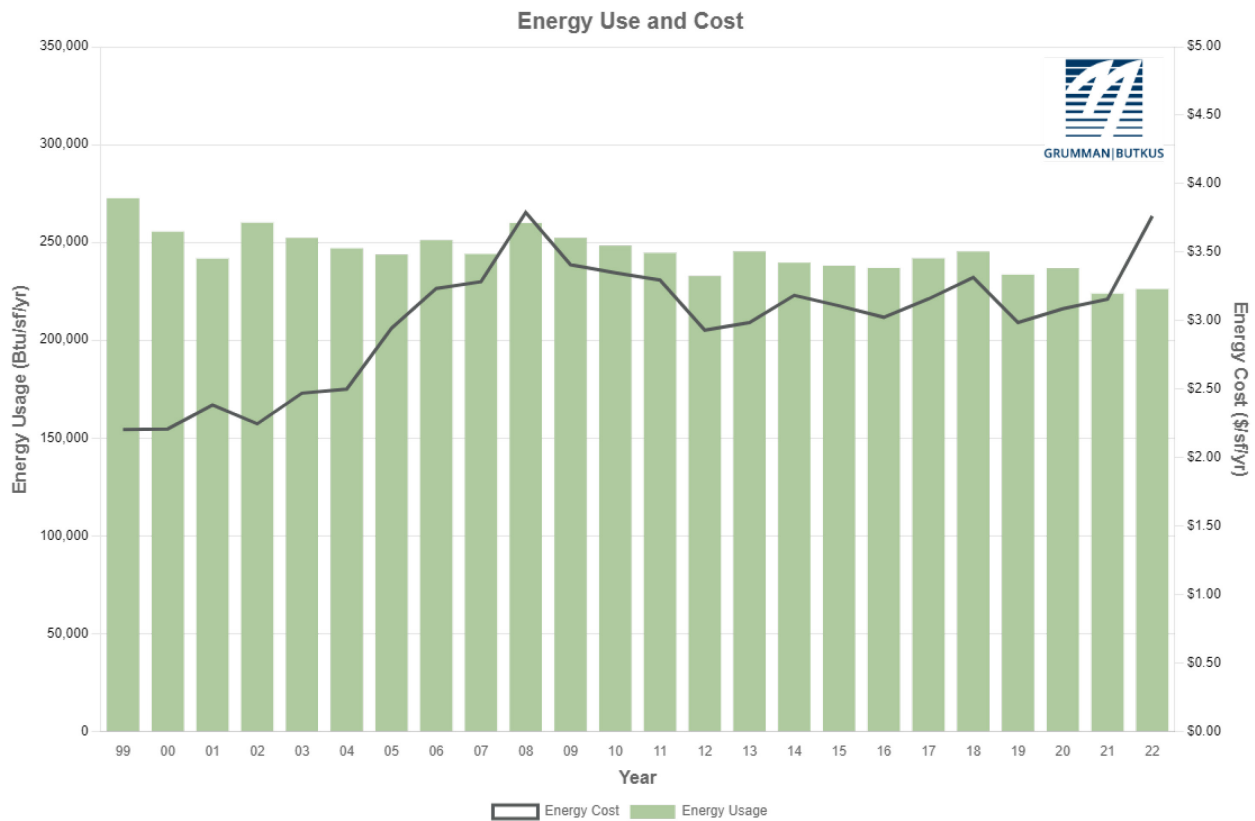
Participants range from the West to the East Coast, with the majority located in the Great Lakes region. Survey participants range in size from smaller community hospitals to large medical centers. The map below shows the location of survey responders by city.



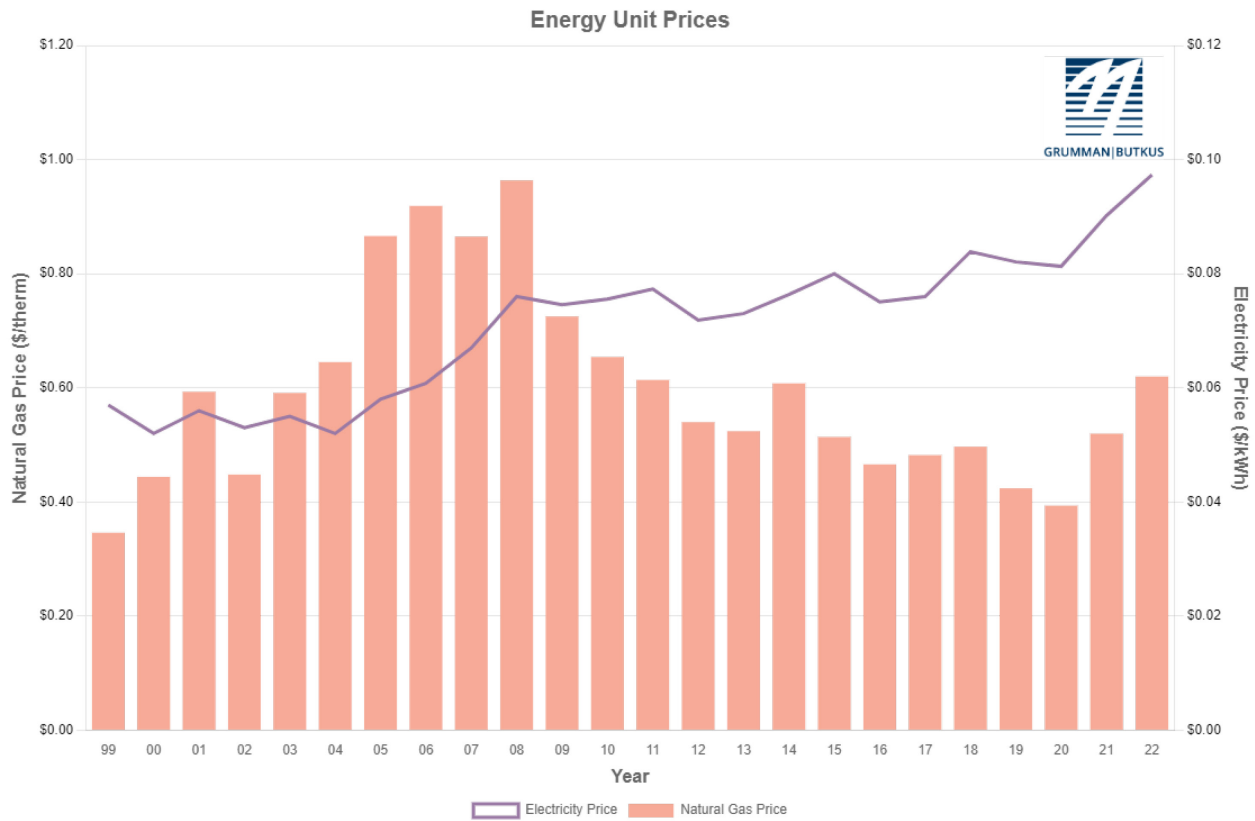
UTILITY COST TRENDS

Hospitals have generally improved their efficiency since the inception of the GBA survey, helping to offset increasing utility rates. Total energy use (Btu/square foot) has declined since 2008, but energy costs (\$/square foot) have fluctuated. Energy use slightly increased while costs sharply increased from 2021 to 2022 (chart, below).

The average hospital's energy cost has increased. However, an individual facility may see a decrease from year to year if energy efficiency improvements have been made.



As illustrated in the following graph, electricity costs (purple line) have had the heaviest influence on rising energy costs over the past decade, holding steady or rising most years even as natural gas prices (orange columns) fall. Natural gas price in 2022 has risen yet again and is at its highest since 2011. Electricity price has increased from 2018 to 2022 at a similar pace to 2004 to 2008 and is now almost \$0.10 per kWh. In 2022, the average hospital spent almost three times as much on electricity (\$2.78/square foot) as natural gas (\$0.98/square foot).



WATER AND SEWER DATA

Also included in the survey is data on water and sewer usage and costs. Initially, our survey only tracked energy. We began tracking water usage and costs in 2006. This addition reflects our understanding that water and energy use are inextricably linked, and the growing importance of water as an environmental concern.

Reducing water consumption saves energy:

- The extraction, treatment, and delivery of water accounts for as much as 15% of energy consumption in some parts of the country.
- Energy can account for as much as 80% of a typical water bill.

Reducing electricity and gas consumption saves water:

- Power plants use lots of fresh water (about 48 **trillion** gallons of water in 2020 per the American Public Power Association), and nearly half of that evaporates (per the latest U.S. Geological Survey water use report).
- The production of natural gas by hydraulic fracturing uses large quantities of water.

While costs for water and sewer are considerably less than those for electricity and natural gas, many parts of the country are experiencing price hikes. In fact, in recent years, water and sewer costs have risen much faster than the Consumer Price Index or energy costs.

In 2001, commercial customers using 100,000 gallons of water per month were paying an average of about \$180 for water and about \$275 for sewer. By 2020, those bills had risen to approximately \$575 and \$775, respectively.* This trend reflects not only the growing scarcity of this vital resource but also the cost to replace aging infrastructure. There are also new concerns about water quality (for example, the Flint, MI, lead scandal).

Water and sewer prices vary considerably depending on location. Among major metropolitan areas, a commercial customer in Milwaukee with 100,000 gallons of billable water usage would have a bill of just about \$509. But a commercial customer in Baltimore would pay about \$1,220 for the same level of usage. A Seattle customer would pay about \$2,400, and one in Atlanta would pay nearly \$3,000.**

*Source: "2021 50 Largest Cities Water and Wastewater Report", Black & Veatch Management Consulting

**Source: "50 Largest Cities Rate Survey 2016," Black & Veatch Management Consulting

The tables below summarize water usage and cost reported by our participants in 2021 and 2022; again, states with fewer than five participants are not shown in the tables.

CY2021 WATER USAGE AND COST SUMMARY

STATISTICS	WATER			
	SAMPLE MEAN	GAL/SF	\$/SF	\$/KGAL
Overall (61)	41.9	\$0.46	\$10.90	
Illinois (22)	45.4	\$0.43	\$9.50	
New Jersey (12)	42.4	\$0.45	\$10.72	
Wisconsin (5)	38.0	\$0.34	\$9.00	

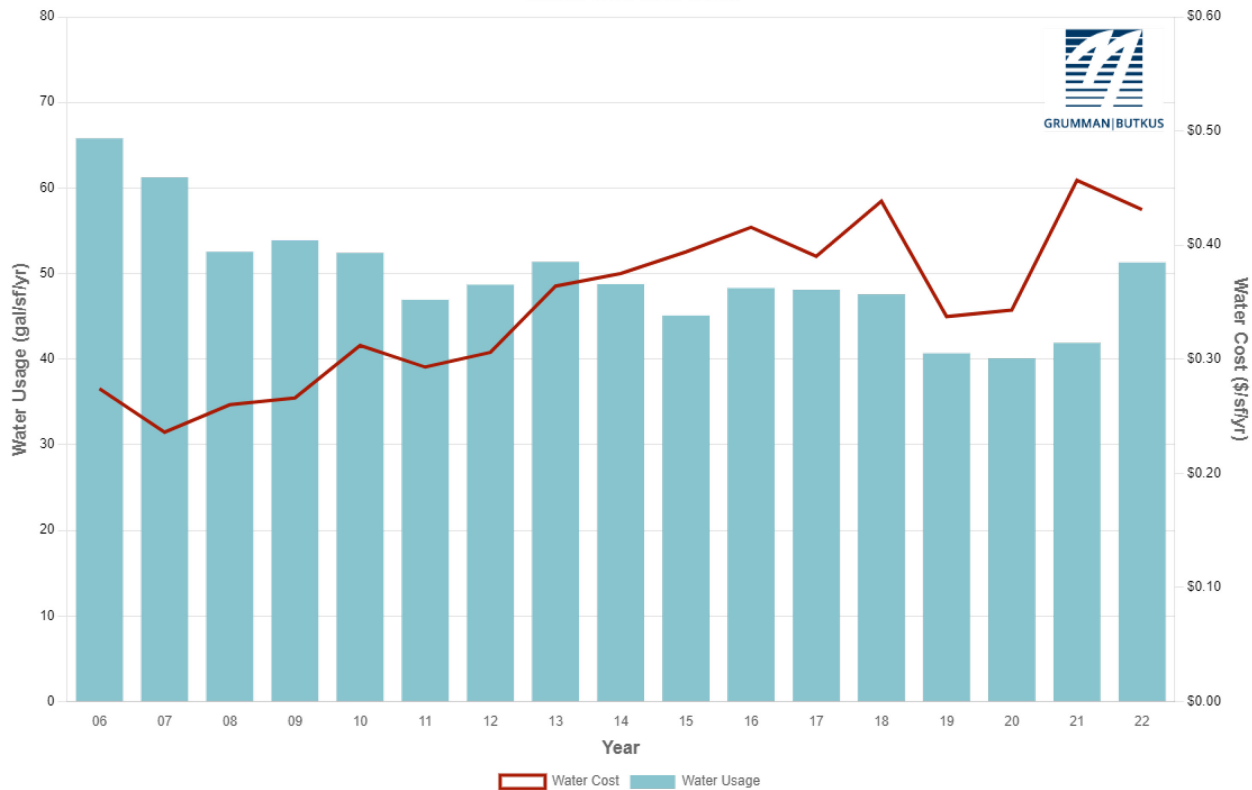
CY2022 WATER USAGE AND COST SUMMARY

STATISTICS	WATER			
	SAMPLE MEAN	GAL/SF	\$/SF	\$/KGAL
Overall (63)	51.3	\$0.43	\$8.73	
Illinois (20)	44.2	\$0.40	\$9.01	
Nevada (15)	73.6	\$0.29	\$3.91	
Wisconsin (14)	34.9	\$0.32	\$9.08	
New Jersey (8)	76.7	\$0.62	\$8.08	

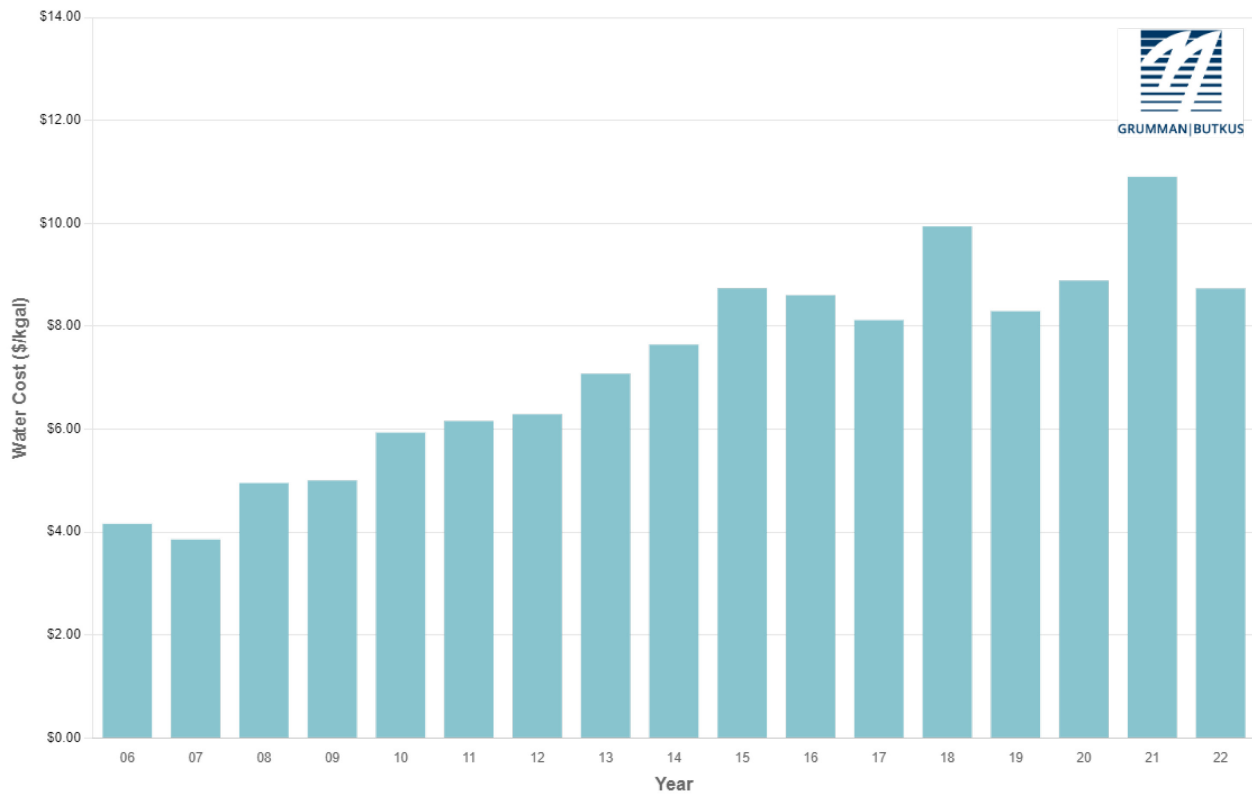
The water usage trends chart below indicates that hospitals have steadily been reducing their water consumption since 2006. However, water use in our survey has sharply increased in 2022, potentially due to the inclusion of facilities that do not usually participate. Water costs have generally increased on a \$/sf/year basis, with the pattern especially evident since 2011.

Hospitals spent \$0.43 per square foot (10% of utility costs) on water/sewer in 2022, compared with \$0.27 per square foot in 2006 (8% of utility costs). Water and sewer utility prices have steadily risen since 2006 and are expected to continue to rise.

Water Use and Cost



Water Unit Prices

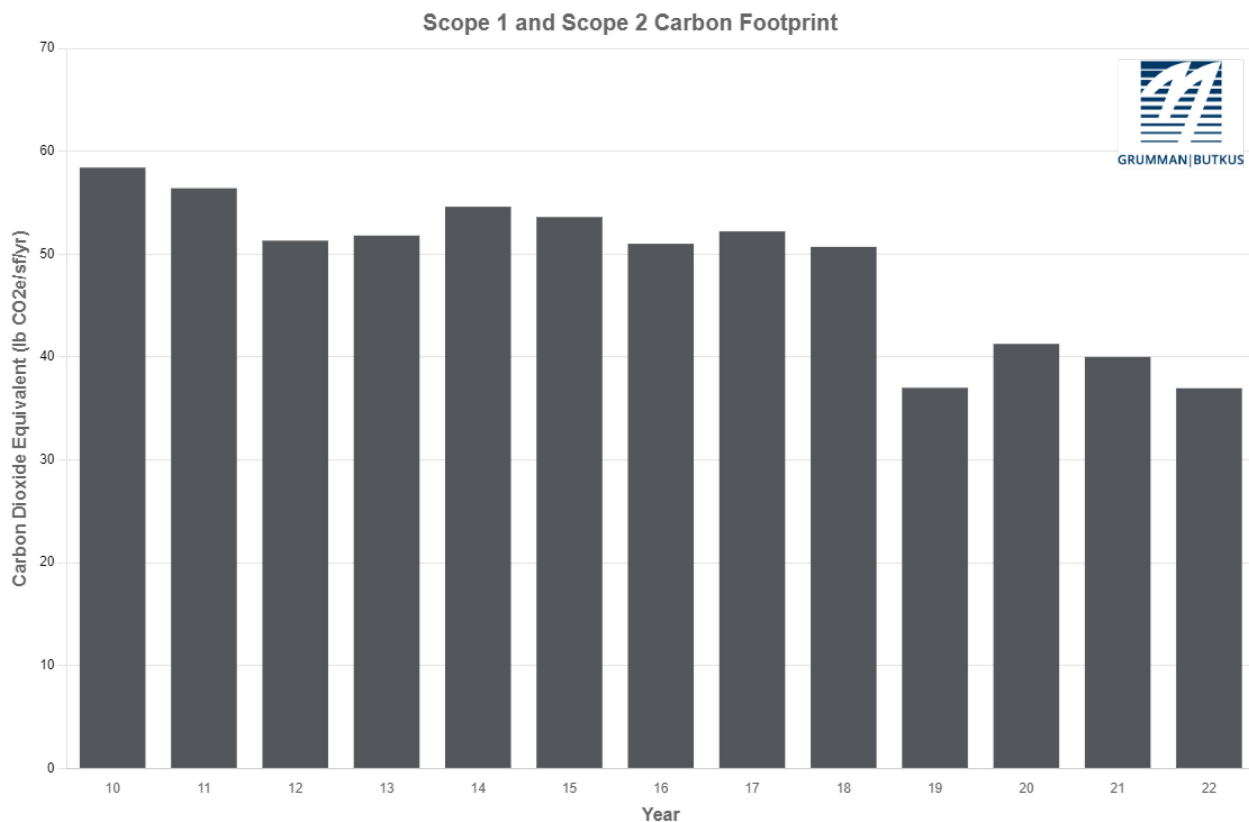


CARBON FOOTPRINT

In 2008, based on world sentiment for more regulatory emphasis on greenhouse gas emissions, GBA started including a chart to show carbon footprint attributable to survey respondents' utility use. The graph below presents the normalized carbon dioxide equivalent for survey respondents based on state average emissions factors for electricity purchases from the EPA's Emissions and Generation Resource Integrated Database (eGRID) and EPA standard factors for combustion equipment.

CO₂ footprint in 2022 is the lowest it has been since GBA started reporting on carbon emissions. Carbon output reductions are mostly related to changes in the electric grid. CO₂ emissions from the electric power sector declined by 7% (115 MMmt) in 2023, making up 85% of net energy-related CO₂ emissions reductions observed over the year. (Source: U.S. EIA, 04/25/2024.)

As in prior years, the survey results indicated quite a diverse carbon footprint among our participating facilities, with most falling into the 30 to 50 pounds per square foot per year range. The location of participating facilities changes each year, so variations in the average carbon footprint and wide carbon footprint ranges are expected in this survey.



To meet the United States' ambitious carbon reduction goals, hospitals will have to achieve much more significant reductions in the near term. The reduction goals are 26-28% carbon emissions below 2005 levels by 2025, 50-52% below 2005 levels by 2030, and net-zero carbon emissions by 2050. These reductions can only be achieved by implementing larger and more costly retrofits of existing buildings. The drive to de-carbonize will also require building owners to embrace fuel switching to renewable-based energy sources. Many leading healthcare systems are implementing on-site renewables (usually solar photovoltaic systems), as well as off-site renewables, often funded through Power Purchase Agreements (PPA) to purchase some or all of their electricity.

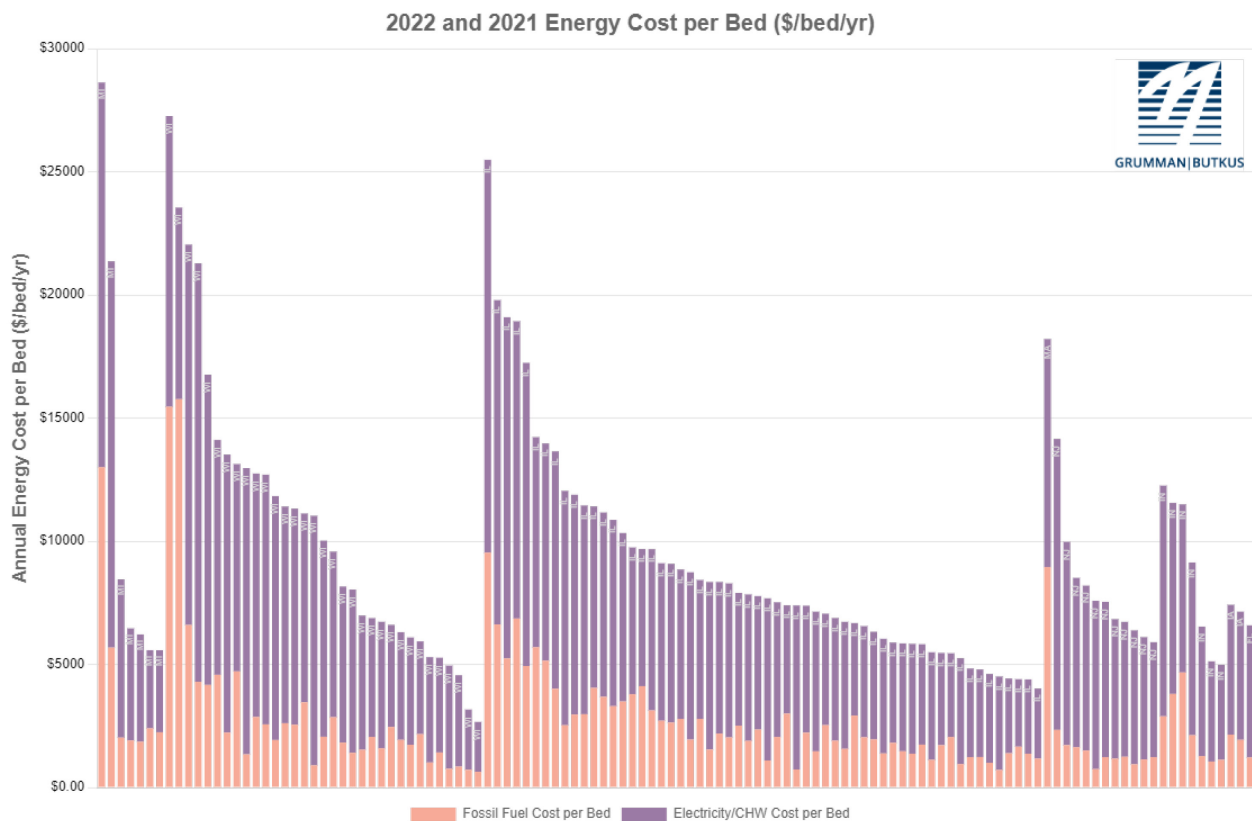
ENERGY AND WATER COSTS PER BED

Another comparison provided with the Hospital Energy and Water Benchmarking Survey is a comparison of energy cost per staffed bed for responding hospitals.

A number of factors contribute to the differences in cost per bed for each group of hospitals:

- Varying fuel prices in each state
- Varying state ventilation requirements
- Relative bed density

Respondents to the 2022 and 2023 Hospital Energy Surveys represent over 126 million square feet of facilities, with over 28,000 staffed beds reported. The average cost for all utilities (excluding water) was \$10,900 per staffed bed for respondents from all states that included bed counts. The chart below shows individual facilities' utility costs (excluding water) per staffed bed, sorted by state.



For respondents that included water data, the average water/sewer cost per staffed bed was \$1,550 per staffed bed.

As with carbon footprint, annual energy cost per bed varied widely, from a high of over \$35,000 to a low of just under \$4,400.

BENCHMARKING: STEP 1 TOWARD A COMPREHENSIVE ENERGY MANAGEMENT PLAN

Tracking and benchmarking your hospital's energy use is just the first step in establishing a comprehensive energy management program. What must be addressed in a comprehensive approach?

- Utility tracking
- Benchmarking
- Managing energy purchases / supply side
- Operations and maintenance
- Retro-commissioning (RCx)
- Retrofit of existing building systems/equipment
- Building infrastructure planning process integrating energy efficiency
- Ambitious targets for energy performance of new buildings, major additions, and renovations
- Commissioning and monitoring-based commissioning (Cx and MBCx)
- Equipment purchasing policies incorporating life cycle costing
- Maximize grants and rebate opportunities to help pay for projects
- Maximize recognition opportunities to increase internal/external support
- Explore alternative financing options to find energy/water efficiency and sustainability initiatives

GBA has been helping hospitals develop and manage their energy management programs for more than 40 years. Please call us at 847.328.3555 if we can assist you in your efforts, or email Dan Doyle at ddoyle@grummanbutkus.com.

Again, the energy-and water-use and cost charts can be viewed online:

- 2023 report charts: https://www.trendsumo-gba.com/survey/report_charts/2023
- Historical charts: https://www.trendsumo-gba.com/survey/historical_charts

For information about participating in the 2024 edition of the survey (2023 data), visit <https://grummanbutkus.com/hospital-energy-water-survey/>.